

Energy Use Profile for TUNXIS 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 - 12 community colleges and 4 state universities - provide opportunities to

approach sustainable energy management systematically 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 and water use benchmarking data for **Tunxis 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 Tunxis Community College specifically.

KEY FINDINGS

94%



of Tunxis Community College's annual total energy cost in 2015 was for electricity.

\$77,170

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

Energy use (as measured in site energy use intensity) by Tunxis increased slightly from 2013 to 2016.



Tunxis Community College is comprised of seven buildings in total, of which four are connected. All buildings contain classroom and office spaces. Its existing gross area is 258,099 square feet.

Finding 1

Between 2013 and 2015, energy use increased by 1.7% for Tunxis 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).

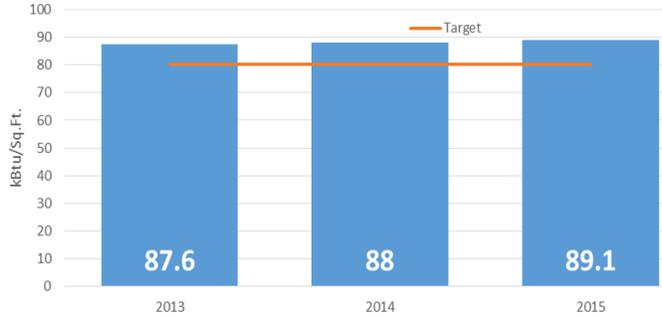


Figure 1. Building energy performance (site EUI) by calendar year from 2013 to 2015 (in blue) and a proposed energy use target (in orange) for Tunxis Community College. The target reflects a 10% reduction in energy use from 2015 use.

Tunxis Community College’s site EUI is currently below the Connecticut average, at 89.1 kBtu/ft², indicating better than average energy performance among Connecticut community colleges. However, from 2013 to 2015, site EUI increased from

87.6 to 89.1 kBtu/ft² (see **Figure 1**), representing a 1.7% increase. This occurred at a time when many community colleges are decreasing energy use. This report sets forth a 10% reduction in energy use as an attainable further target.

Finding 2

Electricity accounted for 73% of Tunxis Community College’s total energy use and 94% of its total energy costs in 2015.

From October 2014 to September 2015, Tunxis Community College’s total campus energy consumption was split between electricity, natural gas and fuel oil (see **Figure 2** for energy consumption by energy source). However, due to the relatively higher cost per Btu of electricity during this period, and accounted for 94% of the total costs (see **Figure 3**). In order to optimize cost savings, the college might consider prioritizing actions that reduce

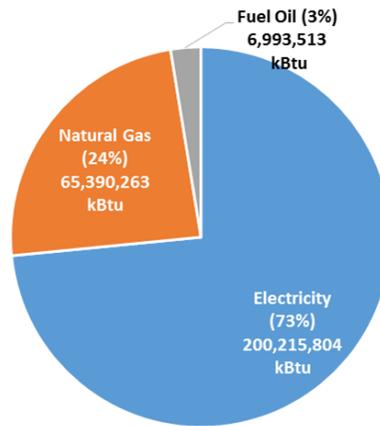


Figure 2. 2016 energy consumption by energy source for Tunxis Community College.

electricity use (see **Next Steps** in this report), with the understanding that energy prices vary over time and that

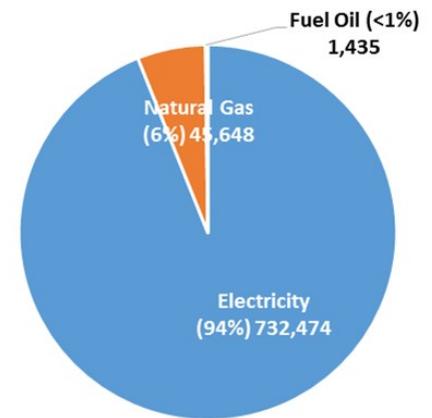


Figure 3. 2016 energy costs for Tunxis Community College.

both electricity, natural gas and fuel oil prices may vary year to year.

