

b) Total Energy Consumption

The total energy use comparison for 2019 has been normalized for all fuels and is presented in the following figures.

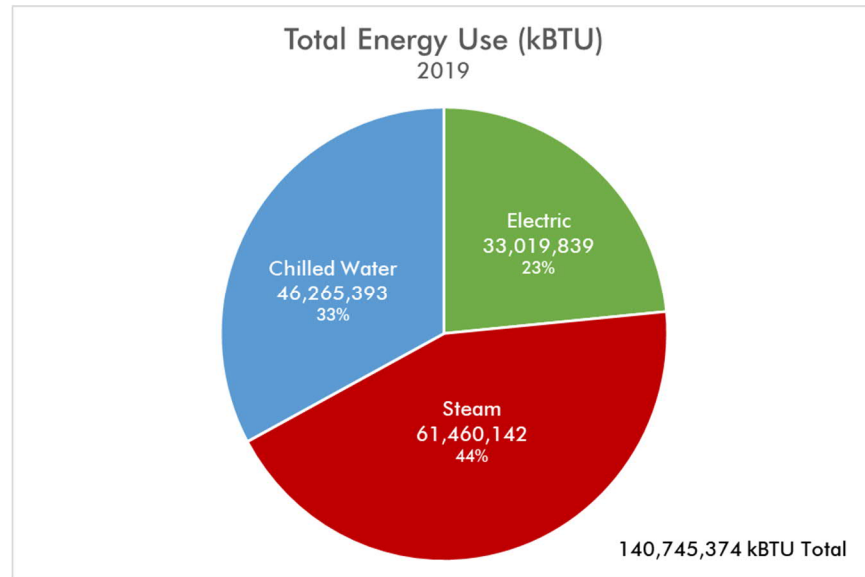


Figure 7

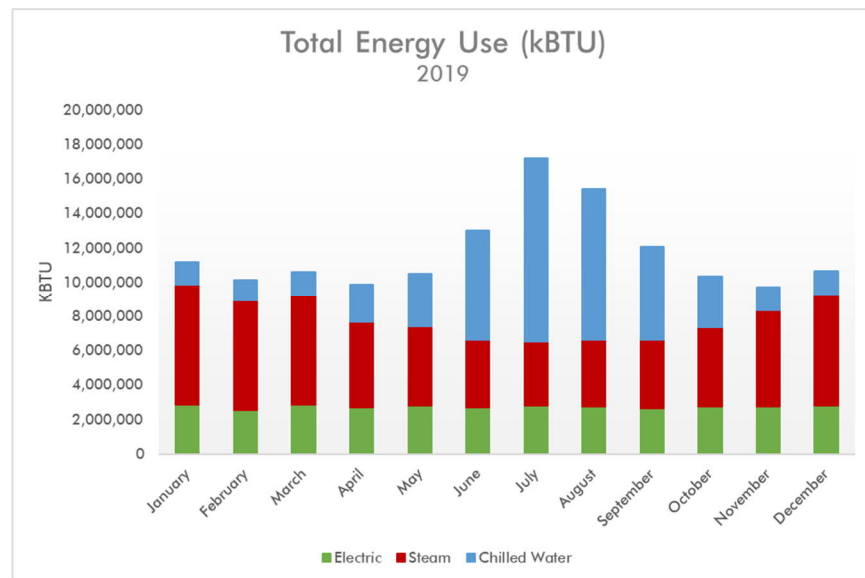


Figure 8

Steam and chilled water consumption account for a majority of energy use at Building 76 and seem to exhibit seasonal correlations. This may be accounted for by the fact that laboratory spaces typically require 100% outside air supply, leading large cooling, heating, and reheating loads for

### Electricity

The monthly electric consumption for the entire building from January 2017 to December 2019 is presented in the following figure, and the monthly consumption for 2019 is presented in comparison to the heating and cooling degree days on the secondary axis.

