

Energy Use Profile for NORWALK COMMUNITY COLLEGE

Benchmarking 2016



Photo Credit: Norwalk Community College

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 INCLUDING NORWALK COMMUNITY COLLEGE, 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 **Norwalk 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 Norwalk Community College specifically.

KEY FINDINGS

81%



of Norwalk Community College's annual total energy cost in 2016 was for electricity, even though only 47% of its total energy was supplied by electricity.

7%

more energy (as measured in site energy use intensity) is being used by Norwalk Community College in 2016, as compared to 2014.

\$109,650

in annual potential savings could be realized if Norwalk 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

Norwalk Community College is comprised of two main buildings, East and West Campus. These buildings are used primarily for classrooms and faculty and staff offices. In 2011, West Campus building

underwent some renovations. Norwalk Community College’s gross area is 350,765 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—West Campus, and (2) the green circle—East Campus. Electricity, and natural gas are sub-metered by these two campus areas.

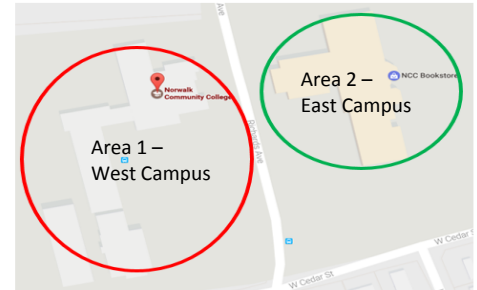


Figure 1. Campus Map of Norwalk Community College.

Finding 1

Between 2014 and 2016, energy use increased by 7% for Norwalk 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/ft² (See **Methods** for source).

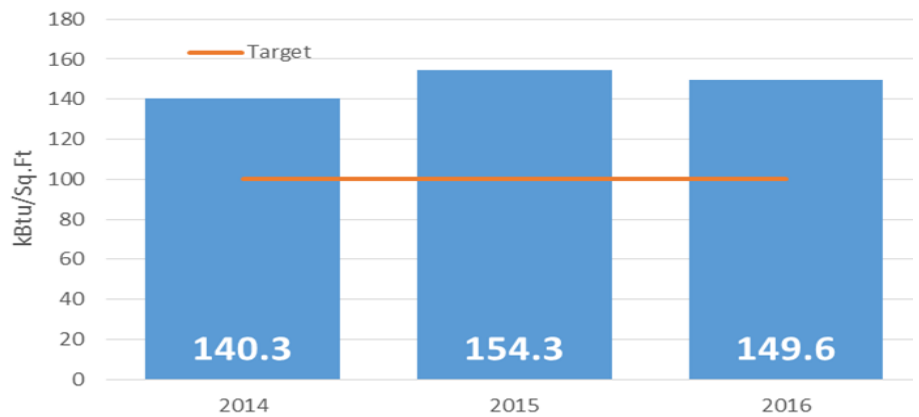


Figure 2. Building energy performance (site EUI) by calendar year from 2014 to 2016 (in blue) and a proposed energy use target (in orange) for Norwalk Community College. The target reflects a 10% reduction in energy use from 2016 use.

Norwalk Community College’s site EUI is currently significantly above the Connecticut average, at 149.6 kBtu/ft², indicating lower 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 half of Norwalk Community College’s total energy use but 81% of its total energy costs in 2016.

From October 2015 to September 2016, Norwalk Community College’s total campus energy consumption was split between electricity, natural gas and fuel oil (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 81% 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.

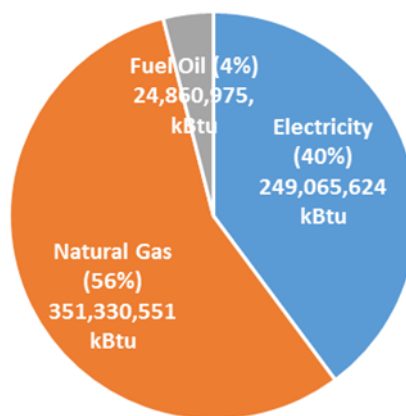


Figure 3. 2016 energy consumption by energy source for Norwalk Community College.

