

INVESTIGATING FACTORS THAT DETERMINE KWH AND THERMS CONSUMPTION ON COLLEGE CAMPUSES

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Introduction

In our research, our goal is to determine the factors that affect the kWh and Therms consumed in university buildings for a year. Our research can be utilized by campuses to determine if their actual amounts are close enough to the predicted energy consumption to see if there were any errors or inconsistencies. We tested different factors to determine the predicted kWh and Therms consumed based on local weather and student populations on two different college campuses, Georgian Court University in New Jersey and Pomona College in southern California.

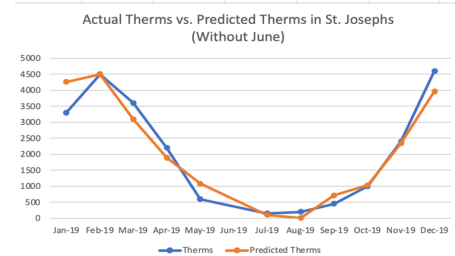
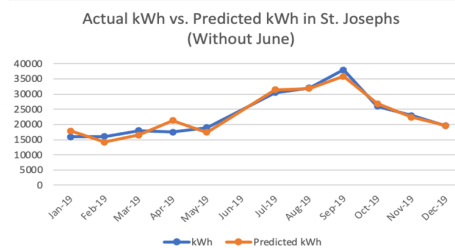
Problem

The energy information that we received about Georgian Court University was from an Energy Audit report that provided the monthly kWh and Therms consumption. The audit broke down the information for each building per month. We used this information for Georgian Court University's residence buildings, but we needed to get individualized data for Pomona College.

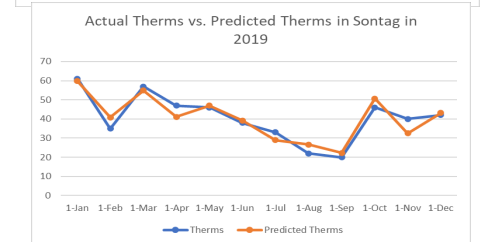
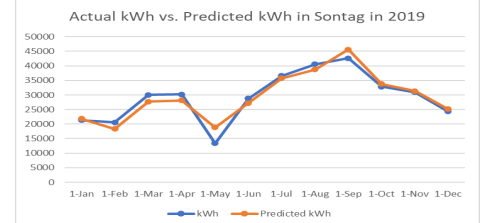
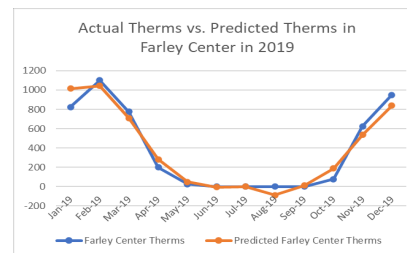
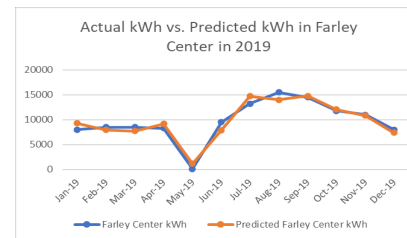
The six factors that we ultimately decided upon were average temperature, average rainfall, average humidity, average student population, average hours of daylight, and average windchill. Both windchill and students needed to be calculated from data collected.

Research

Below are the finalized kWh and Therms charts that display the actual consumption against the predicted. For our kWh analysis, our final R-Squared value was equal to 0.94 which is significantly higher than our previous values. The same goes for the R-Squared values for Therms in St. Josephs, as it is equal to 0.93. As we added more factors that impact the consumption of energy, it dramatically altered the predicted values for both Therms and kWh. These factors proved to not only accurately predict residential buildings, but academic buildings as well.



We used the same six factors used in our analysis for the residential buildings and translated it directly to Georgian Court University's academic buildings.



Discussion

These results demonstrate how despite the location of the university, energy consumption relies heavily on the average temperature, humidity, rainfall, windchill, hours of daylight, and student population. Comparing these two universities, it can be observed that these factors are able to depict accurate predictions of consumed kWh and Therms in both residential halls and academic buildings. This method could be translated further to other universities to determine their predicted energy consumption.

It was vital for us to see if our analysis on Georgian Court University's buildings translated to other campuses, despite being in different climates. Pomona College provided us with data displaying the kWh and Therms usage in each of the residence halls. Some of the residence halls did not measure any Therms throughout the year. The following graphs demonstrate the actual kWh and Therms and predicted kWh in Sontag Hall.

Acknowledgements

