MACALESTER COLLEGE

Fiscal Year 2024 – 2025

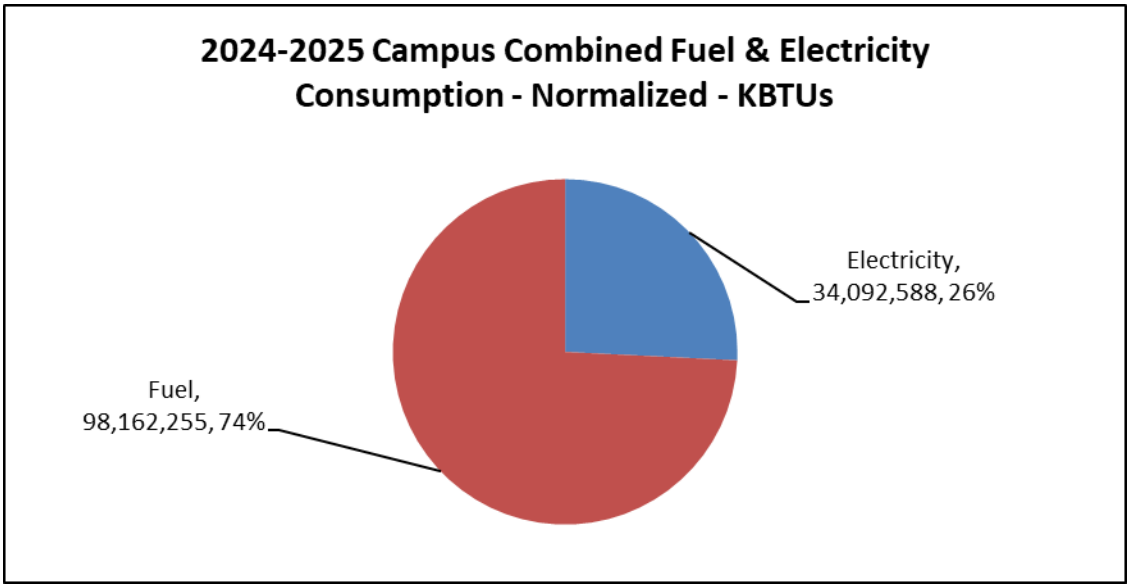
Campus Annual Energy Use Report

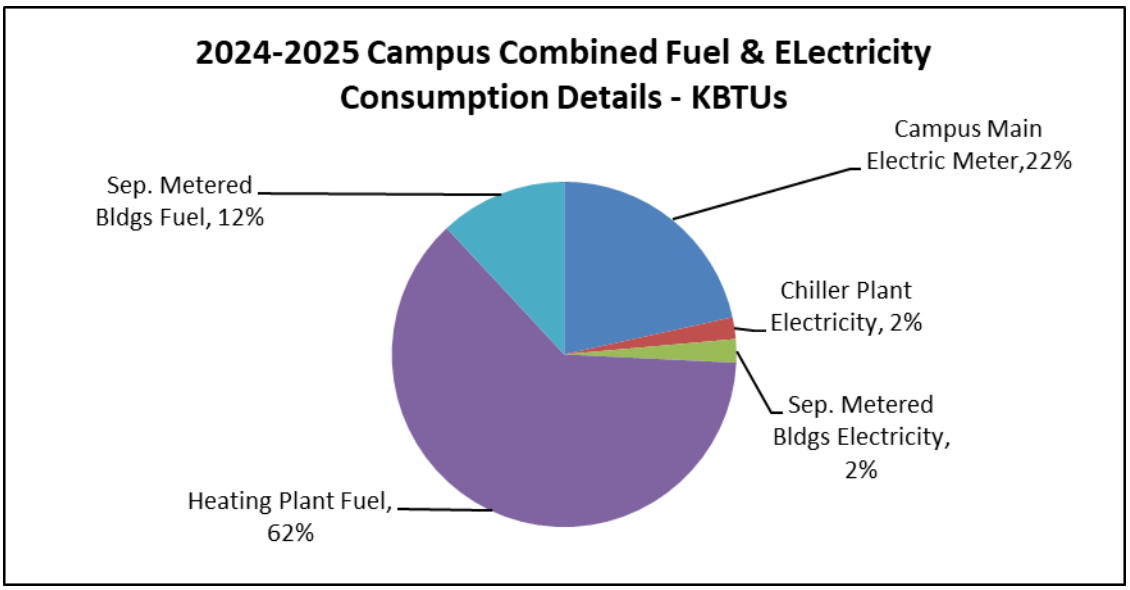
Contents

Fuel, Electricity, & Water Consumption

FY 2024-2025 Total Site Energy Consumption

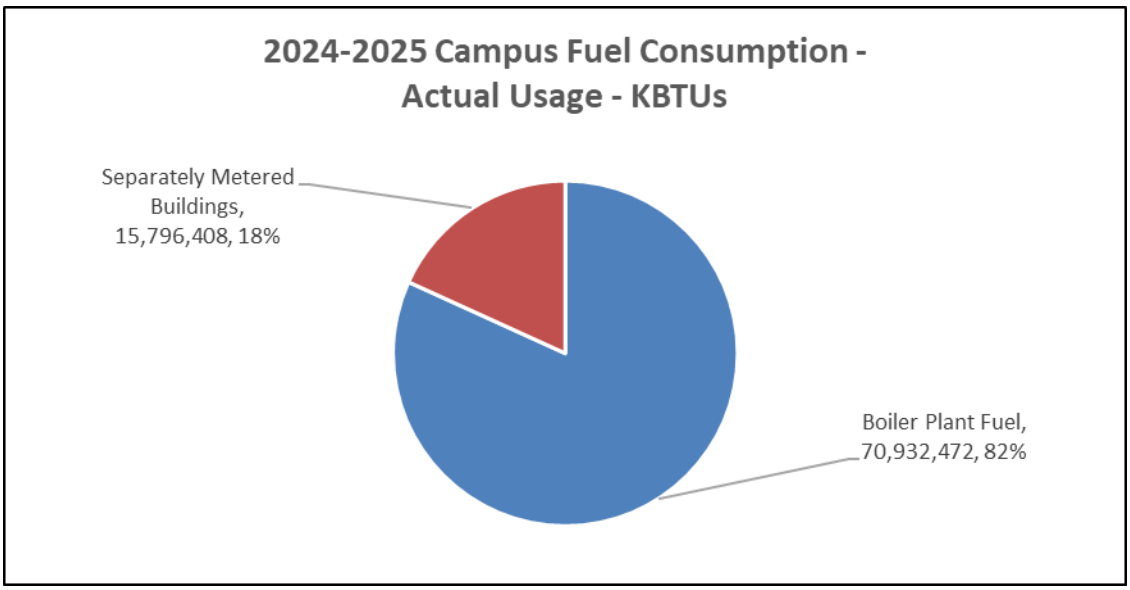
In fiscal year 2024-25, Macalester College consumed 132,254,843 kBTUs of energy on its campus. 74% of the energy was comprised of fuel (natural gas & #2 fuel oil) and the balance of the consumption was electricity usage. The largest single consumer of energy on campus was the heating plant – its fuel consumption accounted for 62% of the campus' total energy usage.