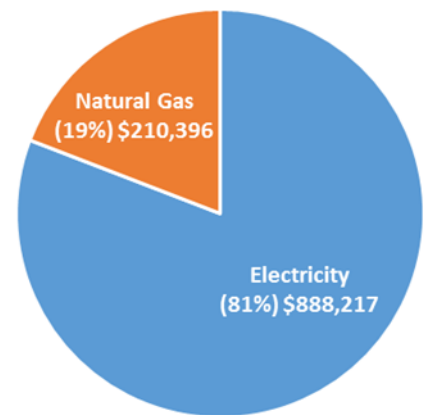


Figure 4. 2016 energy cost for Norwalk Community College. (*Fuel oil cost data was not available, so is not included in the above pie chart).

Finding 3

Norwalk Community College has the potential to save up to \$109,650 per year, if building energy use is reduced by 10%.

In 2014, Norwalk Community College spent \$3.00 per square foot on its energy costs, including electricity and natural gas, versus \$3.13 in 2016 (see **Figure 5**). If Norwalk reduced its energy use by 10% below 2016 levels, the cost per square foot would drop to \$2.81, resulting in potential savings of up to \$109,650 per year, assuming energy prices remained constant.

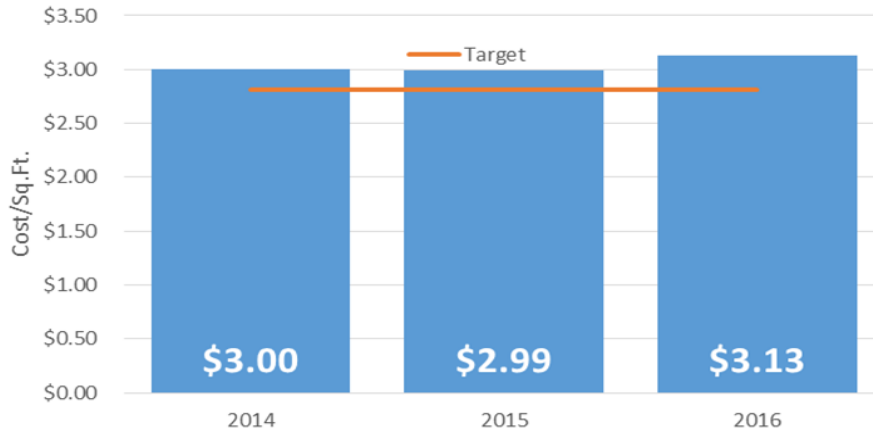


Figure 5. Energy cost per square foot for Norwalk Community College from 2014 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use. (The cost data above does not include fuel oil cost, which was unavailable).

Finding 4

Electricity use at Norwalk Community College varied between 342,000 kWh and 763,000 kWh over the course of the year, with peaks typically occurring in summer months.

Detailed electricity use data is available for Norwalk Community College from January 2014 to October 2016 (see **Figure 6**). In general, electricity use typically peaked in August, successively increasing each year, with the highest annual peak occurring in August 2016 at 762,961 kWh. Of the annual data available thus far for full calendar years, electricity use was highest in 2015.

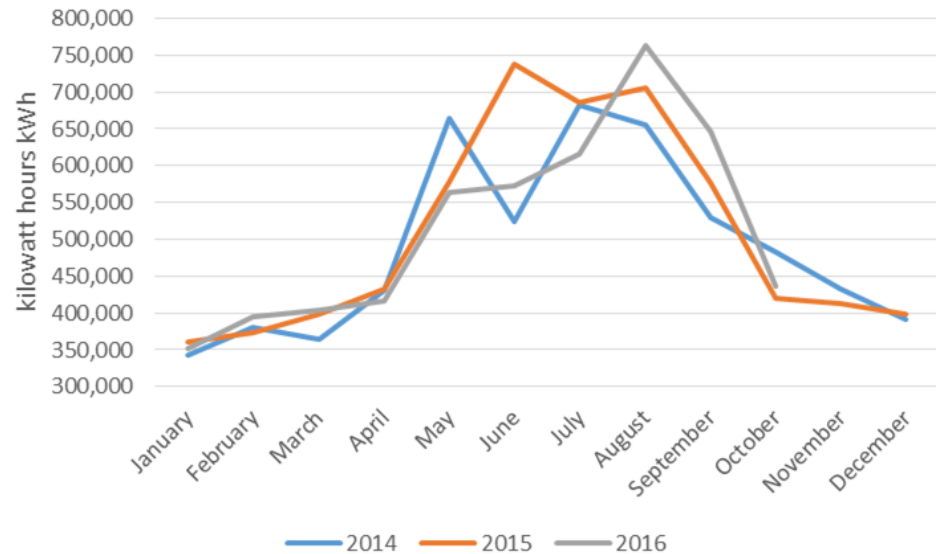


Figure 6. Monthly electricity use (in kilowatt hours) for Norwalk Community College from January 2014 to July 2016.