Finding 3

Tunxis has the potential to save up to \$77,170 per year, if building energy use is reduced by 10%.

In 2013, Tunxis Community College spent \$2.56 per square foot on its total energy costs (including electricity and gas) versus \$2.99 in 2015 (see **Figure 4**). If Tunxis reduced annual energy use by 10% from 2015 levels, the cost per



Figure 4. Energy cost per square foot for Tunxis Community College from 2013 to 2015 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use.

square foot would drop to \$2.56 resulting in potential savings up to

\$77,170 per year, assuming energy prices remained constant.

Finding 4

Electricity use at Tunxis Community College varied between 285,000 kWh and 581,000 kWh, though it is relatively consistent from year to year.

Detailed electricity use data is available for Tunxis Community College from January 2013 to August 2016 (see **Figure 5**). Over that time frame, electricity use was lowest in January with an average use of 318,000 kWh each year, and highest in July.

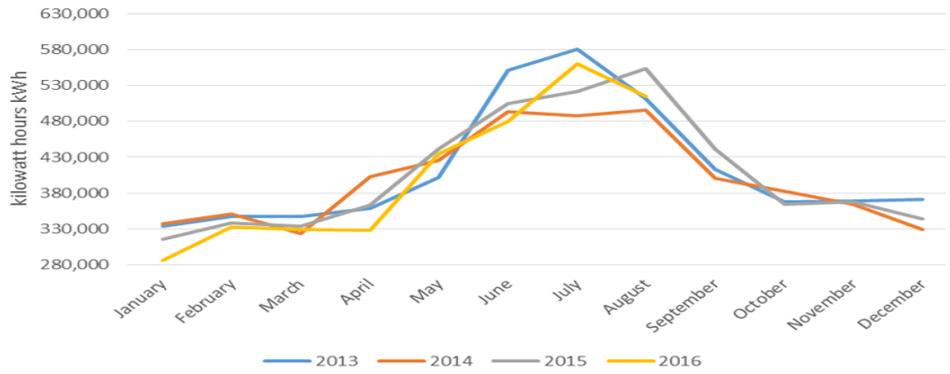


Figure 5. Monthly electric energy use (in kilowatt hours) for Tunxis Community College from January 2013 to August 2016.

Finding 5

Natural gas use at Tunxis Community College varied seasonally, with lowest use in the summer months and use peaking in the winter months.

Detailed natural gas use data is available for Tunxis Community College from January 2013 to October 2015 (see **Figure 6**). Over that time frame, there is little natural gas used between June and October each year.

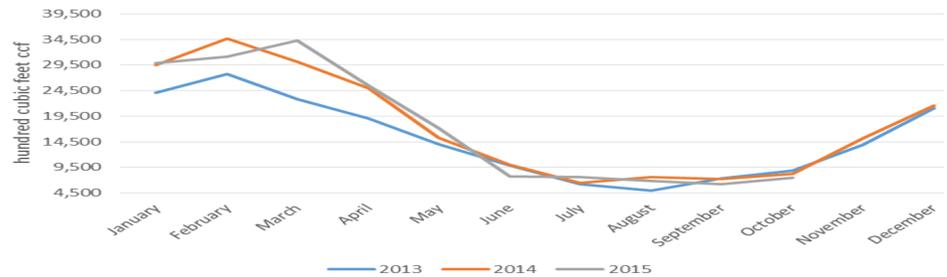


Figure 6. Monthly natural gas energy use (hundred cubic feet) for Tunxis Community College from January 2013 to October 2015.

Annually, natural gas use steadily climbs through the fall peaking between 25,000 and

35,000 ccf in February each year and steadily declines through late winter and early spring.

Finding 6

Water use at Tunxis Community College varied over the course of each year, with peaks of up to 255,000 gallons.