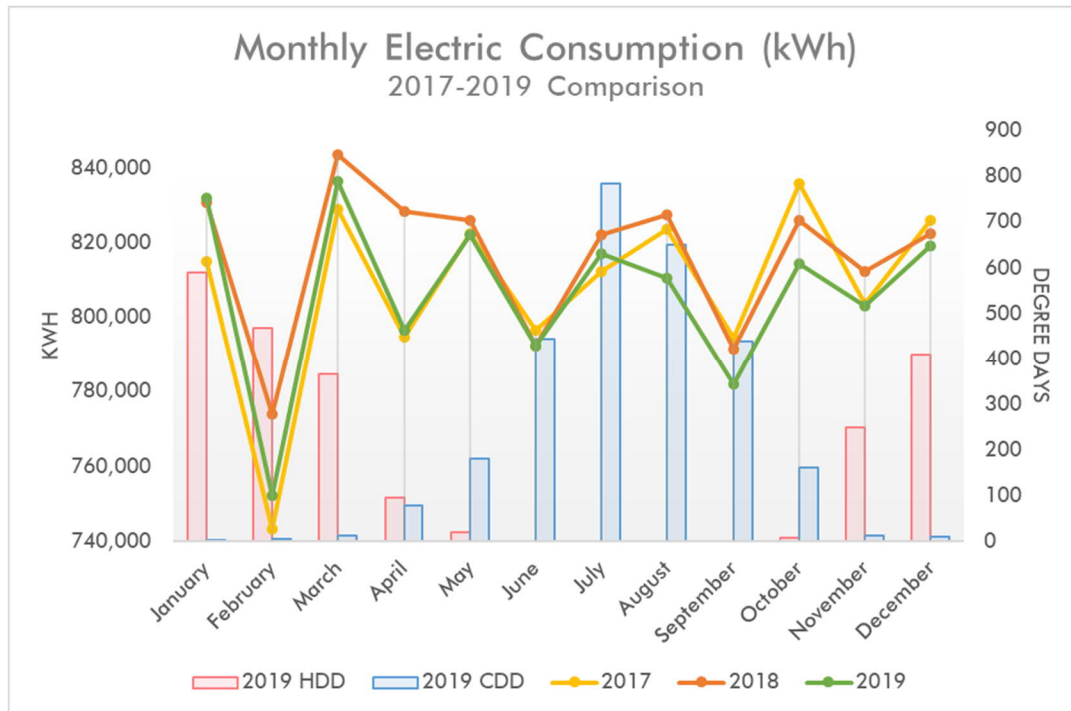


Figure 12

### Key Observations

- i. Electricity consumption in labs is typically related to day to day support of operations, including HVAC equipment, lighting, conveyance, plug loads, and other process loads related to lab and vivarium spaces.
- ii. 2019 resulted in year over year electric consumption reduction of 0.2% and 1.2% in comparison to 2017 and 2018, respectively.
- iii. There does not seem to be a strong correlation between electric consumption and either HDD or CDD. The yearly electricity profiles does not show significant increases in consumption during the summer months. All cooling related loads are served by the chilled water service, and indicates the electrical consumption is not weather-dependent.