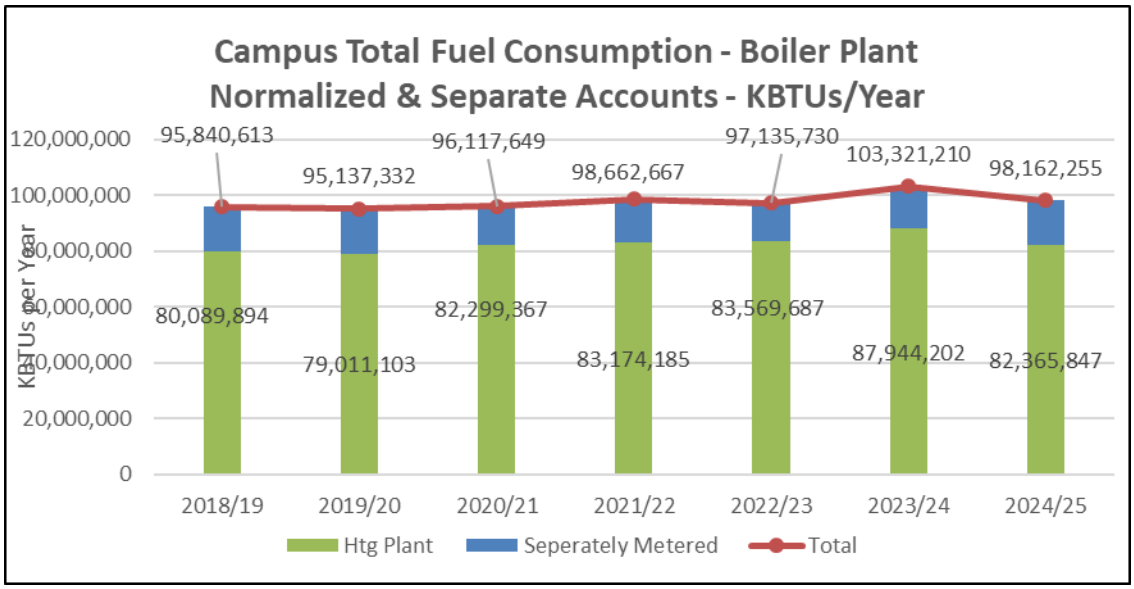


Fuel Energy Consumption

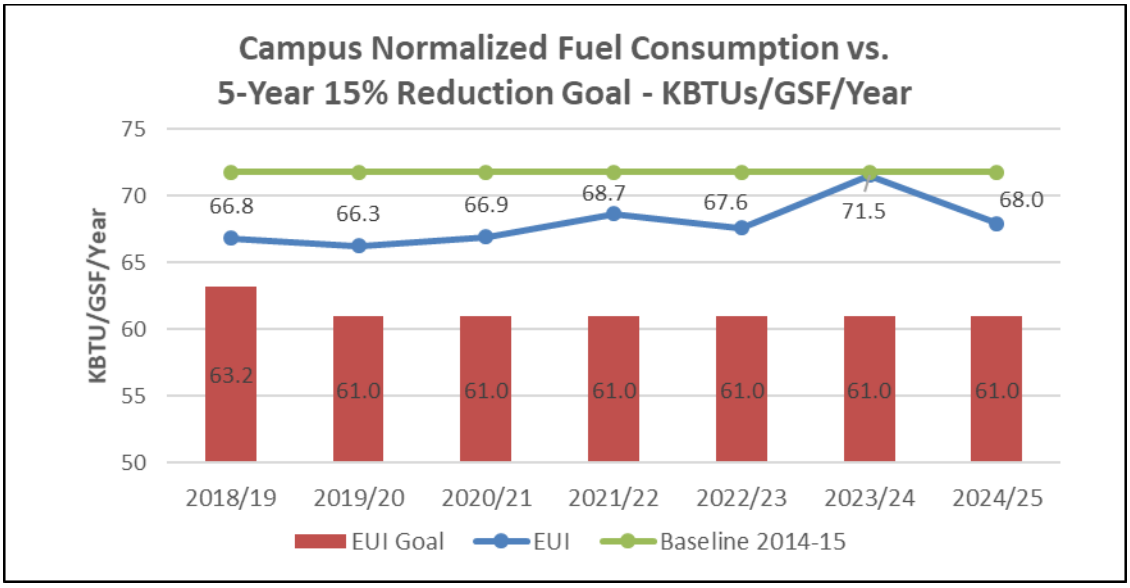
Macalester consumed 86,728,880 kBTUs of fuel during FY 2024-25. 82% of the fuel energy was consumed by the central heating plant and the balance was used in other buildings and houses on campus for space heating, domestic water heating, and cooking. The Art building's kilns and forges also consume a significant amount of natural gas.



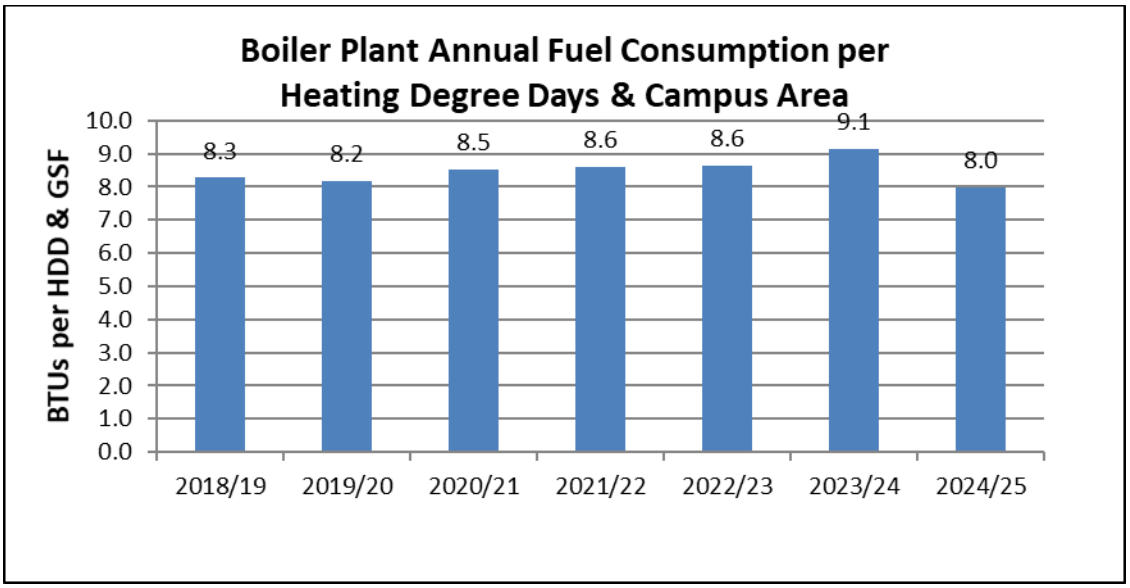
After weather normalization, the total fuel consumption for the campus was 98,162,255 kBTUs, which was in line with the average consumption. Natural gas usage for domestic hot water and kitchen use does not vary with the weather which can skew the numbers.



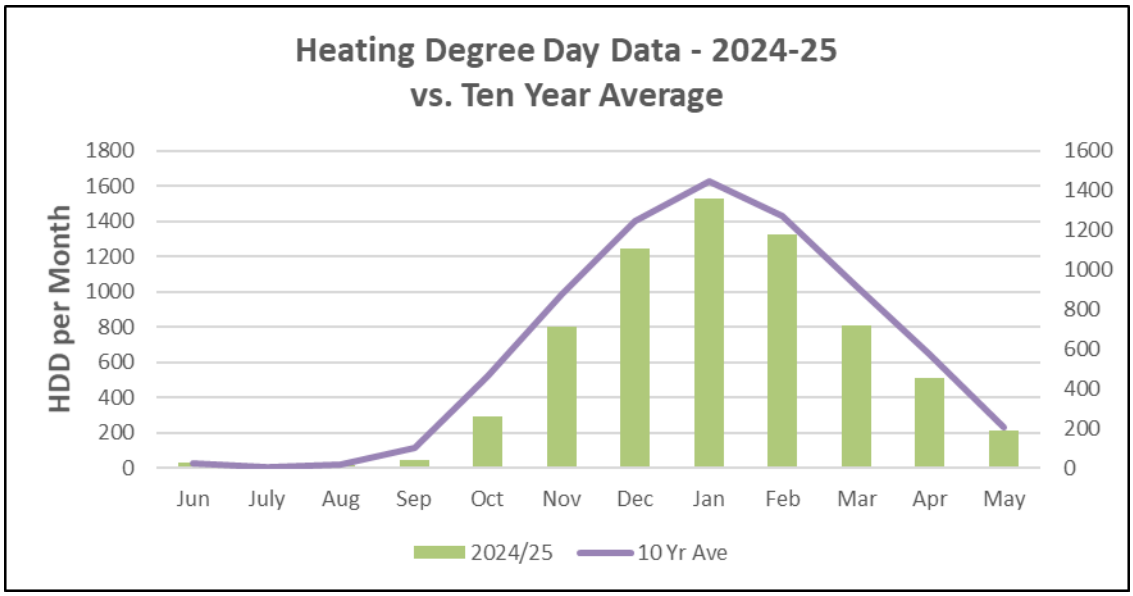
On an EUI basis, the College's fuel consumption rate of 68 kBTU/GSF/Year FY 2024-25 fell back in line closer to our average but we are not in range of the 5-year reduction goal of 61 kBTU/GSF/Year that was to be met in FY 2019-20. Again, this shows our high usage of fuel and begins to point towards the need to move towards systems such as geothermal heating and cooling. The baseline in 2014-15 is shown at an EUI of 71.8.



After normalizing for both weather and changes in the square footage of campus area that it serves, the rate at which the heating plant used fuel in FY 2024-25 was slightly lower than the rate at which used fuel over the last six years.

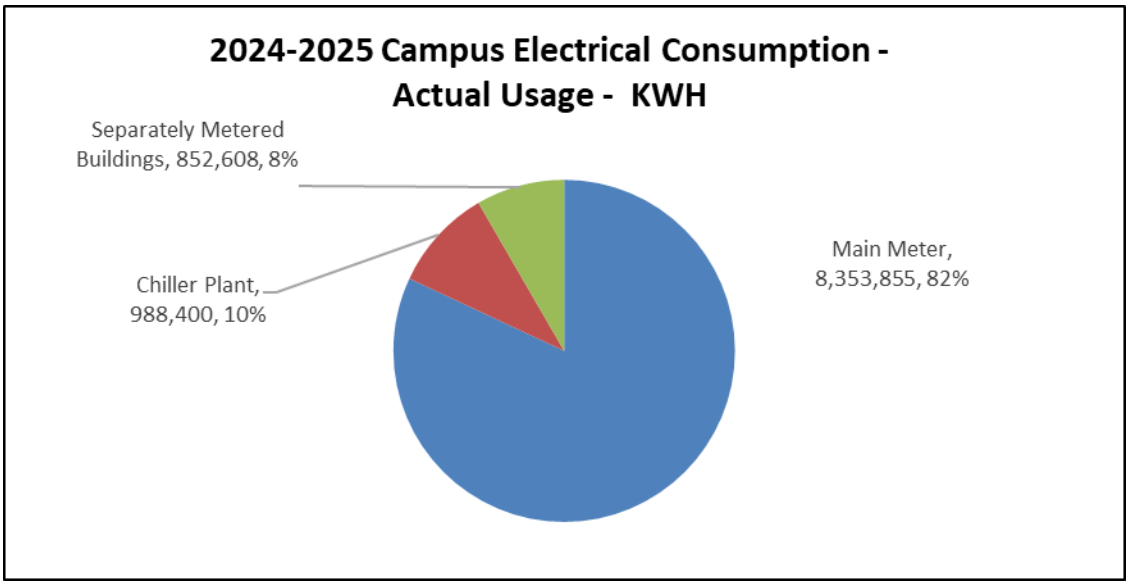


The actual amount of fuel consumed in any given year can be adjusted via weather normalization calculations to provide an "apples to apples" comparison with the fuel consumption in any selected base year. The winter of FY 2024-25 was slightly milder than average, with a total of 6,824 heating degree days (HDD) vs. the average of 7,161 HDD for the previous ten years. The temps in January and February did get low enough to cause Xcel Energy to curtail the use of natural gas in the heating plant and switch to burning #2 fuel oil for part of those months.

