Looking around a large city like Chicago, you can see many large buildings. These buildings are often very tall with many floors. Have you ever wondered how much electricity these buildings use and why? I am very interested in the correlation between many factors and electricity usage in Chicago. I found a dataset on Chicago Energy Usage in 2019 and analyzed why some buildings use a lot of energy while others do not. This dataset has 3438 observations and 29 rows (99702 data points). My main goal for this project was to find the main reason the buildings in Chicago use the amount of energy they do. To start with, I made a different subset for each property type with its average energy usage. Then I made a barplot that compares each type of property and its energy usage.

**Amount of Electricity in different Property Types (kBtu)**
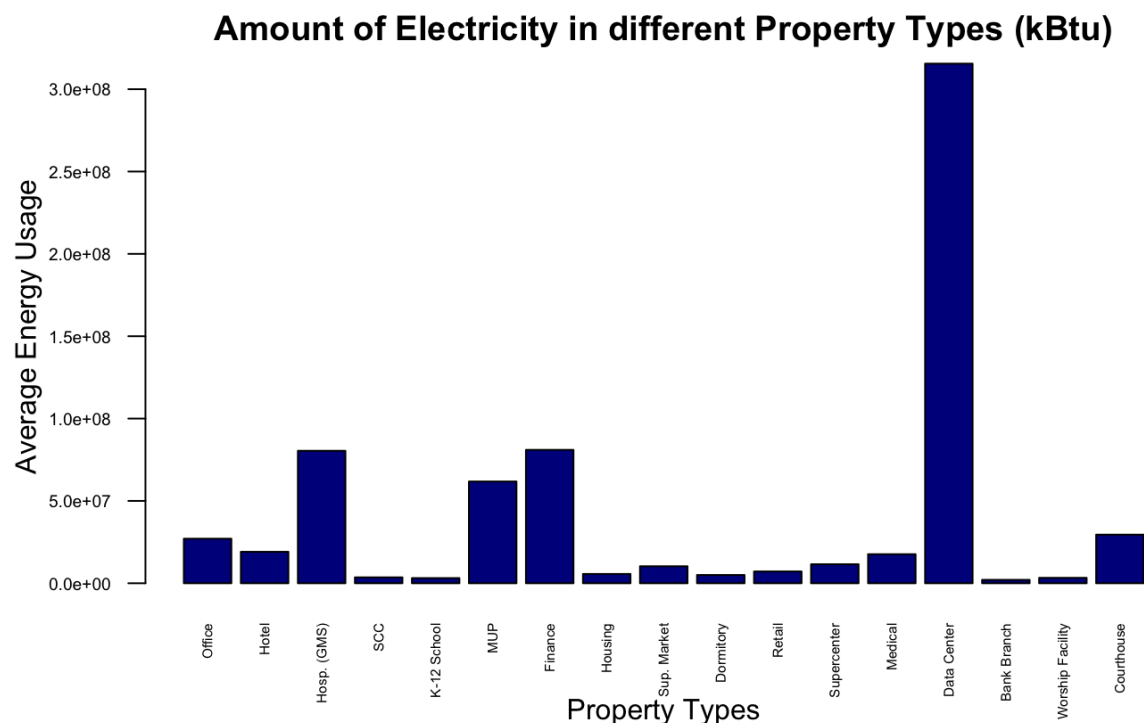
This barplot distinctly shows that some property types use more energy than others on average. Financial Offices, Hospitals, and Mixed Use Properties use much more energy than

other property types. Additionally, Data Centers use significantly more power than every other property type. The high energy usage of data centers is most likely because data centers have hundreds of servers running continuously that draw lots of power. The property's purpose positively affects the amount of energy a building uses. Unsure of the correlation, I made a summary of the relationship, which had an R-squared value of 0.3241. This means there is a slight correlation between the two variables. Another relationship I wanted to investigate was the correlation between floor area and energy usage. So I made two linear regression graphs, one with outliers and one without outliers.
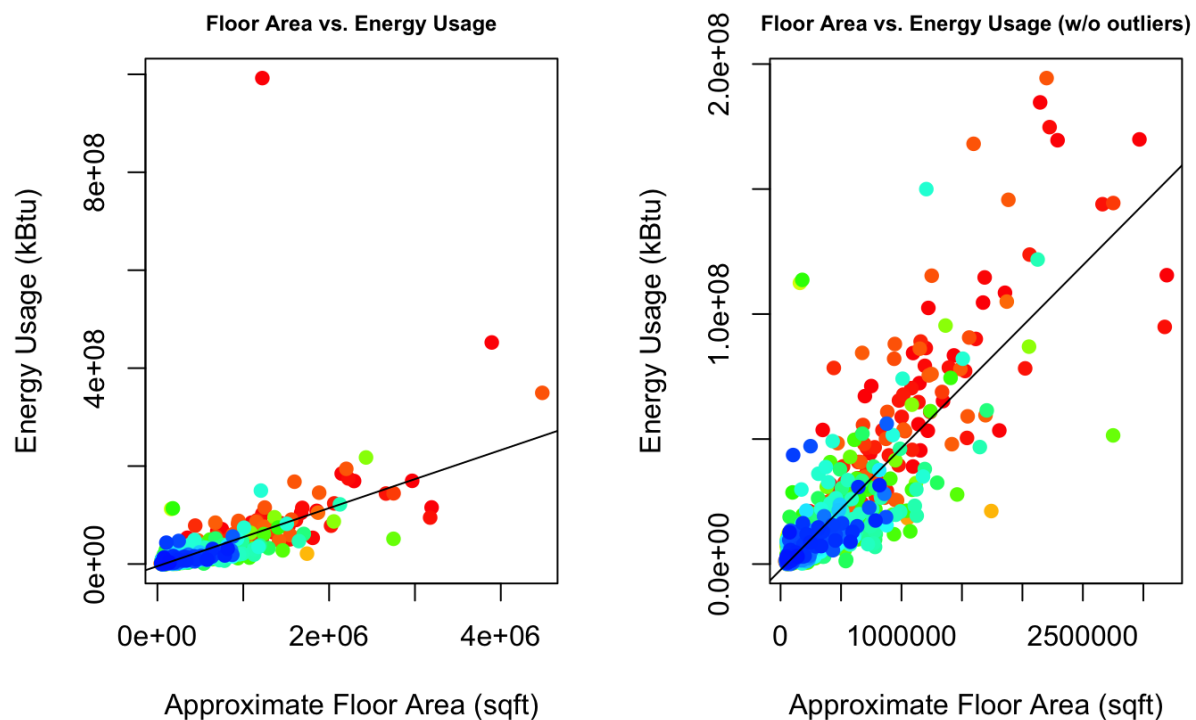
The three outliers in the first graph significantly affected the correlation between floor area and energy usage. The first graph has an R-squared value of 0.4346, while the second plot has an R-squared value of 0.7236. This means there is a weak positive correlation with the