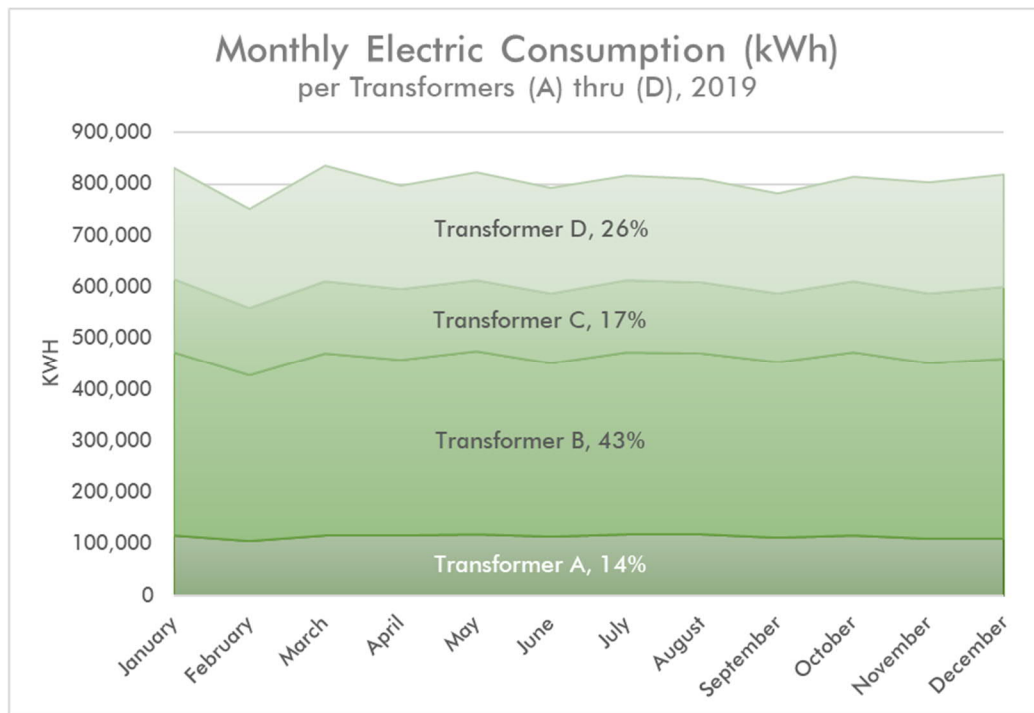


Figure 13

The 2019 electric consumption for each of the (4) main transformers serving the site is presented in the above chart.

#### Key Observations

- i. There do not appear to be any significant season-specific peaks or valleys in consumption at any of the metered transformers.
- ii. Transformer B makes up 43% of the electric consumption at the site, and it, along with Transformer D, exhibit what may be an occupancy-related dip in consumption in February.

### Steam

The monthly steam consumption for January 2017 to December 2019 is presented in the following figure, and the monthly consumption for 2019 is presented in comparison to the heating and cooling degree days on the secondary axis.

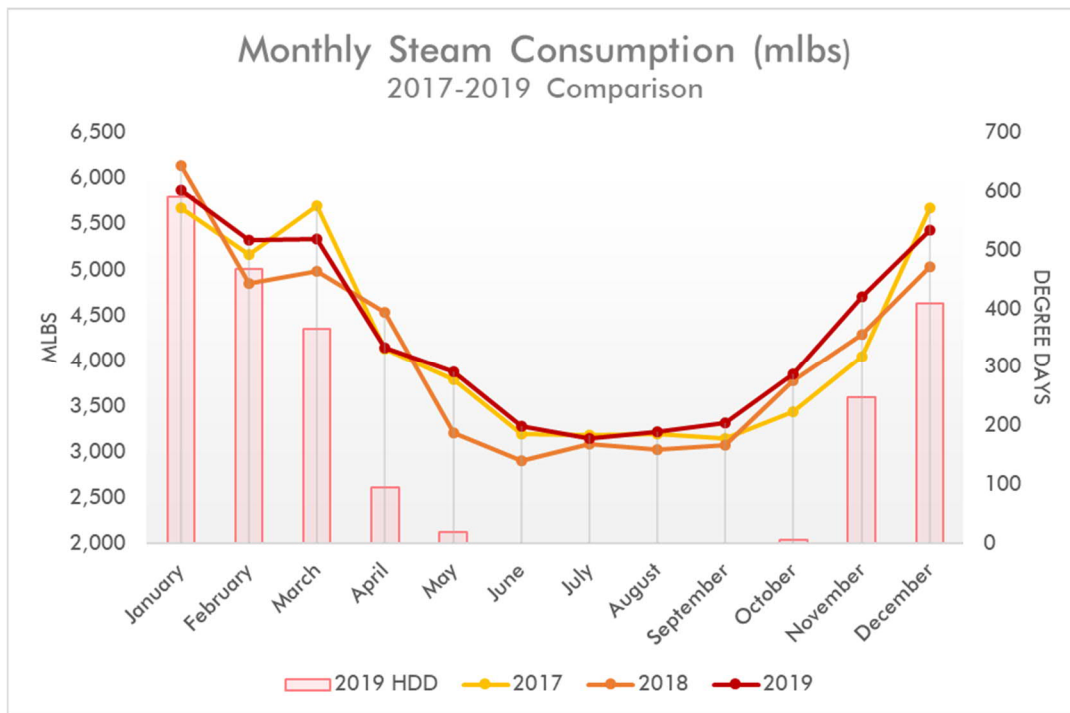


Figure 14

Steam consumption is related to vivarium process cleaning and sterilization equipment, seasonal space heating, terminal reheat, humidification, domestic hot water, and laboratory hot water and sterilization.