Finding 5

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

Detailed natural gas use data is available for Norwalk Community College from January 2015 to September 2016 (see **Figure 7**). Natural gas use is lower during the months of May through September, although natural gas use continues during this time. Annually, natural gas use climbs steadily through the fall as outside temperature drops, peaking at an average of 40,000 ccf in January, and declines through late winter and early spring.

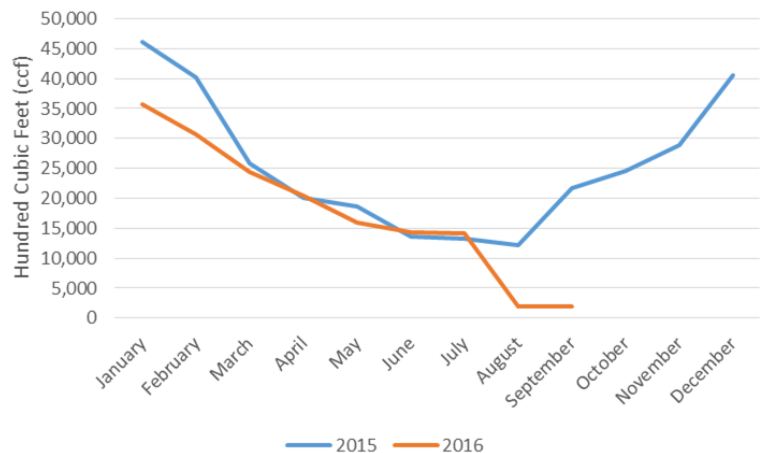


Figure 7. Monthly natural gas use (by hundred cubic feet) for Norwalk Community College from January 2015 to September 2016.

Area 1 Findings: West Campus Building

Building Information

West Campus Building at Norwalk Community College has a total gross area of 214,009 square feet. It was built in 1961, with renovations in 2011. West Campus Building contains classrooms spaces, computer labs, and exercise rooms and labs. West Campus Building has its own electric and natural gas meters. The findings below show energy use for this building alone.

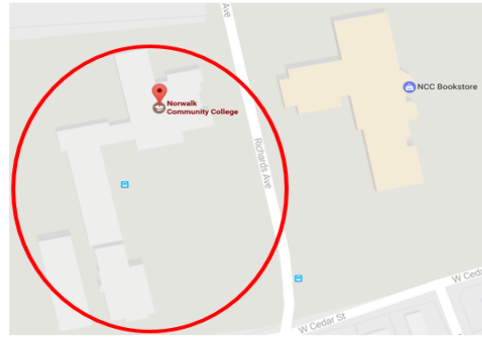


Figure 8. Campus Map of Norwalk Community College. The red area, or Area 1 (see Figure 1) includes the West Campus Building.

Finding 6

Between 2014 and 2016, energy use decreased slightly for West Campus Building.

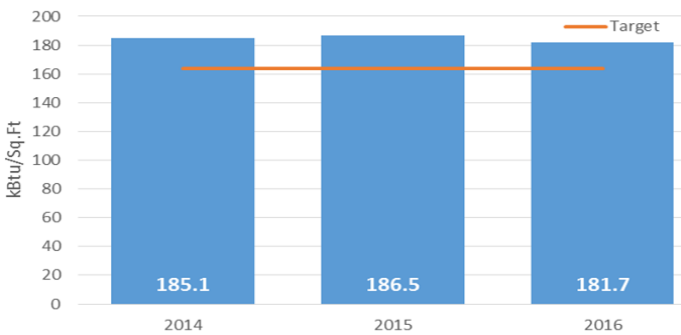


Figure 9. West Campus building energy performance (site EUI) by calendar year from 2014 to 2016 (in blue) and a proposed energy use target (in orange) for West Campus. The target reflects a 10% reduction in energy use from 2016 use.