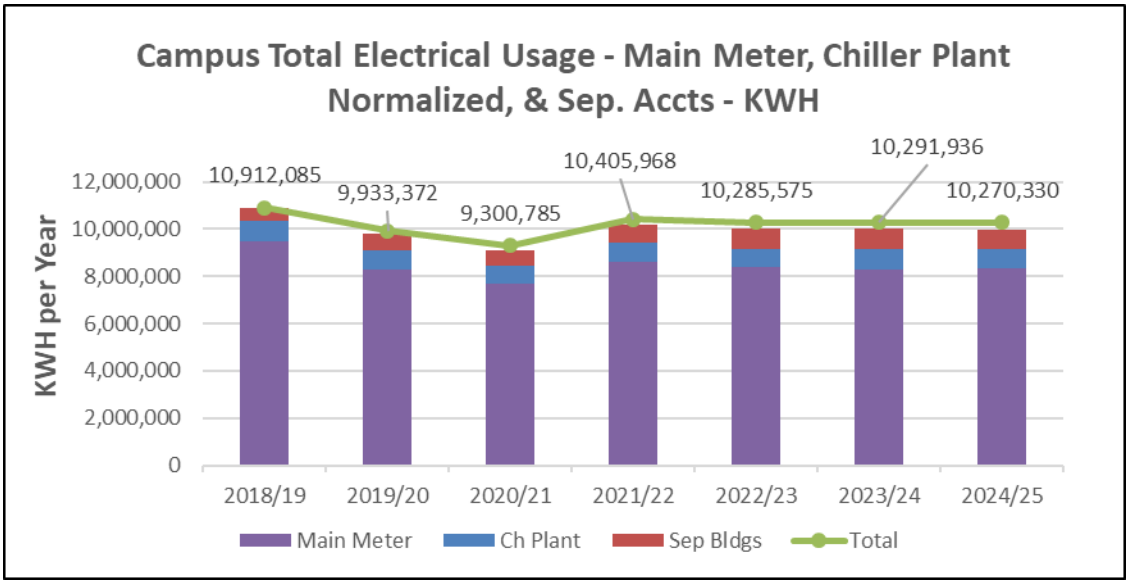


Electrical Energy Consumption

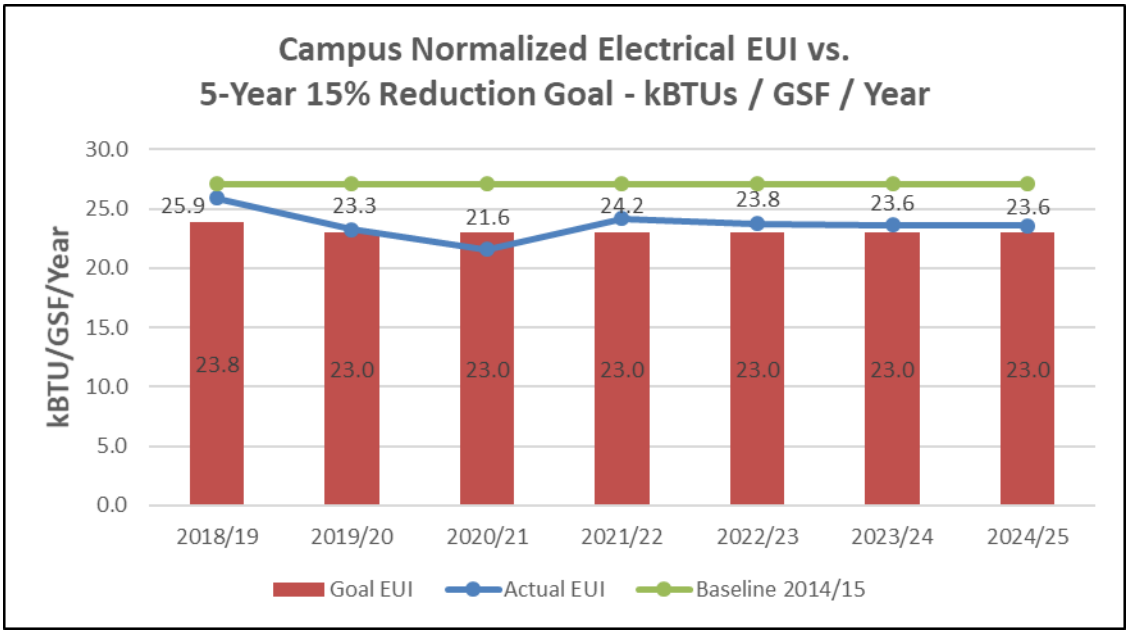
Macalester College's total actual electrical consumption in FY 2024-25 was 10,194,863 kWh. 82% of the electricity was used for the electrical loads served by the campus main electric service, such as building lighting, HVAC equipment, and plug loads. The College's chiller plant is served by a separate Xcel meter and used 10% of the campus' total electric energy. The remaining 8% was used in the various buildings and houses on campus that also have individual electric services and meters.



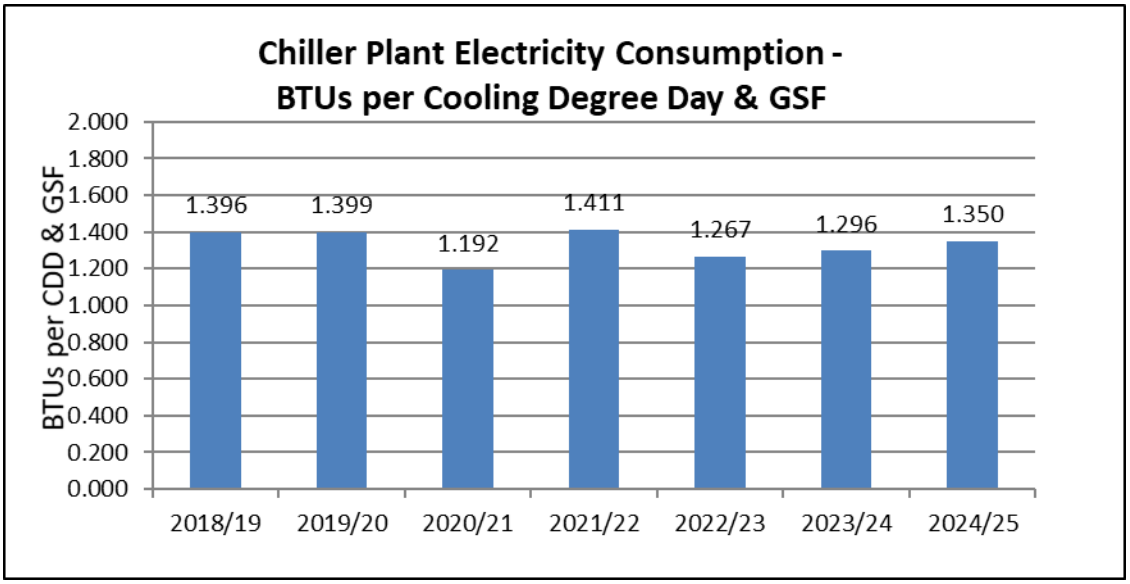
After weather-normalization of the chiller plant's usage, the total electrical consumption for the campus was 10,270,330 kWh, which was 8% less than the weather-normalized amount of electricity consumed in the 2014-2015 baseline year and in line with the last few years.