### Key Observations

- i. The yearly steam profiles show visible increases in consumption during the winter months. This is expected, since much of the space heating requirements are served by the steam service, and indicates the consumption is weather-dependent.
- ii. A significant and constant consumption is observed during the non-heating months. This consumption in laboratories is typically associated with terminal reheats, domestic hot water production, laboratory hot water production, Vivarium processes such as sterilization, cage/rack washing and tunnel washers, and laboratory process sterilization and washing equipment.

### Chilled Water

The monthly chilled water consumption for January 2017 to December 2019 is presented in the following figure, and the monthly consumption for 2019 is presented in comparison to the heating and cooling degree days on the secondary axis.

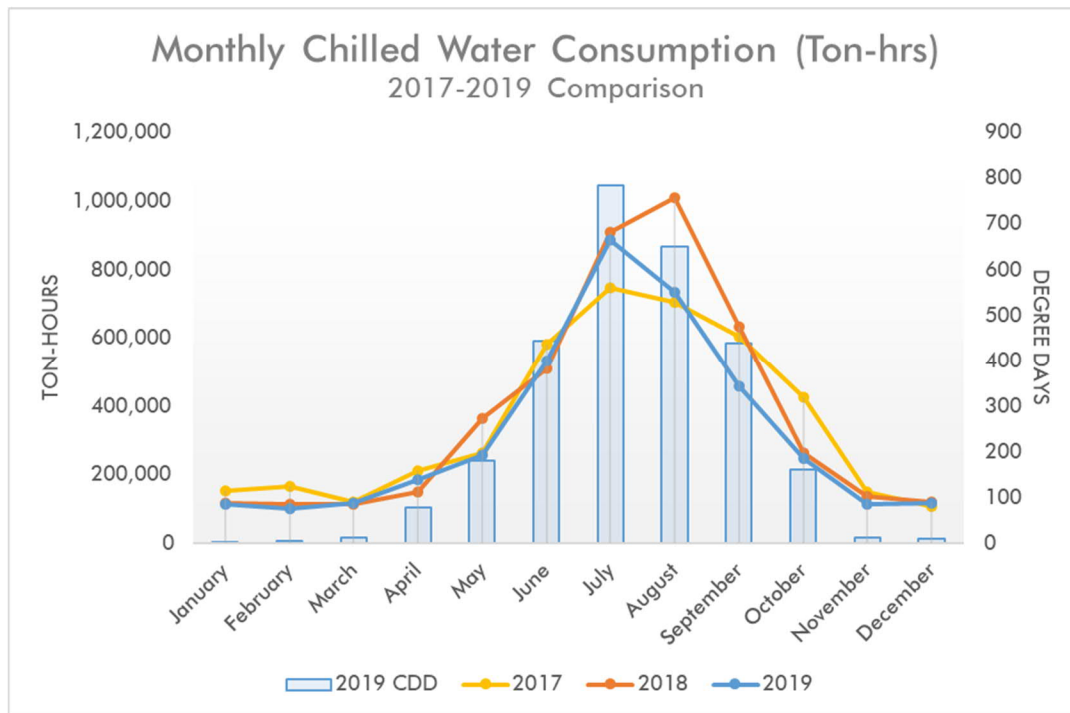


Figure 15

Chilled water usage in laboratories is typically related to seasonal space cooling, dehumidification, and process loads for laboratory equipment.

### Key Observations

- i. The yearly chilled water profiles show significant increases in consumption during the summer months. This is expected, since all space cooling requirements are served by the chilled water service, and confirms that a large portion of the chilled water rate of consumption is weather-dependent.
- ii. Relatively consistent consumption (approximately 110,000 Ton-Hrs/month) is observed during the non-cooling months and across all three observed years. This consumption is most likely associated with cooling requirements for associated lab and vivarium spaces, as well as cooling requirements for spaces with additional process loads.

ii. Major End-Use Data Results

The following charts represent the Energy Model's major end-use energy breakdown.