Finding 7

West Campus Building has the potential to save up to \$75,500 per year, if building energy use is

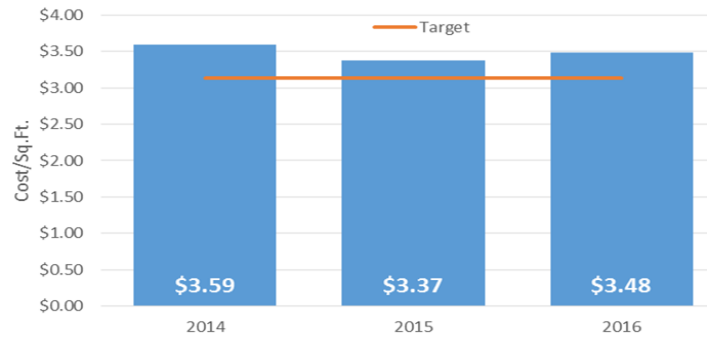


Figure 10. Energy cost per square foot for West Campus building 2014 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use.

Finding 8

Electricity accounted for 35% of West Campus Building's total energy use and 78% of its total energy costs in 2016.

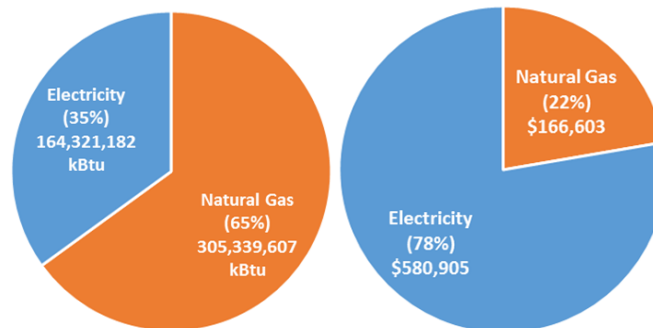


Figure 11 (left pie chart). 2016 energy consumption by energy source for West Campus Building.

Figure 12 (right pie chart). 2016 energy cost for West Campus Building.

Finding 9

Electricity use at West Campus Building varied between 200,000 kWh and 550,000 kWh over the course of the year, with peaks occurring in the summer months.

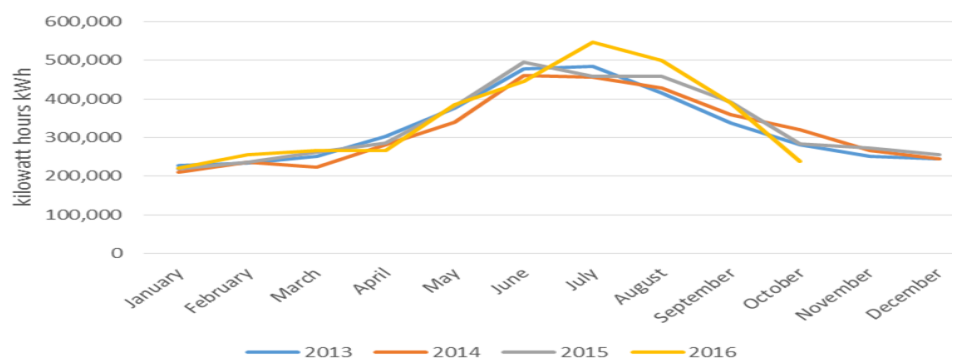
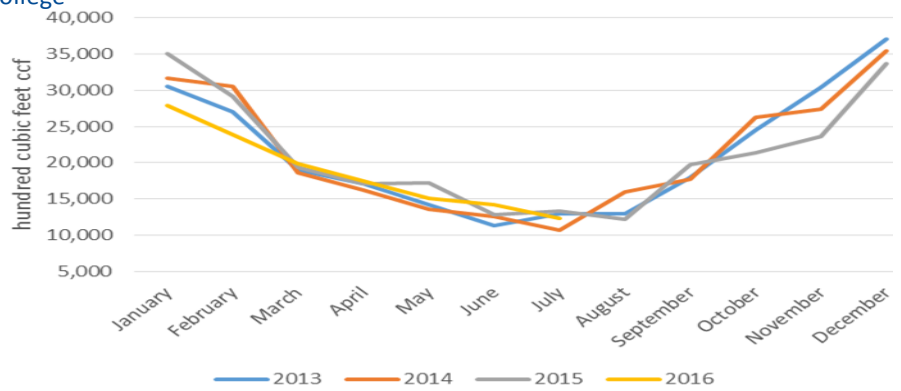


Figure 13. Monthly electricity use (in kilowatt hours) for West Campus Building from January 2013 to October 2016.

