1. + Energy dataset: detect correlation among time, voltage imbalance, waste power and the energy usage for different types of appliances.

+ Dataset: contains the measurements of electric power consumption in one household with one-minute sampling rate over a period of almost 4 years

+ Significant insights into utility consumption trend and the correlation between minutes, hours, days or months and the energy usage of different types of appliances.

+ Make better use of the power.

1. + 1st plot: general graph to get a basic idea of how much energy that the family uses for the past 4 years.

+ Distinct pattern of electricity usage in the family with the most electric consumption in December and January and the least electric consumption in June or August.

+ Able to reduce the energy consumed by other appliances.

+ The total active energy consumed by the high electric water-heater and an air-conditioner is still kept at the same significantly high level.

+ The reactive energy (or unusable energy) doesn’t change.

1. + 2nd plot: even though the active energy increases and deceases in different months, the reactive energy remains roughly the same and even increases when we use less active energy.

+ Need to pay is both the active energy and the reactive energy.

+ Plotting the power factor that tells u the ratio of the actual energy that you use over the energy that you need to pay for.

+ In general, good utility of energy should reflect higher power factor over time.

+ Reducing active energy is good but if the power factor drops, it means there are some problems.

1. + Common sense that energy usage depends on the daily schedule of each family.

+ Useful to plot the cycle of the average usage of active energy in each hour block in different months for different categories.

+ This family has a pretty consistent routine of schedule: different types of appliances have different peaks throughout the day.

+ Even though all other types of energy have a significant drop in July and August, it seems to me the energy used for the laundry room doesn’t seem to decrease a lot.

+ Leads me to plot the next graph to see more clearly the actual amount of energy used for each type of appliances in the house.

1. +The area of each circle tells you how much energy was used. As you can see, in the laundry room, the energy used was pretty uniform through out the day and especially in July and August.

+ Actually tells us there are some appliances that consistently run in the laundry room.

1. + Work with voltage and the intensity to see if we can detect any imbalance or harmonics.

+ The electricity shouldn’t experience any voltage fluctuation over time.

+ Take a look at Box Plot see the distribution of data based on the five number summary: minimum, first quartile, median, third quartile, and maximum.

+ Non-parametric and doesn’t rely on any assumption and it can basically give you some basic information about the spread of the data.

+ Ideally, we wanted to see a very short box with min and max values are smaller.

+ The voltage fluctuates more during the winder and less during the summer.

1. + Help electricity companies to understand the pattern of surges in power usage and the families to monitor their own utility use according to their own schedules.

+ In terms of economics, brings a potential new source of savings and profits.