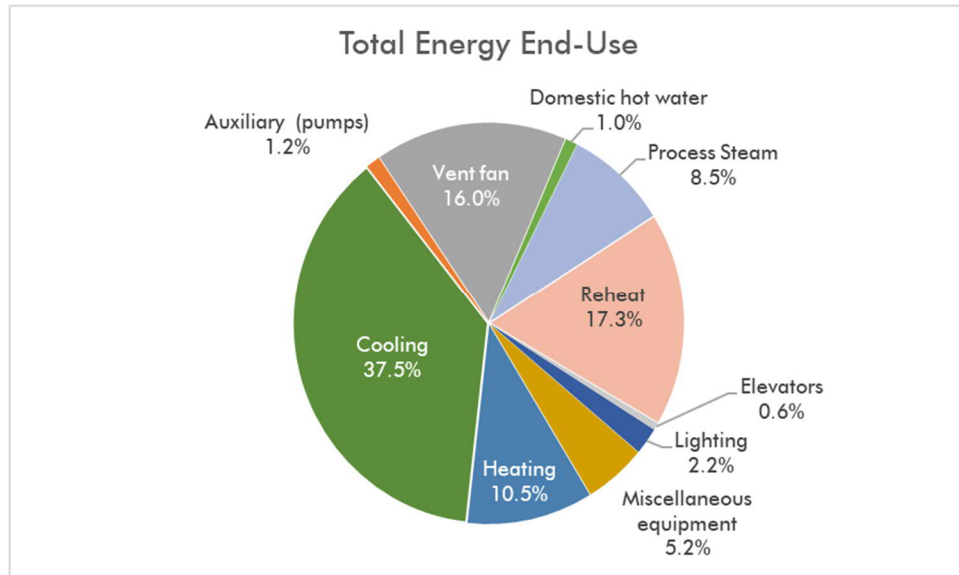


Figure 32 - Modeled Major End-Use Breakdown – Total Energy

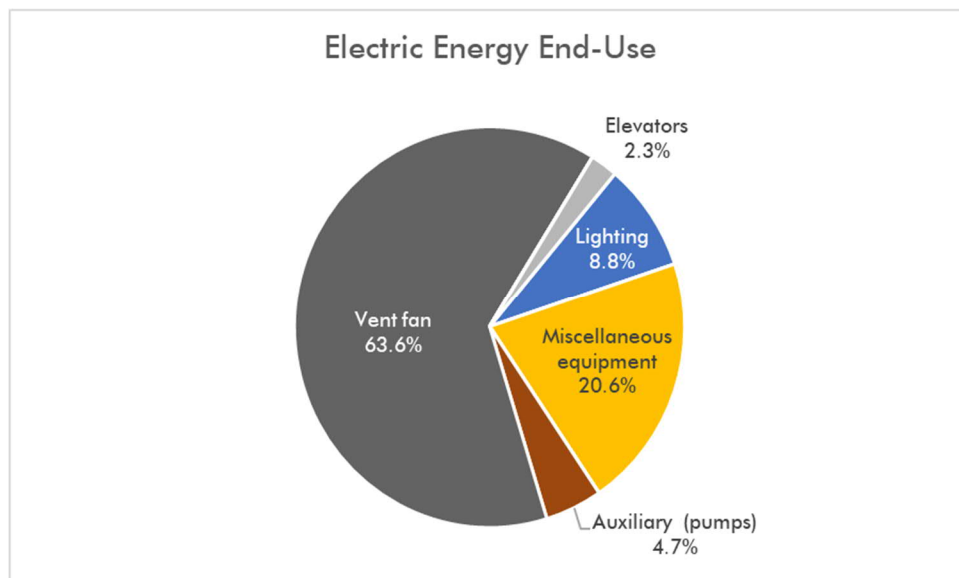


Figure 33 - Modeled Major End-Use Breakdown – Electricity

In addition to the various equipment types that make up a typical office space's plug load profiles, the site's "Miscellaneous Equipment" end-use category includes equipment such as refrigerators, centrifuges, autoclaves, and incubators, among others.