Finding 10

Natural gas use at West Campus Building varied seasonally with building heating needs.

Figure 14 (right). Monthly natural gas use (by hundred cubic feet) for West Campus from January 2013 to July 2016.



Area 2 Findings: East Campus Building

Building Information

East Campus Building at Norwalk Community College, built in 1990, has a total gross area of 136,756 square feet. East Campus Building includes staff and faculty departmental offices and classrooms. East Campus Building has its own electric and natural gas meters. The findings below show energy use for this building alone.

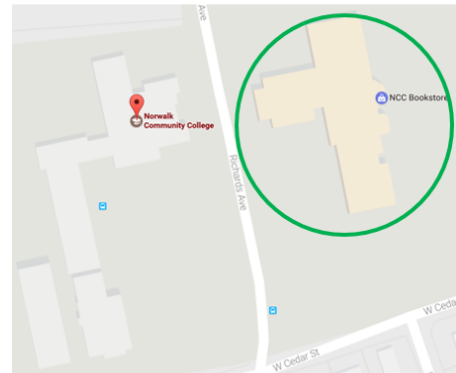


Figure 15. Campus Map of Norwalk Community College. The green area, or Area 2 (see Figure 1) includes the East Campus Building.

Finding 11

Between 2014 and 2016, energy use increased by 66% for East Campus Building.

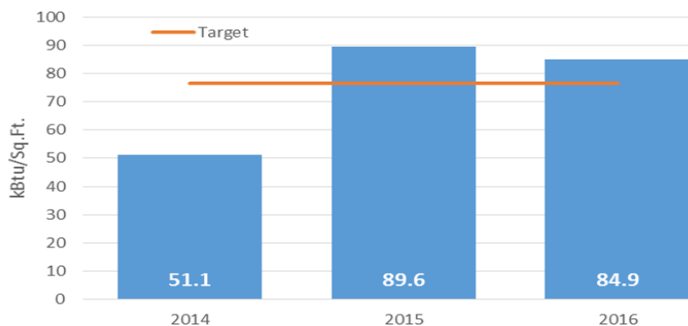


Figure 16. Building energy performance (site EUI) by calendar year from 2014 to 2016 (in blue) and a proposed energy use target (in orange) for East Campus Building. The target reflects a 10% reduction in energy use from 2016 use.

Finding 12

East Campus Building has the potential to save up to \$35,140 per year, if building energy use is reduced by 10%.

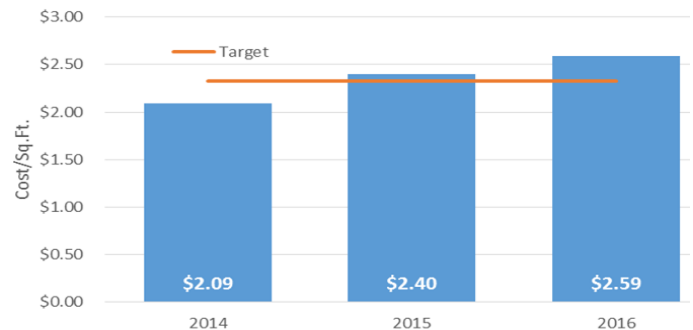


Figure 17. Energy cost per square foot for East Campus Building from 2014 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use.

Finding 13

Electricity accounted for 65% of the East Campus Building's total energy use but 88% of its total energy costs in 2016.

