

Energy Use Profile for NORTHWESTERN COMMUNITY COLLEGE

Benchmarking 2016



Photo Credit: Northwestern Community College



Photo Credit: Northwestern 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 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 a

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 **Northwestern 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 Northwestern Community College specifically.

KEY FINDINGS

99%



of Northwestern Community College's total energy cost in 2016 was from electricity, presenting a unique opportunity to consider diversifying energy sources to optimize energy and cost savings.

\$34,150

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

Energy use (as measured in site energy use intensity) by Northwestern Community College was roughly the same in 2013 and 2016.



Northwestern Community College is comprised of a variety of buildings, including faculty and administrative offices. The total gross square feet of all buildings is 183,042. There are plans for an additional building with construction to begin in 2017.

Finding 1

Between 2013 and 2016, energy use was largely constant for Northwestern 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

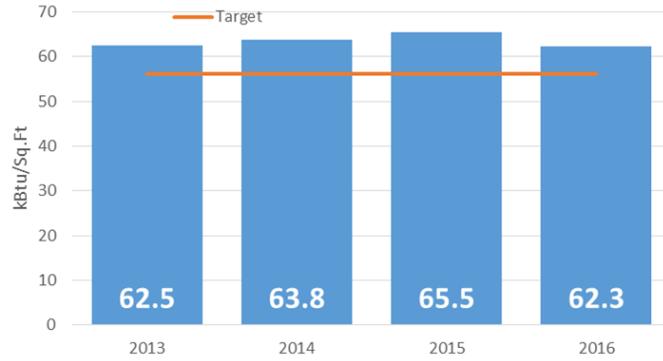


Figure 1. Building energy performance (site EUI) by calendar year from 2013 to 2016 (in blue) and a proposed energy use target (in orange) for Northwestern Community College. The target reflects a 10% reduction in energy use from 2016 use.

101 kBtu/ft² (See **Methods** for source). Northwestern Community College’s site EUI is currently below the Connecticut average, at 62.3 kBtu/ft, indicating better than average energy performance among Connecticut community colleges. However, from calendar year 2013 to calendar year

2016, site EUI was virtually unchanged from 62.5 to 62.3 kBtu/ft² (see **Figure 1**), suggesting opportunity for further reductions. This report sets forth a 10% reduction in energy use as an attainable further target.

Finding 2

Northwestern Community College has the potential to save up to \$34,150 per year, if building energy use is reduced by 10%.

In 2013, Northwestern Community College spent \$1.75 per square foot on its total energy costs (including electricity and natural gas) versus \$1.86 in 2016 (see **Figure 2**). If Northwestern reduced its energy use by 10%



Figure 2. Energy cost per square foot for Northwestern Community College from 2013 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use.

below 2016 levels, the cost per square foot would drop to \$1.67, resulting in potential

savings up to \$34,150 per year, assuming energy costs remained constant.

Finding 3

Electricity accounted for almost all of Northwestern Community College’s energy use and 91% of its energy costs in 2016.

From June 2015 to May 2016, Northwestern Community College used electricity and natural gas (see **Figure 3** for energy consumption by energy source). Northwestern is unique among Connecticut community colleges in its almost exclusive reliance (99%) on electricity for energy. Accordingly, electricity is also responsible for almost all of Northwestern Community College total energy costs (91%). Prioritizing actions that save electricity use,

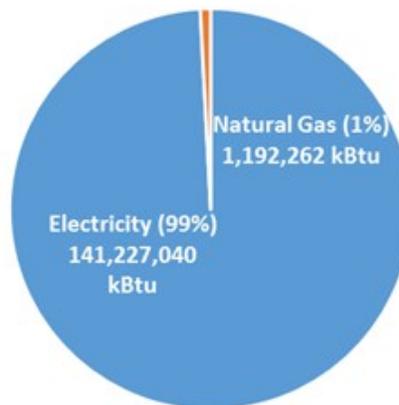


Figure 3. 2016 consumption by energy source for Northwestern Community College.

including exploring solar energy (see **Next Steps** in this report) affords Northwestern Community College a

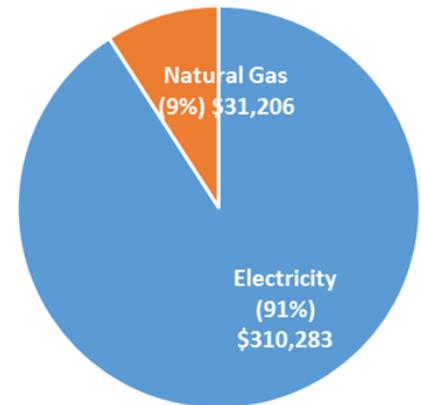


Figure 4. 2016 energy costs for Northwestern Community College.

unique opportunity to optimize energy cost savings.

Finding 4

Electricity use at Northwestern Community College varied between 151,000 kWh and 252,000 kWh over the course of the year, with peaks in the warmer months.

Detailed electricity use data are available for Northwestern Community College from January 2013 to August 2016 (see **Figure 5**). Specific trends vary by year, but across all years, usage

typically peaked in July, with the highest annual high occurring in July of 2013 at 258,008 kWh. Of the annual data available to date representing full calendar years, electricity use was the highest in 2013.