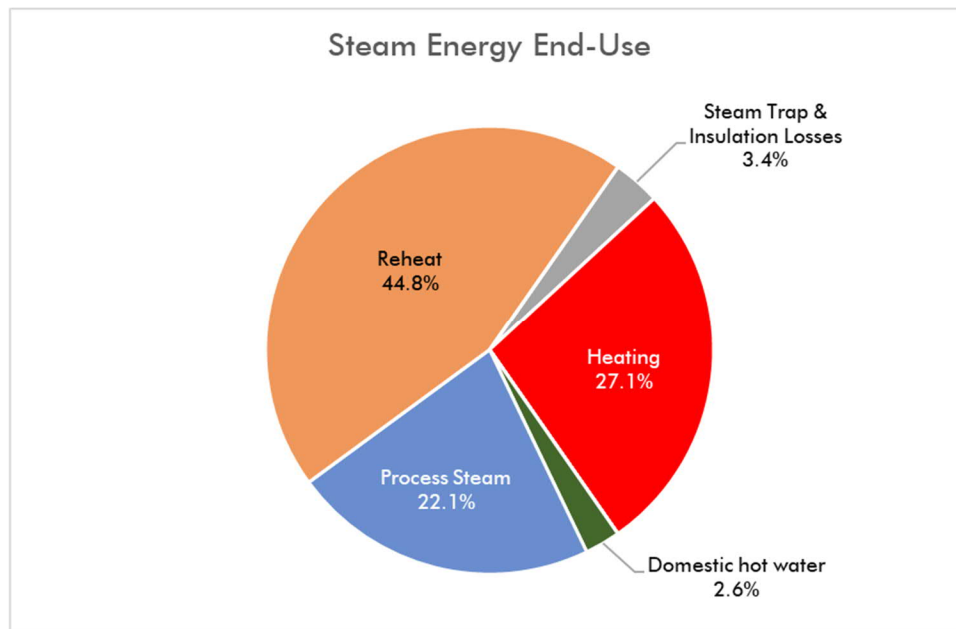


Figure 34 - Modeled Major End-Use Breakdown – Steam

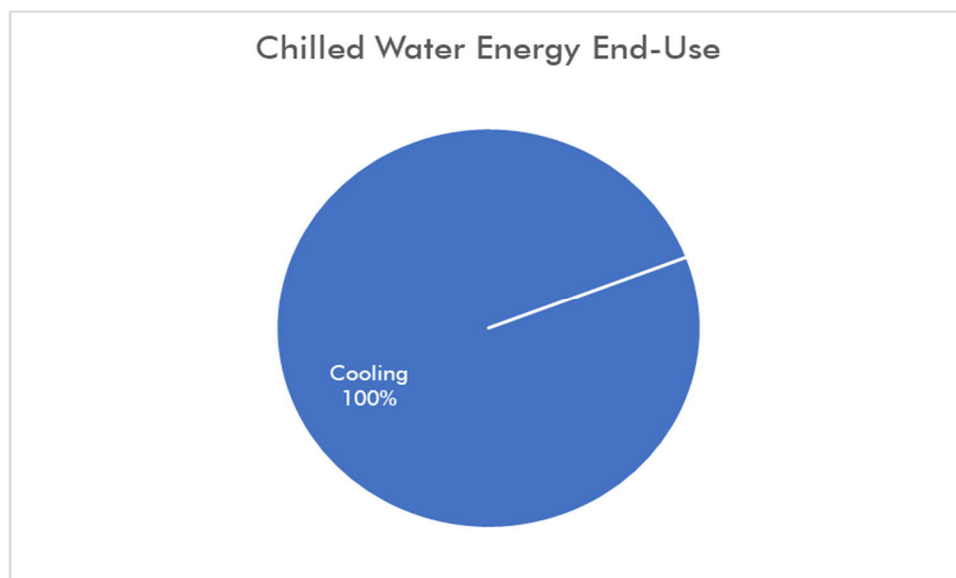


Figure 35 - Modeled Major End-Use Breakdown – Chilled Water