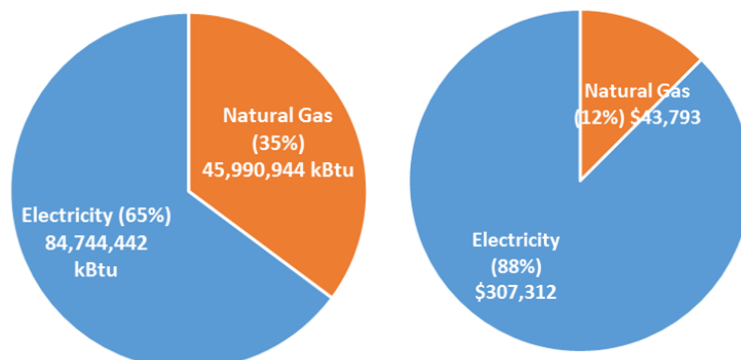
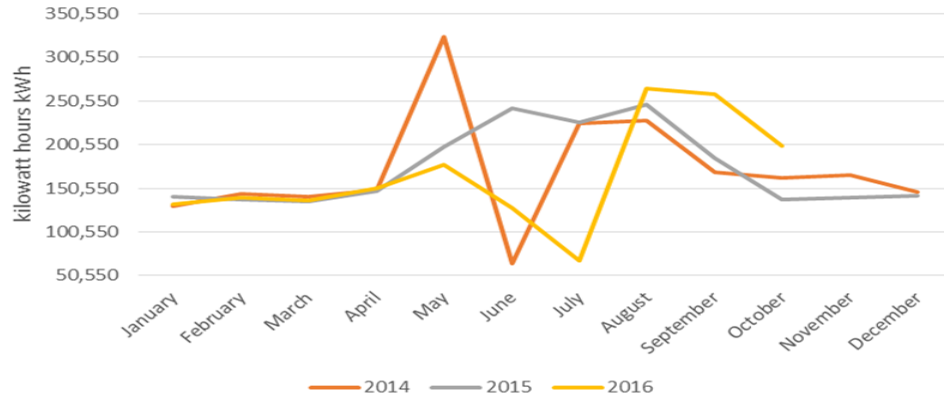


Figure 18 (left pie chart). 2016 energy consumption by energy source for East Campus Building. **Figure 19 (right pie chart).** 2016 energy cost for East Campus Building.

Finding 14

Electricity use at East Campus Building varied between 52,000 kWh and 330,000 kWh over the course of the year. In general, electricity use was highest in the summer.

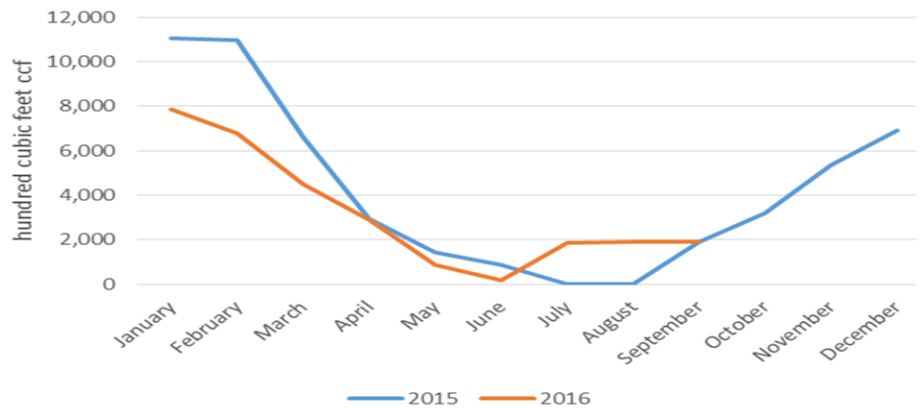
Figure 20 (right). Monthly electricity use (in kilowatt hours) for East Campus Building from January 2014 to October 2016.



Finding 15

Natural gas use at East Campus Building varied seasonally with building heating needs.

Figure 21 (right). Monthly natural gas use (by hundred cubic feet) for East Campus Building from January 2015 to September 2016.



Next Steps

Energy use and 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:

- With increasing energy use at Norwalk Community College from 2014 to 2016 (see **Figure 2**) 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.
- The peaks of electricity use in the summer months (see **Figure 6**) and natural gas use in the winter months (see **Figure 7**) suggest that Norwalk Community College could consider assessing building use, relative to energy expenditures, as well as more strategic energy management.
- Norwalk 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.

- Norwalk Community College should explore opportunities for solar energy, which could further reduce energy costs.
- West Campus Building uses more than double the energy on a square foot basis than East Campus Building. Norwalk Community College should focus on energy audits and identifying energy savings measures at West Campus Building.

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.

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.

This report suggests an initial energy savings target of 10%. This report further references an average site EUI of 101 kBtu/ft² 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 Norwalk 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



This report was prepared with the support of the Energy Efficiency Fund and Energize Connecticut. Energize Connecticut, supported with funding from a charge on customer energy bills, promotes cost and energy savings through home and business rebates, financing and services for energy efficiency and clean energy improvements. www.energizect.com