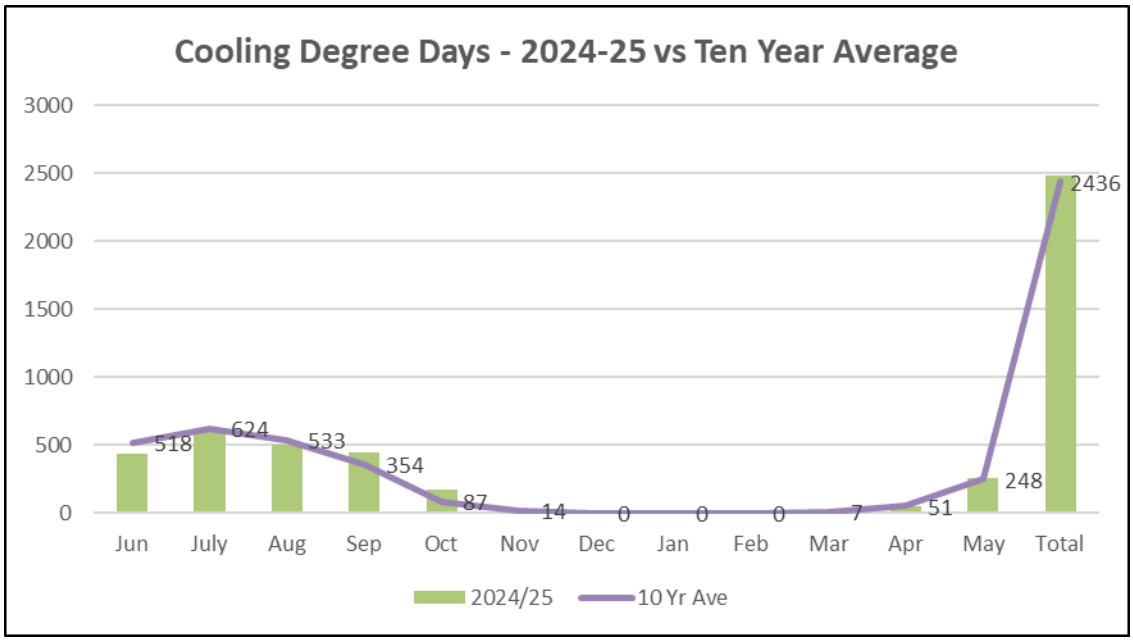
On an EUI basis, the 23.6 EUI rate at which the campus consumed for electricity in FY 2024-25 was slightly higher than the 5-year reduction goal of 23 kBTU/GSF/Year and on par with the last couple years. The baseline in 2014-15 is shown at an EUI of 27.1.



Like the boiler plant's fuel consumption, the amount of electricity used in Macalester College's central cooling plant is affected by seasonal weather variations and is adjusted via weather normalization calculations to provide a standardized method of measuring year-to-year progress toward the College's energy reduction goals. After normalizing for both weather and changes in the square footage of campus area that it serves the rate at which the chiller plant used electricity in FY 2024-25 increased slightly from the previous two years.

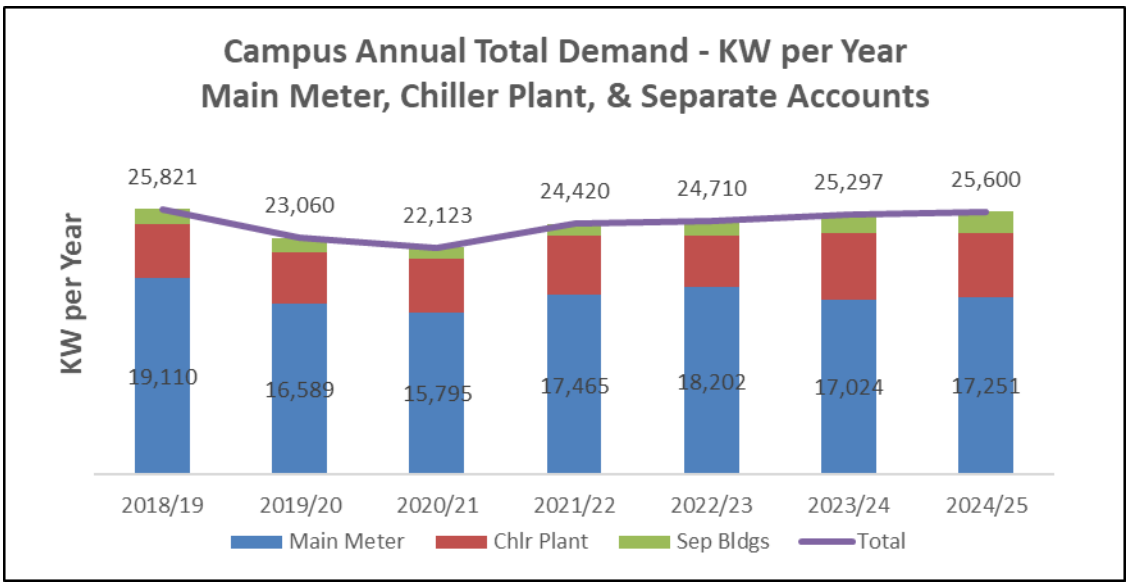


Fiscal year 2024-25's cooling season was on par with the ten-year average, with a total of 2,479 cooling degree days (CDD) vs the average of 2,436 CDD for the previous ten-year period.

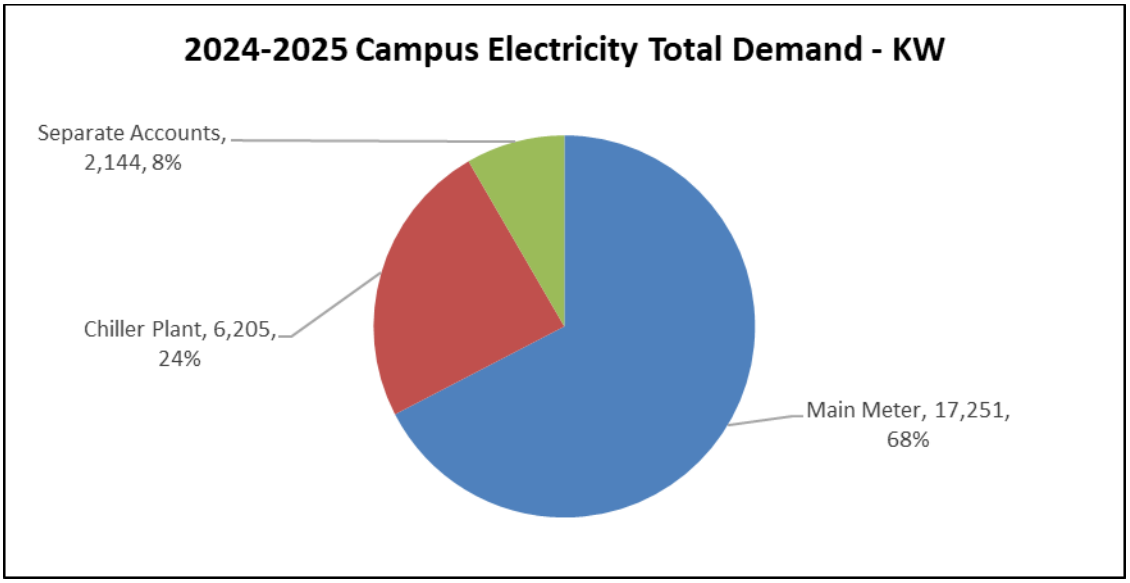


Electrical Demand

In addition to the amount of electricity consumed on campus (measured in kilowatt-hours or kWh), the College is also charged for the rate at which it uses electricity (demand, which is measured in kilowatts or kW). Macalester used 25,600 kW in FY 2024-25, which was 11% less than the 28,854 kW used in the 2014-2015 base year and very close to FY 2023-24.

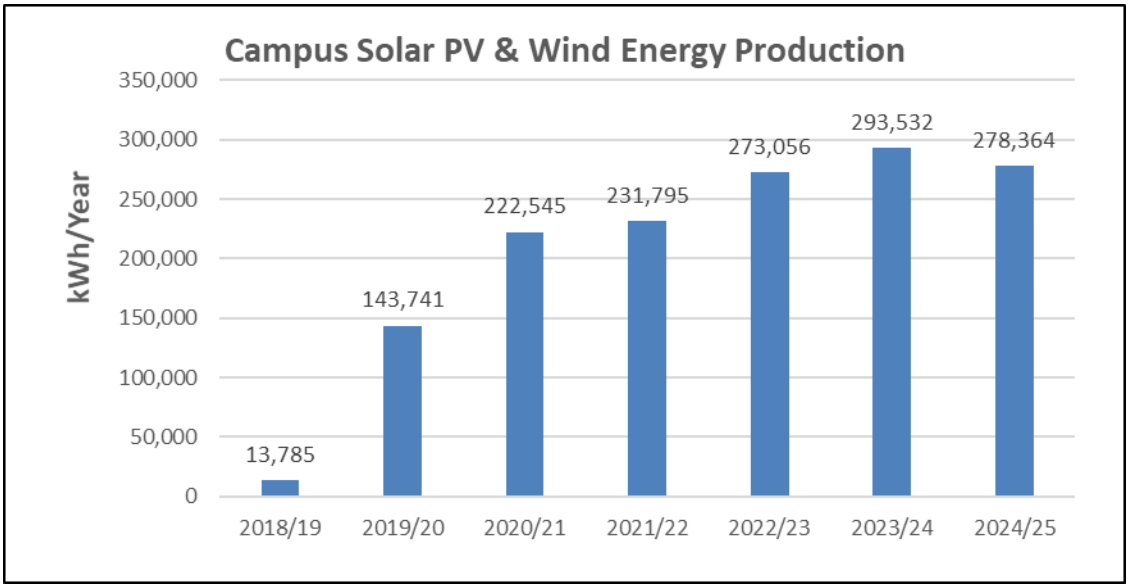


The chiller plant comprises the single largest component of the College's demand. Although it is operated only from May through October and its electrical consumption is 10% of the campus total, the demand associated with the chiller plant accounts for 24% of the campus total.



