ESC ENERGY CASE STUDY:

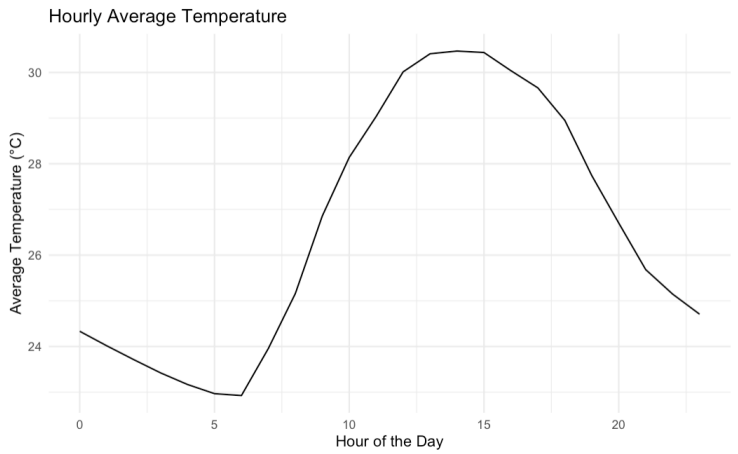
Climate and Physical Factors that Impact Energy Consumption- preventing customer energy blackouts

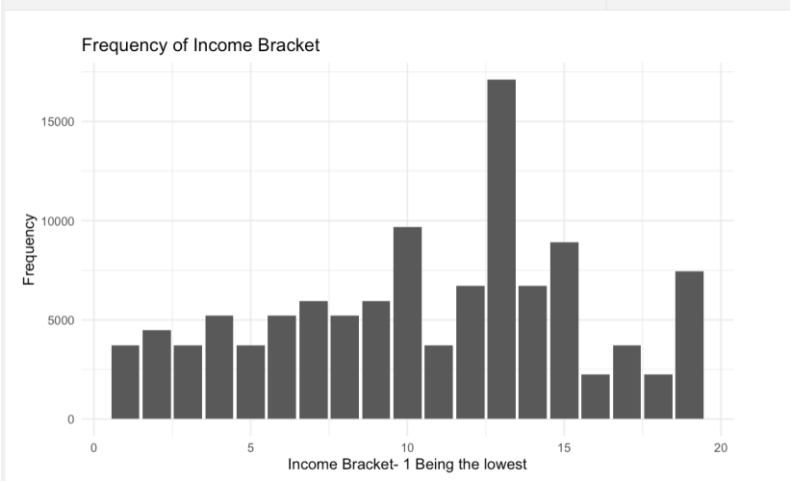
Business Case:

- Goal: determine what factors correlate with the highest energy consumption in homes across North and South Carolina during the summer.
- Need: Understanding what factors may cause for higher risk of energy blackout in this area

