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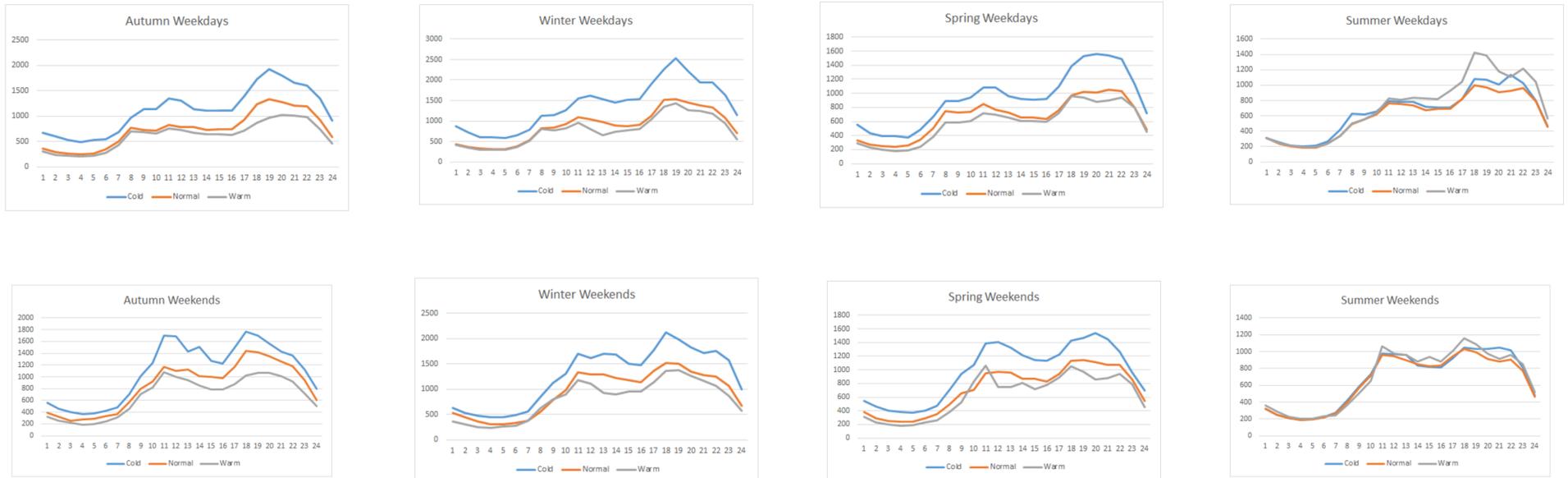
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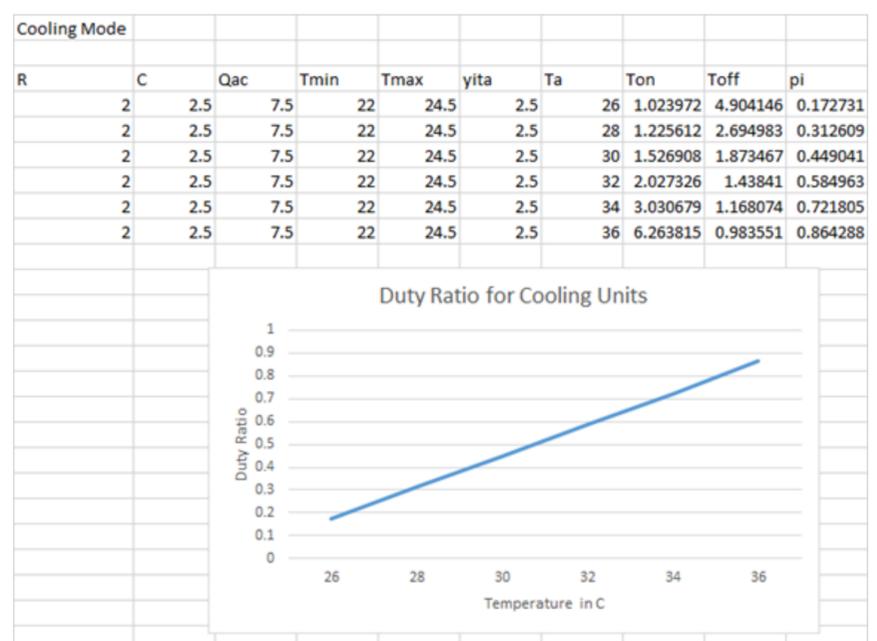
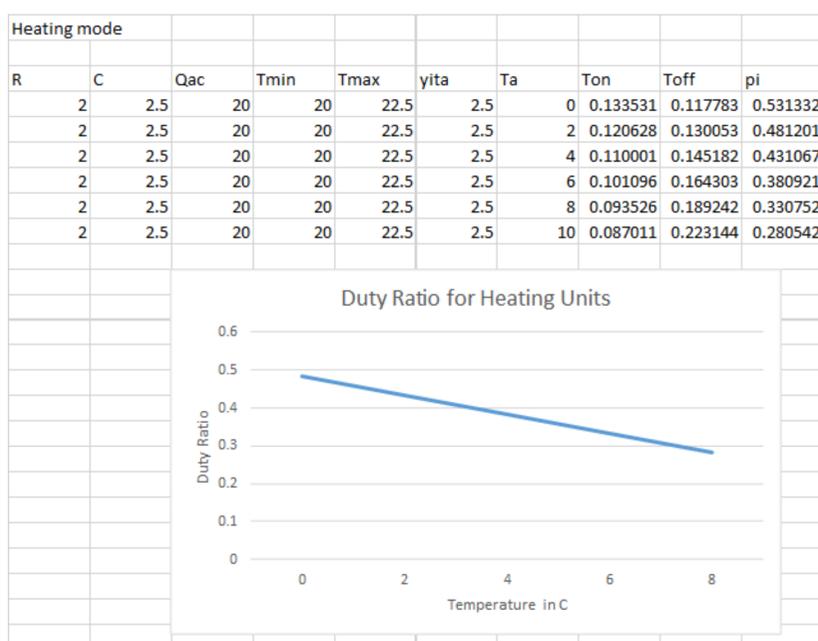
Residential Load Profile Throughout the Year

Using data collected from 1992 and 1993 by NorthWestern Energy, we graphed the load profile for 100 residents in the area. The data is graphed as kilowatts vs. time. Each graph represents a different season of the year and the time of week. Data for different temperatures was also included.



As seen in the graphs, power consumption is at minimum at night. Most people would be asleep and use a reduced amount of power. Also, all graphs indicate that power consumption reaches a peak at around 5:00 pm. As adults return from work and children came back from school, they consume much more power at home. Activities include cooking, watching television, and using air conditioning. Additionally, the trend shown in the duty ratio graphs are present in the residential load profiles. In the winter, the colder temperatures are shown to cause a higher usage of energy. Because it is cooler in the winter, heating units work harder to warm up homes. Similarly in the summer, air conditioning units use the most power in warm temperatures.

We investigated the operation of air conditioner units in response to the outside air temperature. We used hypothetical yet realistic data and constants to determine the activity of the units known as duty ratio. The duty ratio is the proportion of time that the unit is active during its work cycle.



Based on these results, a general trend can be established for the power consumption of a suburb throughout the day and year. Because electric companies must equalize their energy supply with consumer demand, it is important to be familiar with daily trends, and it is even more important to be able to predict changes to the trends based on environmental factors. The power grid is a fragile system that requires constant monitoring and observation. With knowledge of energy usage and potential complications, electric companies will be able to adapt and maintain consistency in their systems.