outliers, and without the outliers, there is a strong positive correlation. Overall, there is somewhat of a relationship between the size of the building and energy usage. The last correlation I chose to analyze was between the year the property was built versus the energy used.

Year Built vs. Energy Usage
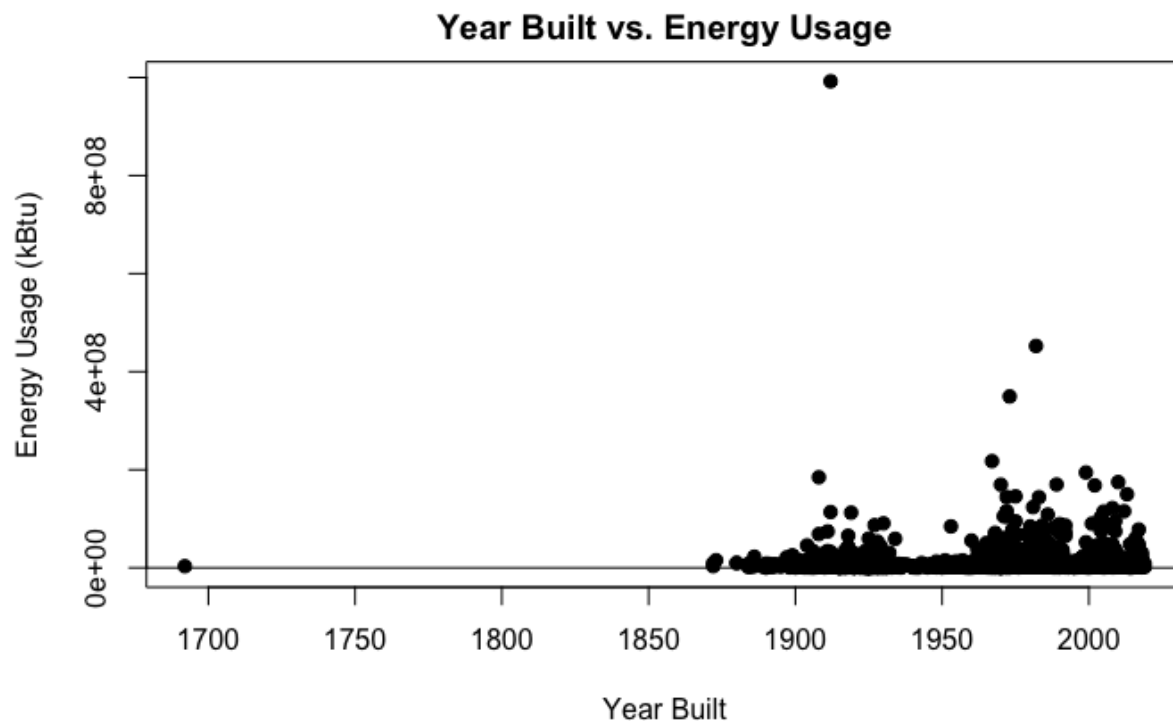
This graph shows the correlation between the Year Built and Energy Usage. Based on the chart, it is safe to assume there isn't a correlation between the year built and energy usage. The multiple R-squared value is 0.002368, which confirms there is no correlation between the year built and energy usage, meaning that advancements in architecture don't affect energy usage.

In this project, I found the factors that cause buildings in Chicago to use the amount of energy they do. Through my analysis, I concluded that the floor area and the property type are significant reasons for the building's energy usage. Some buildings are much larger than others,

meaning they will inherently use more power. And some types of facilities, such as data centers, have power-hungry use cases and are being run continuously. Another relationship that I have found to be uncorrelated to energy usage is the age of the buildings. I have learned a lot about the different factors that do and do not impact the energy usage of various buildings. However, there are still many factors of energy usage that I have not analyzed. In my brief analysis, I have concluded that the floor area and property type affect the amount of energy a building uses.