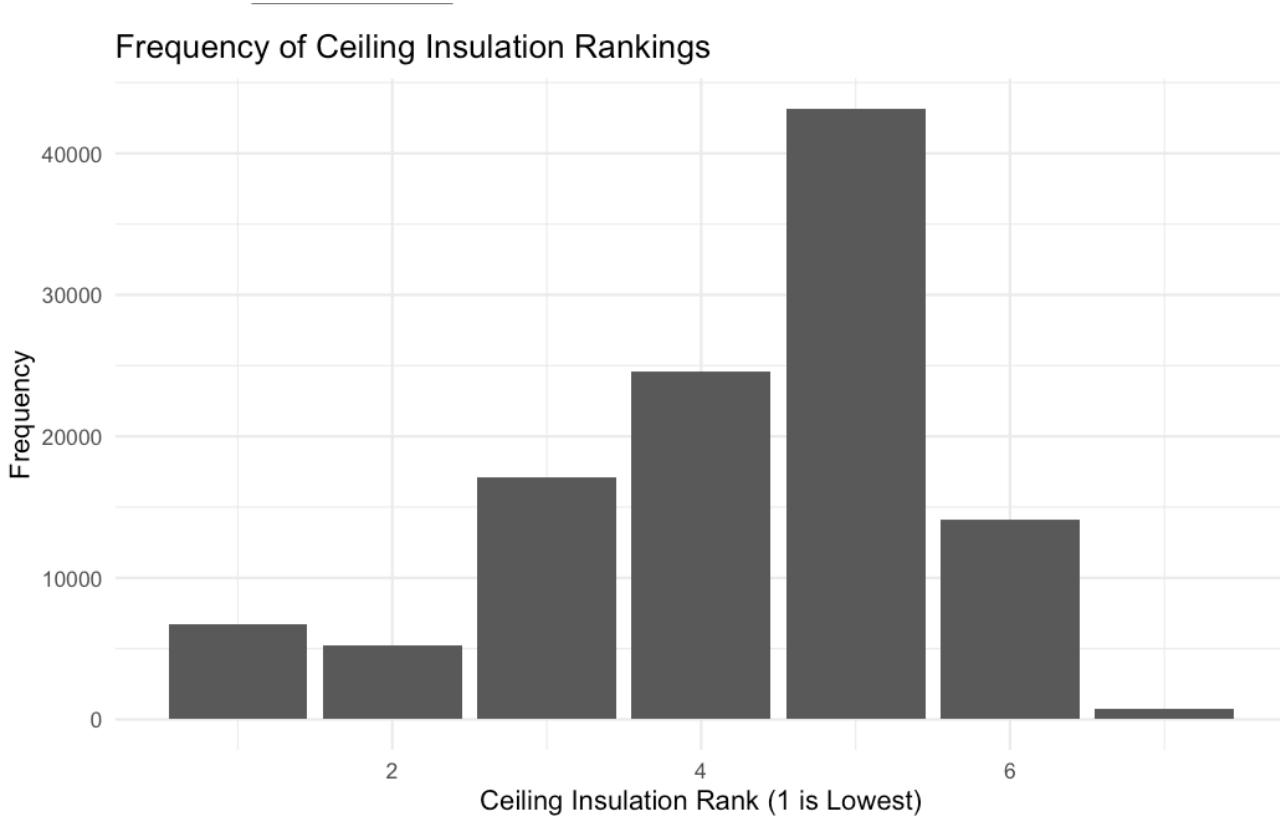
Areas of Note

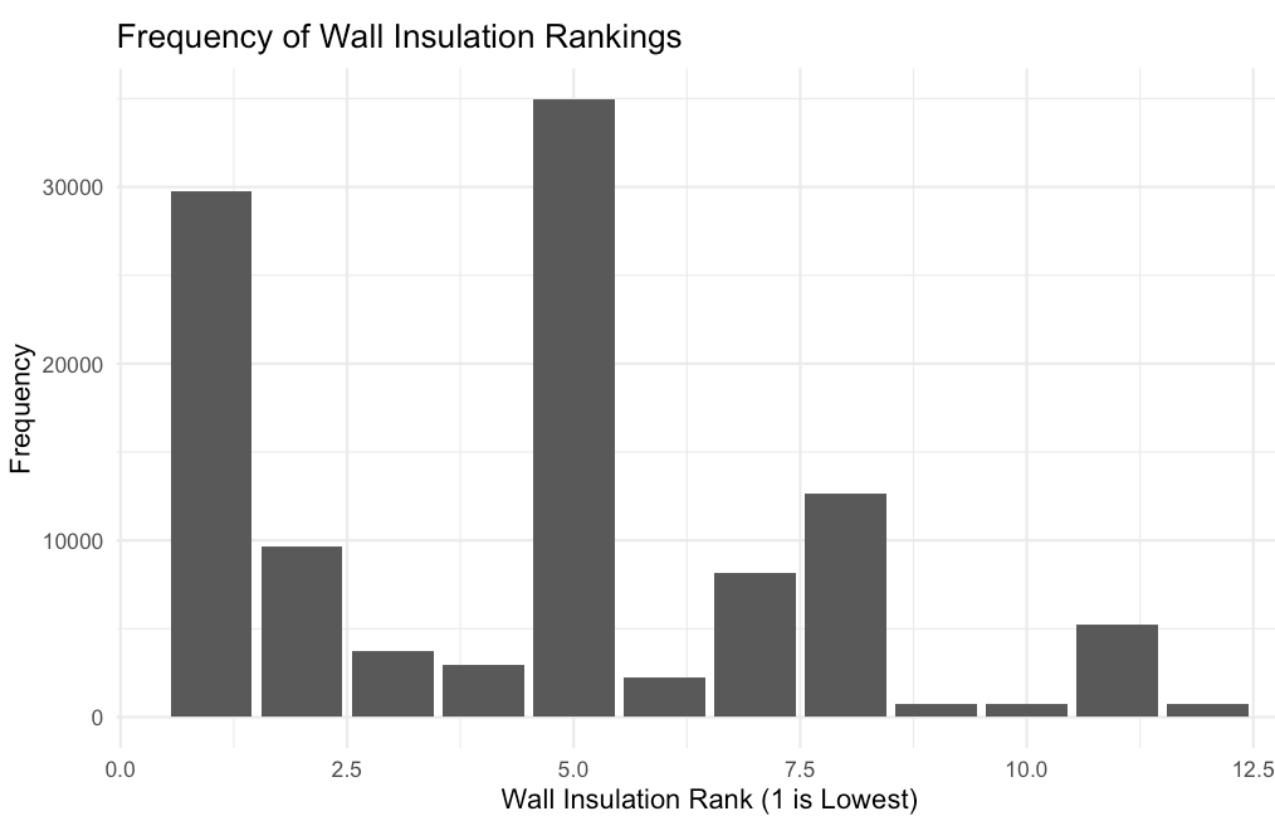
- The average temperature during each hour of the day is likely to be correlated with energy consumption during those times
- Income is another area of interest, each income bracket may be related to energy consumption in some way





INSULATION MAY BE AN IMPORTANT FACTOR





ML Modeling- What Were the Results and Findings

- I used four models in my Predictions, Linear Regression, Decision Tree, TreeBag, and Support Vector Regression
  - All of these provided scientifically valid results

My research focused on SVM modeling specifically, which showed that my predictions compared to the testing data was accurate in a considerable amount of the cases across the 111,600 rows

Results

- **Income** is plays a large factor in energy consumption during the hot months of summer
  - There is a relation between lower quality insulation materials, ducts, and other physical building factors with income
  - There is a strong relationship between income and energy consumption per square foot
- Temperature was **not** the strongest predictor of energy consumption, square footage, diffused radiation, income, duct quality, insulation quality, and window type all played a strong role
- Usage level of appliances was lower on the scale of strength in my predictions, meaning it has less of an impact that one might suspect

Recommendations to ESC

- Be cautious about providing energy to homes with low quality or inefficient insulation and material quality
  - This also presents an ethical dilemma, lower income areas are more prone to have lower quality construction
- Prepare the largest bandwith of electricity during the hottest hours of the day
- Continue to research factors that impact consumption
  - My model does not paint an entire picture, and second opinions would be a good choice