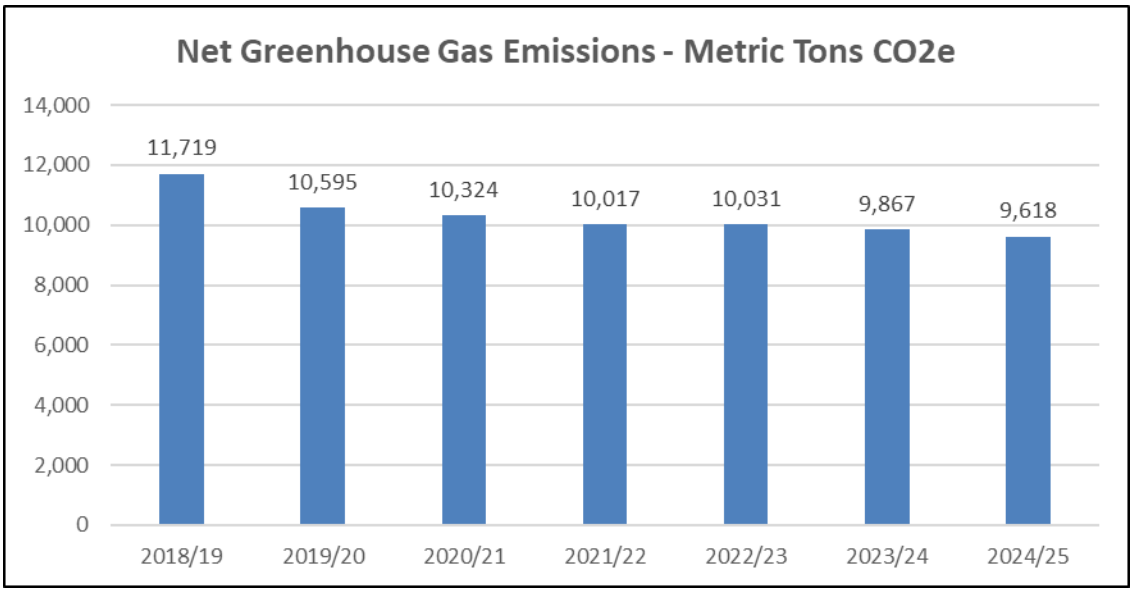
Campus Solar & Wind Energy Production

In FY 2024-25 the total combined electrical output from the wind turbine installed next to the Olin-Rice Science Building, and the solar arrays installed on the roofs of the International Global Center (IGC), Theater building, Leonard Center, and the Ordway Field Station was 278,364 kWh, which was equivalent to 2.7% of the campus' total electrical consumption. This was the first year that production decreased, due to less production from our solar arrays.



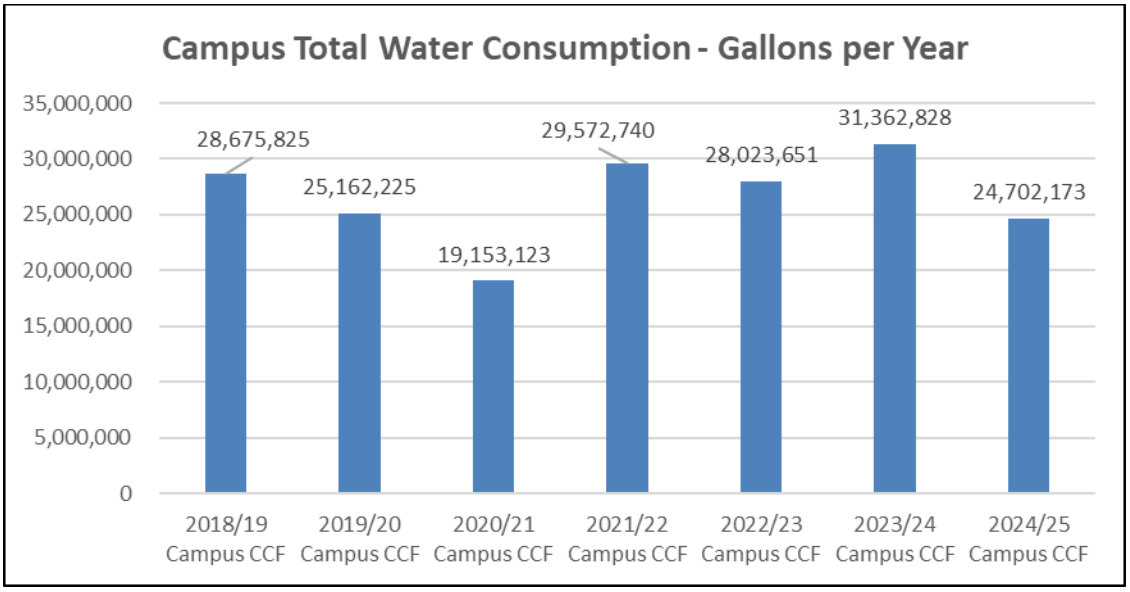
Carbon Footprint / Greenhouse Gas Emissions

Macalester College records the data related to the amounts of electricity, natural gas, and fuel oil that are consumed in campus buildings in Energy Star Portfolio Manager (ESPM). The Portfolio Manager application uses Xcel Energy's emissions factors to calculate the College's greenhouse gas emissions and carbon footprint. For FY 2024-25, ESPM estimated that Macalester emitted 9,618 metric tons of CO2e, which was 23% less than the amount of CO2e emitted in FY 2014-15 and 2.5% less than FY 2023-24.

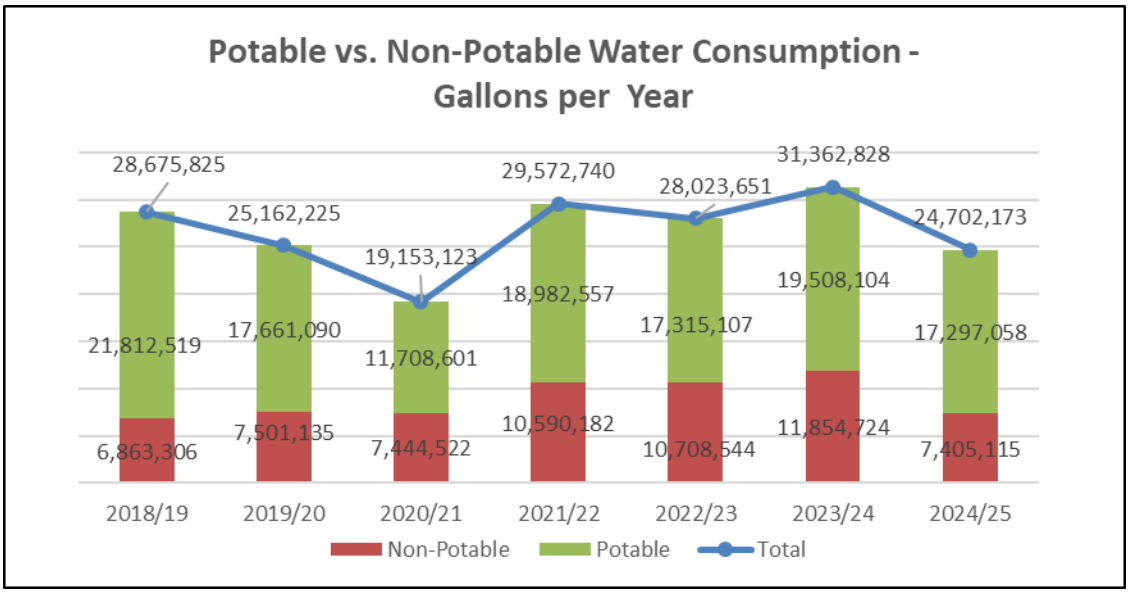


Water Consumption

Macalester consumed 24,702,173 gallons of water on its campus in FY 2024-25. The amount of potable water consumed on Macalester's campus in any given year is directly related to the number of full-time students on campus. Usage was the lowest it has been since FY 2020-21 when Covid-19 had affected campus.



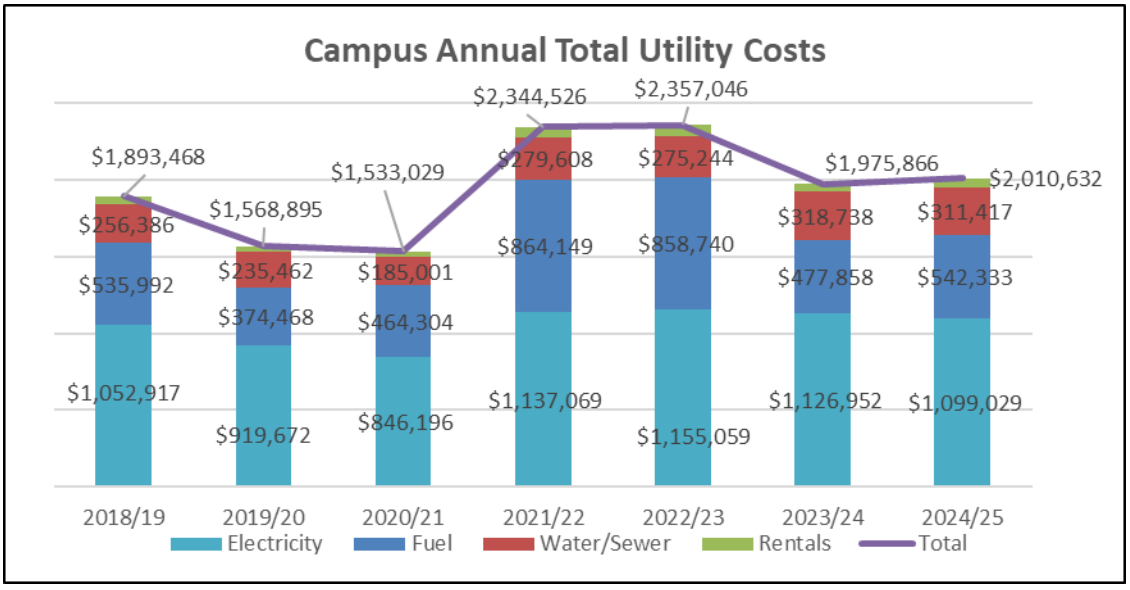
Nearly 30% of the water consumed in FY 2024-25 was used for non-potable purposes, such as the irrigation of campus vegetation and as makeup water for the central heating boilers & cooling plant's cooling towers. The non-potable percentage in the last few years has been much higher than the 20-25% typically observed in previous years due to an increase in irrigation needs. Leonard Center, Rice Olin, and Campus Center had the highest usage on campus.



