Covid-19 impact on Electric Power

Links:

Dashboard Hyperlink: https://niranjanpm.shinyapps.io/Datathon/

GitHub repository link: https://github.com/Niranjan-p-m/Datathon

Introduction:
Covid-19 affected the energy sector in an unpredicted way, International Agency predicts largest ever drop in demand, as the majority of industries are shut down during the COVID-19 lockdown period. But domestic usage has been increased for various reasons because of lockdown, which made government agency difficult to analyse and produce the electricity. To help the government and agencies to analyse better, I have a model through which we can analyse and take actions as and when needed.

The world is a big place, it's home to over 7 billion of us and in the next 2 decades will have another 2 billion join the party, going further we're going to need a ton of energy.

As we become a more digital civilization, we require more electricity power for our gadget also as our world grows increasingly connected, we need to transport a lot more stuff including ourselves to meet all of this demand. we need to get energy from wherever we can get it, right now fossil fuels apply about majority of that energy with the remaining 20% coming from sources including nuclear power, biofuel, hydro and other renewables like solar, wind .So, it is important to know the demand and production of electricity adequately to save fuel and reduce the pollution caused by fossils.

Dataset description:
The data set contains hourly power usage of two storied house located in Houston, Texas, USA. The data set contains hourly power usage in kwh starting from 01-06-2016 to August 2020. The dataset has marked notes for weekdays, weekends, COVID lockdown & vacation days in notes category column.

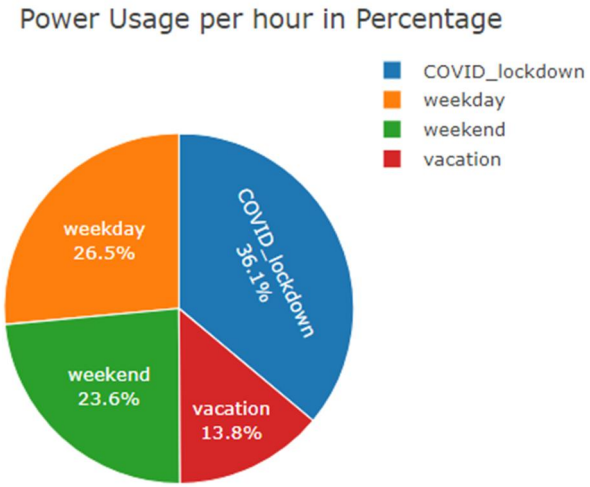
Power usage during daytime is different from night-time. The electrical devices that are inside the house are security DVR and POI cameras, 2 x refrigerators, 2 x 50gallon water heater that are on during daytime. At night several electrical bulbs, TV's, washing machine, dryer and AC run from evening 6pm to morning 8am.

Another data contains historical weather report of Houston, Texas starting from 01-06-2016 to August 2020. Thanks to wonderful weather at Houston, Texas we are blessed with almost 9 months of summer. Starting from Feb month to Nov month and winter is only for two months December and January for most of the years.

Power Usage 2016 to 2020 data file.
Notes column: -
Vacation setting: - '"AC and electric bulbs turned off"
COVID- Lockdown: - 'AC is turned on during daytime, laptops, monitors etc., are on"
Weekday: - 'Morning 7am to 5pm "AC is 84 F temperature during summer and heating set at 60 F during winter".
Weekends: - 'Room Temperature is set at 78 F during summer and 68 F for heating during winter"

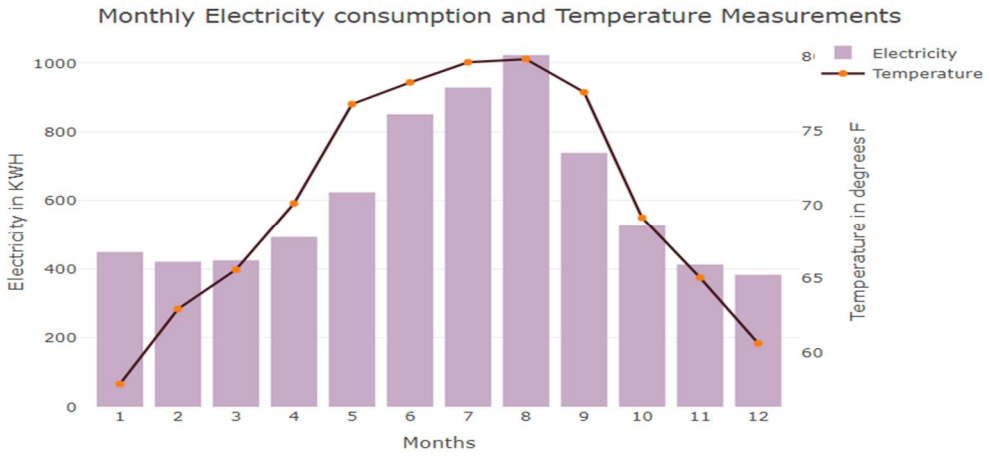
Weather 2016 to 2020 daily
Units
Temperature in F deg
Dew Point in F deg
Humidity in %age
Wind in mph
Pressure in Hg
Precipitation in inch

Analysis
When do you consume most power?