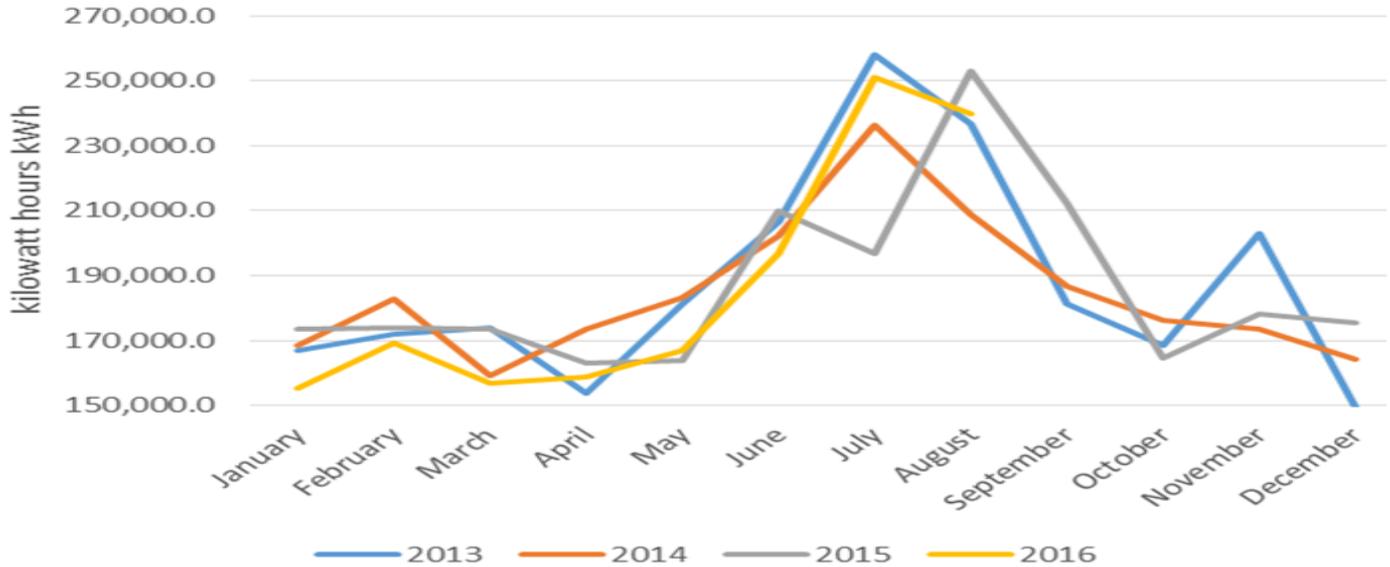


Figure 5. Monthly electric energy use (in kilowatt hours) for Northwestern Community College from January 2013 to August 2016.

Finding 5

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

Detailed natural gas use data is available

for Northwestern Community College from January 2013 to August 2016 (see **Figure 6**). Over that time frame, natural gas use is limited between April and August due to less demand for heating needs. Annually, natural gas use steadily climbs through the fall as

outside temperature drops, peaking at an average of 20,666 ccf in December and January each year, and declines through late winter and early spring. The highest reported annual use was for 2015, with a total of 122,907 ccf.

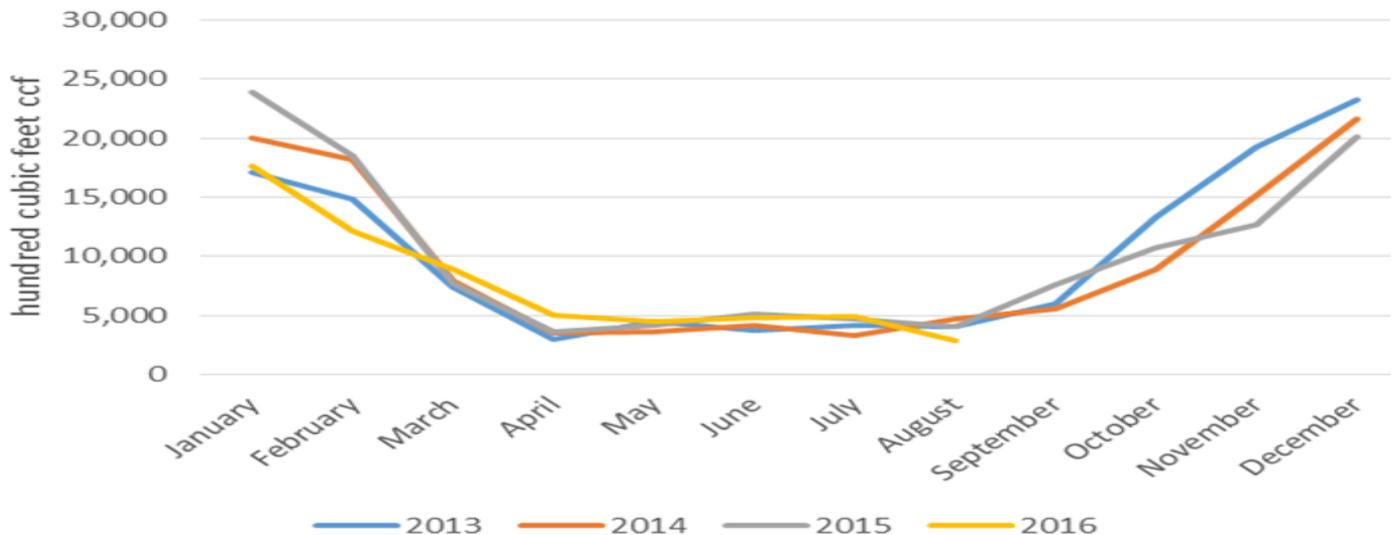


Figure 6. Monthly natural gas energy use (by hundred cubic feet) for Northwestern Community College from January 2013 to August 2016.

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:

- Northwestern Community College's largely unchanged energy use from 2013 to 2016 (see **Figure 1**) suggests 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 5**) and natural gas use in the winter months (see **Figure 6**) suggest opportunities to explore heating and cooling efficiencies to optimize energy cost relative to building use.
- Northwestern 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.

- Northwestern Community College should explore opportunities for solar energy, which could further reduce energy costs.

The CSCU Energy Master Plan (2016) 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, 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 Northwestern 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

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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



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