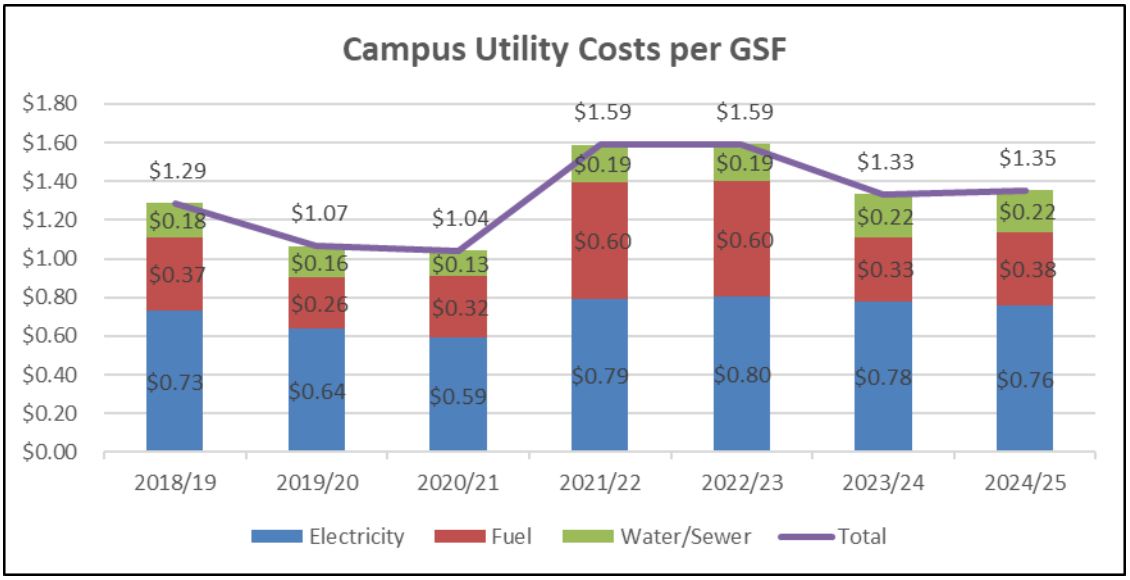
Total Utility Costs

Total Annual Utility Costs:

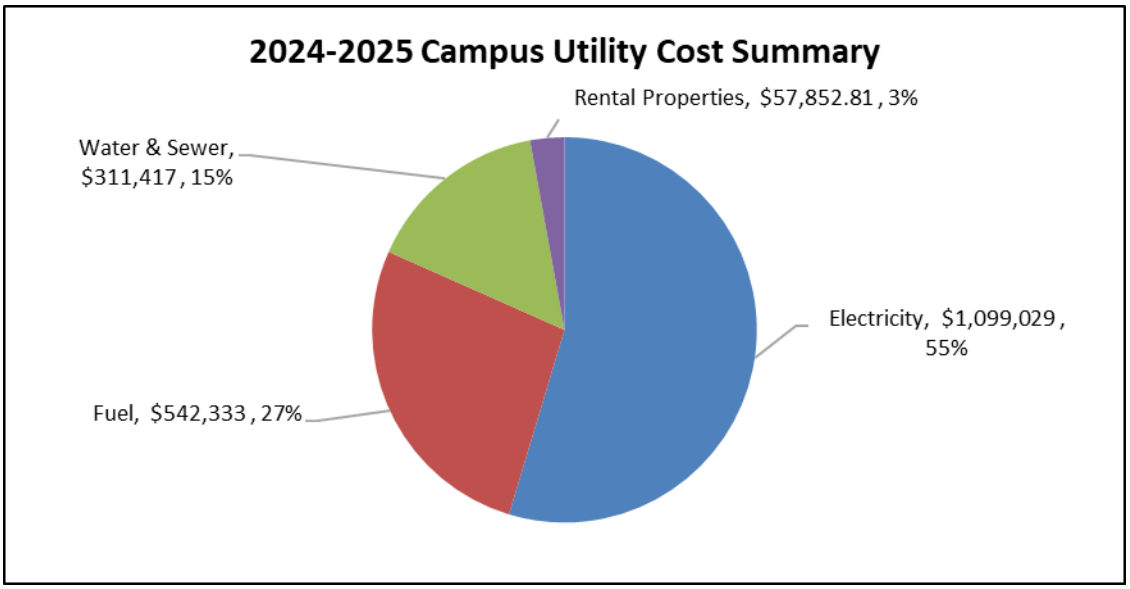
The total amount spent for utilities in FY 2024-25 was $2,010,632. Macalester's utility costs were up slightly due to an average rise of nearly 25% in rates for natural gas and water/sewer despite usages being down.

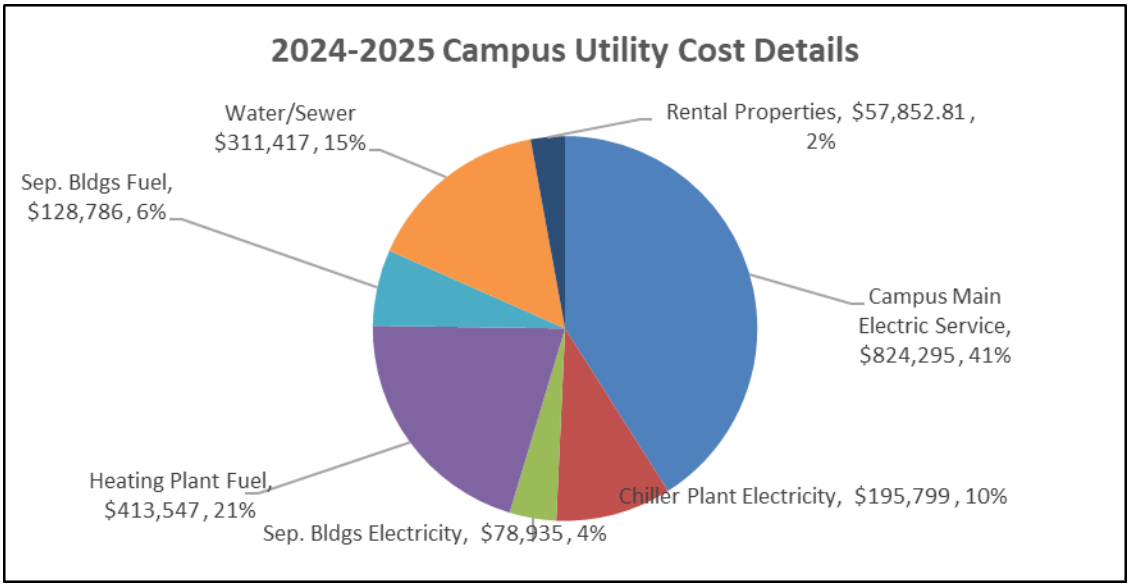


Since FY 2014-15, Macalester's total utility costs per square foot have varied from a high of $1.59/GSF, which came in FY 2021-22 and 2022-23, to a low of $1.04/GSF, which was recorded in FY 2020-21 during Covid-19.



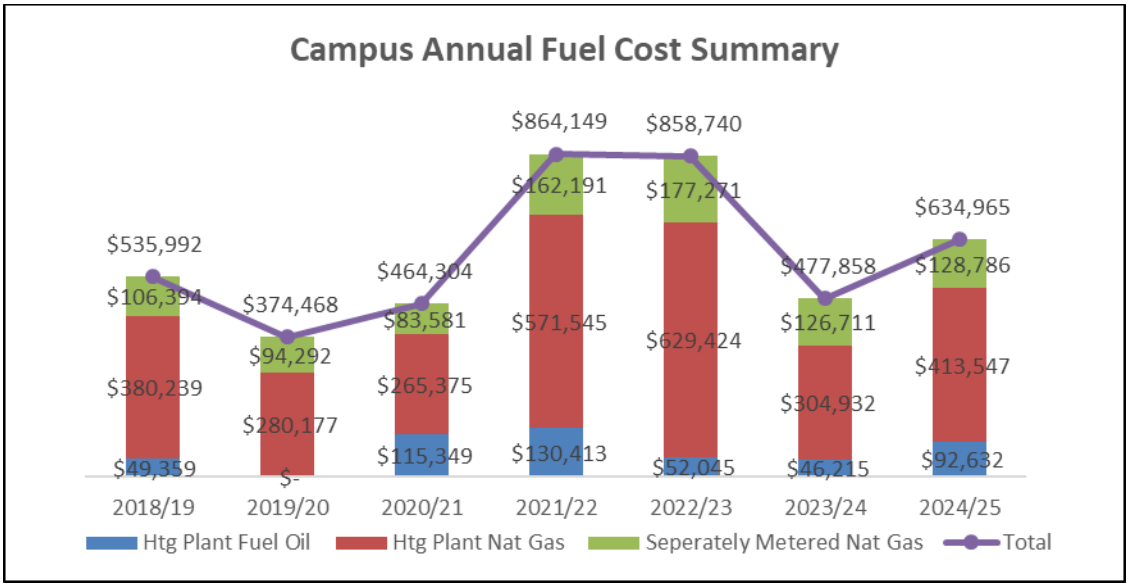
The pie charts displayed below show a summary and detailed breakdown of Macalester College's utility costs in FY 2024-25. Expenditures for electricity accounted for 55% of the total amount spent and were divided between the main campus electric service, chiller plant, and the buildings on campus that have individually billed electric services. Fuel costs comprised 27% of the total utility costs, and were divided between the central heating plant and the buildings on campus that have separately billed natural gas services. Water & Sewer charges comprised 15% of Macalester's total utility costs for the year. The combined total cost for the electricity, natural gas, and water/sewer costs for the rental properties owned by the college accounted for 3% of the total utility budget.