Detailed water use data is available for Tunxis Community College from January 2013 to October 2015 (see **Figure 7**). Annual costs of water at Tunxis Community College are around \$12,000.

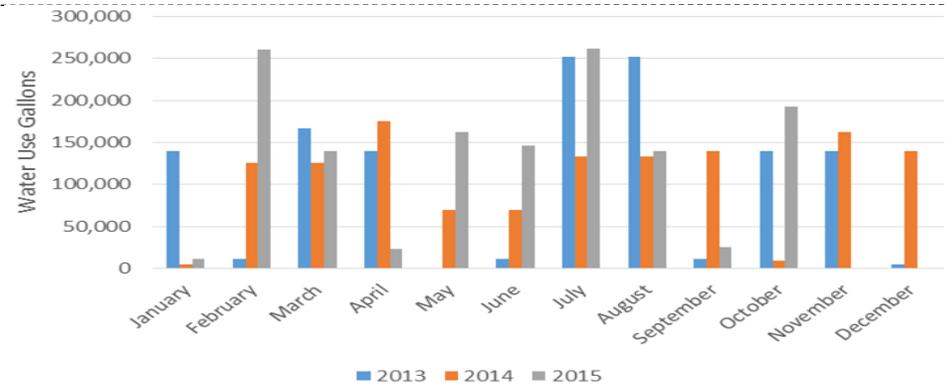


Figure 7. Monthly water use (in gallons) for Tunxis Community College 2013-2015.

Finding 7

Fuel oil use at Tunxis Community College varied seasonally over the course of each year, peaking at 1,200 gallons per month.

Detailed fuel oil use data is available for Tunxis Community College from January 2013 to October 2015 (see **Figure 8**). Over that time frame, fuel oil use was lowest between June and October corresponding with low building heating needs.

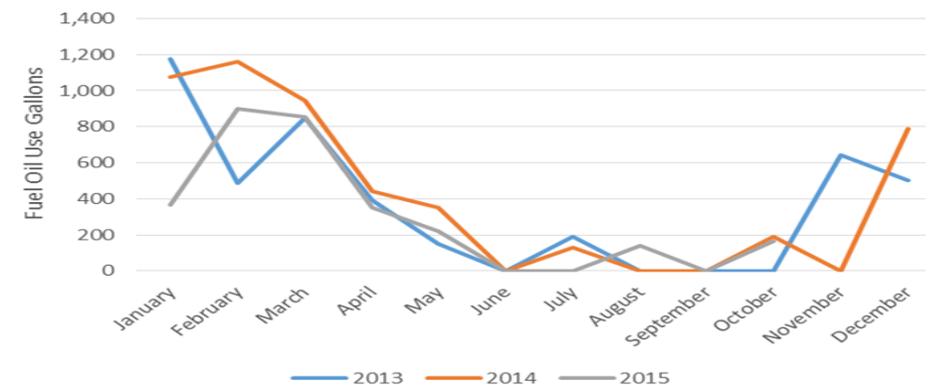


Figure 8. Monthly fuel oil use (in gallons) for Tunxis Community College 2013-2015.



Next Steps

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

- Tunxis Community College saw an increase in energy use from 2013 to 2015 (see **Figure 1**), indicating 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 seasonal variations in energy use, relative to building use.
- Tunxis 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.

- Tunxis Community College should explore opportunities for solar energy, which could further reduce energy costs.
- Tunxis Community College should also continue to track water use and identify opportunities for water efficiency.

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. Water data was self-reported by Tunxis 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/ft² for community colleges in Connecticut. The 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 college campuses 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 Tunxis 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 October 2015, and annual data is reported by calendar year. Further, in Figure 1, the most recent year of data shown is not for a calendar year. Rather, it represents a full year data, going back from October 2015.

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



Prepared by the Institute for Sustainable Energy at Eastern Connecticut State University



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