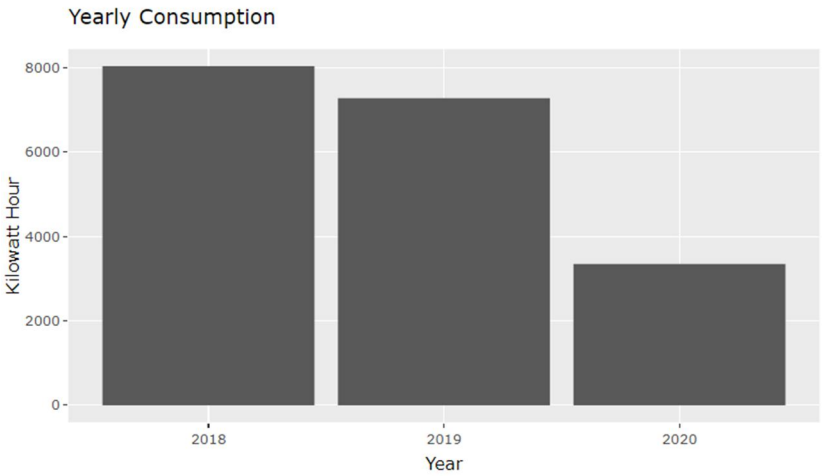
During vacation period the power consumption is least. The AC power settings were changed to 84F during summer and vacation period. The weekday, weekend have 26.5% and 23.6% consumption. During COVID lockdown power consumption is very high, it is almost 36.1%. By this we can conclude that domestic power consumption is increased.

How much does temperature effect power consumption?



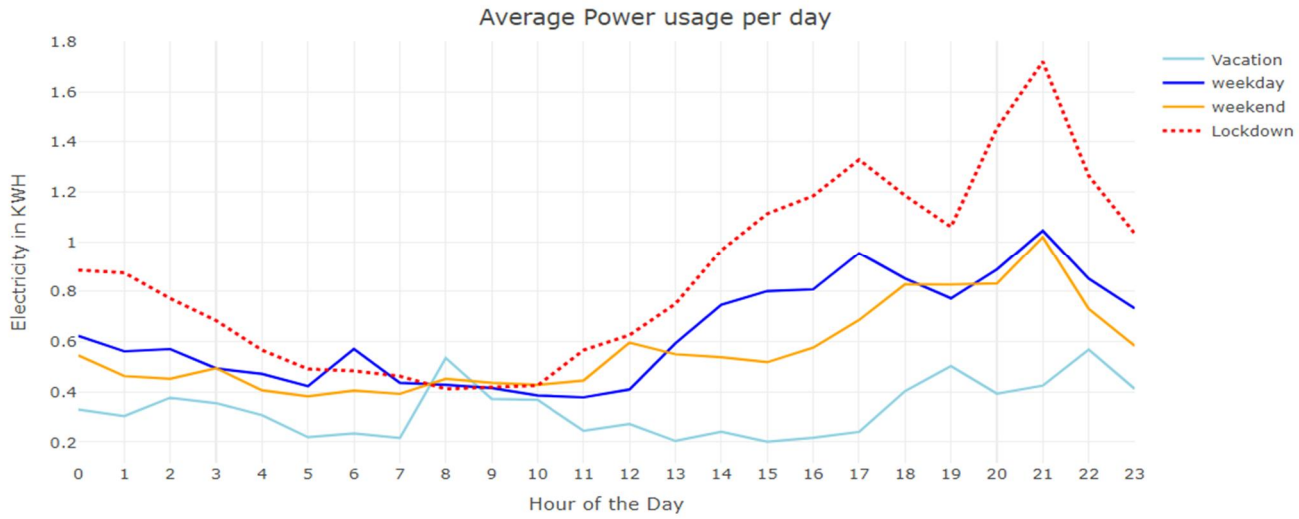
The power consumption increases during months of June to September month, during this period temperature is in the over 70F. So, as the temperature increases, power consumption also increases.

Is power consumption year over year same?



Total Power consumption is reduced from the year 2018, as the industries are shutdown in USA at the end of the year 2019 due covid-19 and complete lockdown in 2020 lead to the reduce in the use of the power.

Peak hours for power consumption in 2020



Power consumption peak hours is between 16hrs to 24hr, it winds down to normal usage during daytime. The spike is seen due usage of AC, lights, and TV's. Low usage is seen during daytime between 5 Hrs to 14 hrs. During vacation period, the AC settings are changed to 84F and hence you see less power consumption and they might have away from the house for some work.