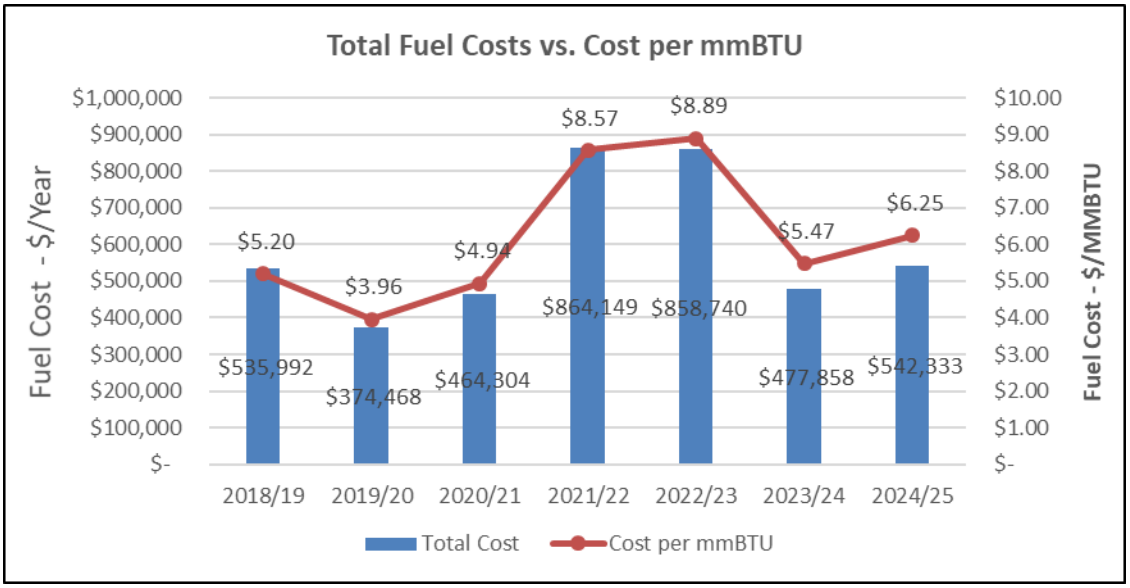


Fuel Costs

The total cost for the natural gas and #2 fuel oil consumed on Macalester College's campus in FY 2024-25 was $634,965. As noted above, Xcel Energy curtailed the College's use of natural gas during cold snaps in January and February.

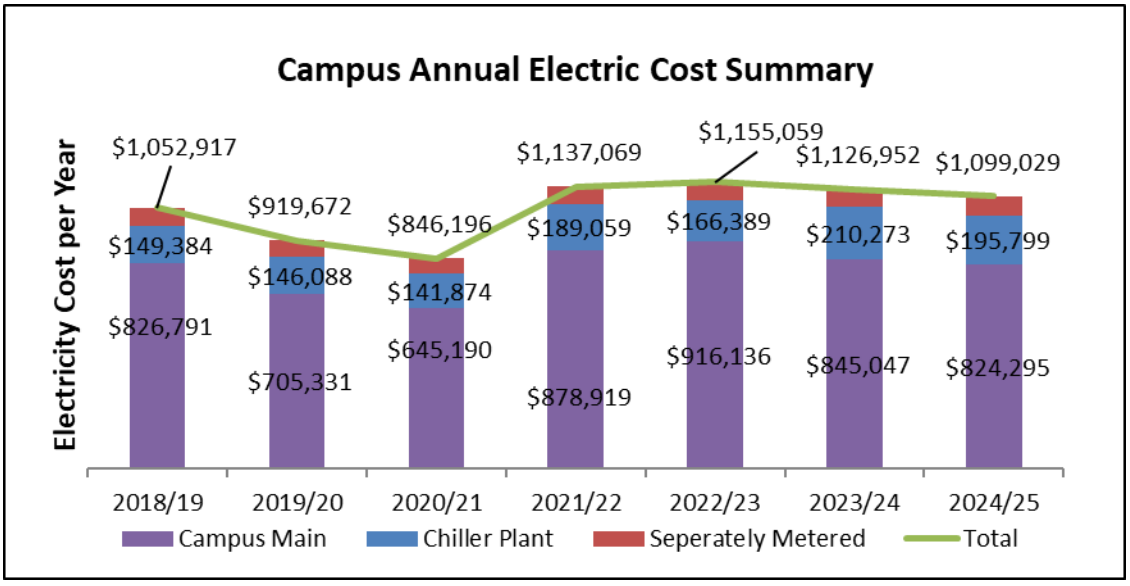


The total amount spent for fuel in any given year is affected by both the severity of the heating season and the cost paid per million BTUs (mmBTU). Since FY 2014-15, the cost paid per mmBTU of fuel has risen to a high of $8.89/mmBTU in FY 2022-23 from a low of $3.96/mmBTU in FY 2019-20. In FY 2020-21 Xcel charged $.403 per Therm compared to $.866 per Therm in FY 2022-23. That is an increase of 115%. In FY 2024-25 prices have risen to $.643 compared to $.520 per Therm in FY 2023-24.

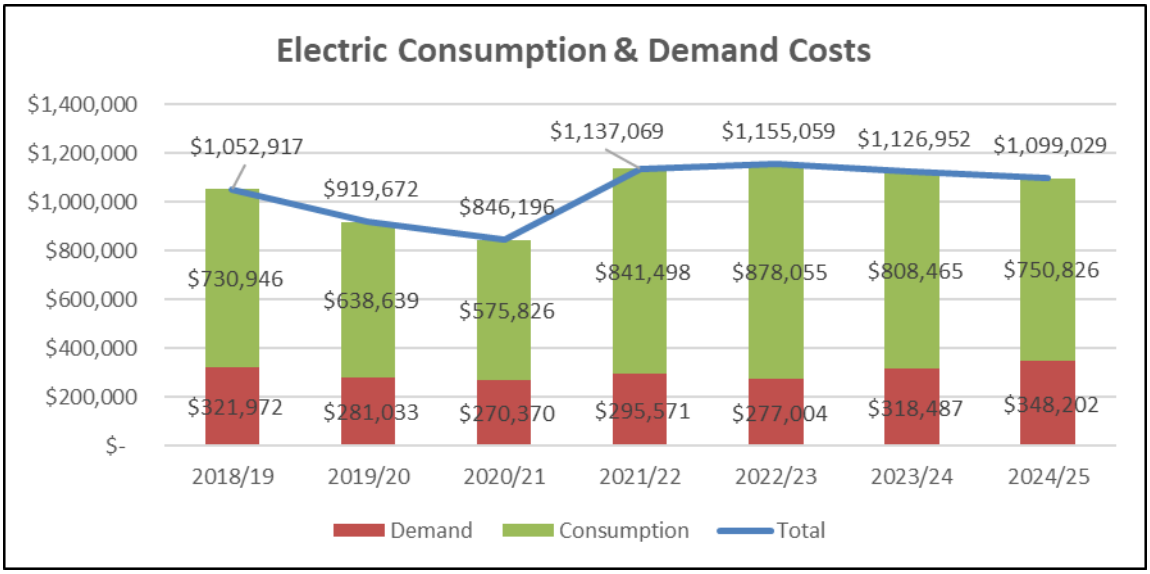


Electrical Costs

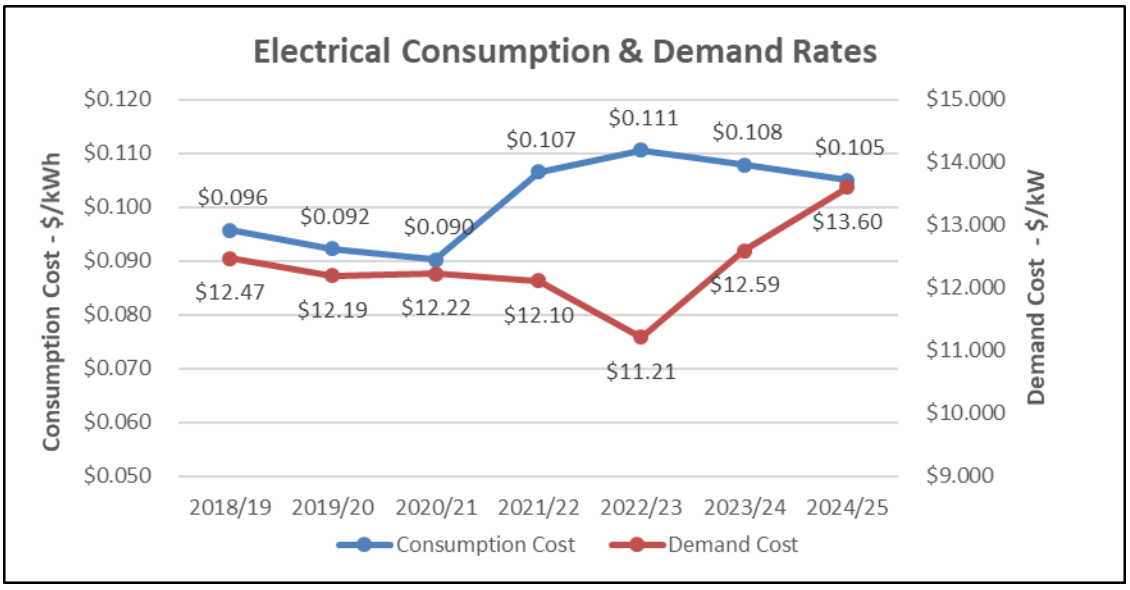
Macalester College spent $1,099,029 on electricity in FY 2024-25. As stated above, usage and prices have remained steady over the last year.



Macalester's expenditures for electricity include the costs for consumption, measured in kilowatt-hours (kWh), plus the costs for demand, measured in kilowatts (kW). The College pays electrical demand charges for the campus main electric service, chiller plant, and several other buildings on campus that are billed individually. In FY 2024-25 demand charges comprised 32% of the total amount spent on electricity.



The largest factor for increased electric costs is what we are being charged for consumption vs demand. The cost of consumption has risen from $.090 per kWh in FY 2020-21 to $.111 in FY 2022-23, a 23% jump in cost but has come back down slightly since then. The rate charged by Xcel per kW of electrical demand has been on a constant increase to $13.60/KW in FY 2024-25.

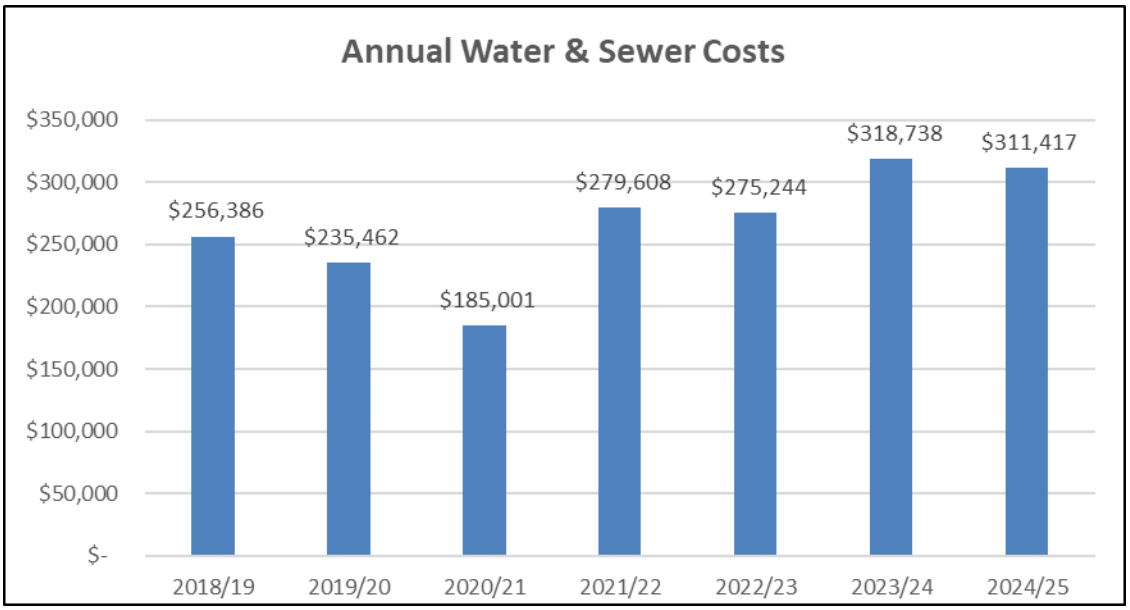


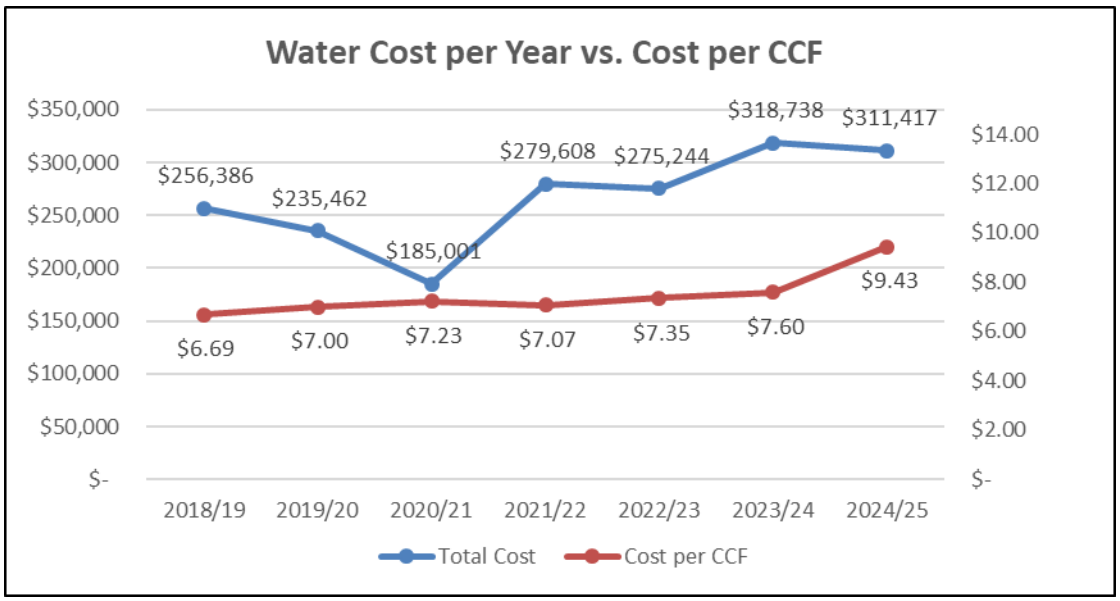
Solar Garden Energy Purchases

In FY 2018-19 Macalester College entered an agreement to purchase a portion of the electricity produced by two regional solar gardens and resell it to Xcel Energy as a partial hedge against future increases in electric utility rates. Under this agreement, Macalester's cost for the electricity produced by the solar gardens is locked in for the term of the contract, while the amount that the College is paid by Xcel Energy will vary with market rates and are expected to rise over time. The first garden started production in August 2018 and the second solar garden came online in July, 2019. In FY 2024-25, the amount of electricity purchased by the gardens was equal to about 29% of Macalester's electrical consumption for the year and provided a financial benefit to the College of approximately $98,000 compared to a benefit of $66,000 in FY 2022-23 and $51,000 in FY 2021-22. This is slightly down from FY 2023-24 due to one of the solar gardens being offline in June and July, two of the most productive months.

Water & Sewer Costs

Macalester College's total water & sewer charges in FY 2024-25 were $311,417. Water & sewer utility rates did increase by 24% although usage was significantly lower.





FY 2022-23 Energy Conservation Projects & Initiatives:

GRITS Project Summary

In 2015 Macalester started recording the costs and estimated energy savings associated with the energy conservation projects implemented on campus with the Green Revolving Investment Tracking System (GRITS). From 2015 to date the College has invested over $1.6M in a total of (100) energy & water conservation projects, with an estimated financial savings to date of nearly $3M.

Macalester College

TOTAL PROJECTS FUNDED (COMPLETED / IN-PROGRESS)	100 / 1
TOTAL INVESTED TO DATE *	$ 1,608,049
TOTAL FINANCIAL SAVINGS TO DATE	$ 2,956,480
TOTAL ENERGY SAVINGS TO DATE	157,042 MMBtu
TOTAL EMISSIONS ABATED TO DATE	26,845 $MTCO_2e$
TOTAL WATER SAVINGS TO DATE	3,011,025 gal

Efficiency data powered by GRITS

* Includes investments to in-progress projects without savings to date

Last updated 09/16/2025

Energy Conservation Projects:

In FY 2024-25 Macalester College has completed multiple energy conservation projects:

- Chiller Plant Efficiency Upgrades:
  - Adding Variable Frequency Drives to two of the three chillers. These VFD's allow our chillers to run more efficiently during low loads.
- Language House Controls:
  - Added building control systems to the language houses to be able to monitor and limit control of the heating and cooling systems.
- Library Lighting Controls:
  - Replaced existing lighting controls in the Basement level to tie in with current building control system as well as adding occupancy controls. Old system would leave lights on 24/7.

O&M Projects:

- Building Controls Updates
  - Replaced Variable Air Volume (VAV) box controls as part of Kagin and Library remodels. The new controls provide more accurate temperature control as well as occupancy controls which allow us to use less energy when the spaces are unoccupied.
- Steam Trap Audits, Repairs, & Replacements:
  - The steam traps in all of the buildings on Macalester's campus that are served by the campus boiler plant as well as in the 1550 Summit Avenue rental property were audited and repaired or replaced as needed.

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