Electric Submeter Installation Summary Report

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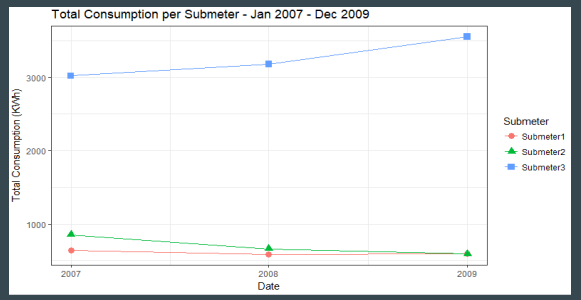
IOT Analytics

Goal Summary

- Provide Additional Value to Customers by building “Smart homes” that would provide home owners with analytics to monitor and control the power usage on their own.

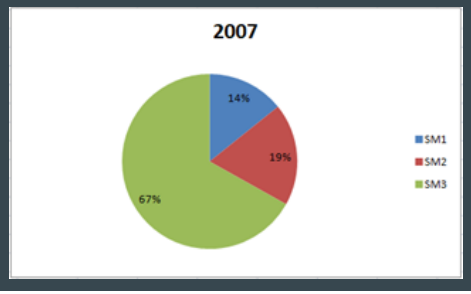
Data Analysis

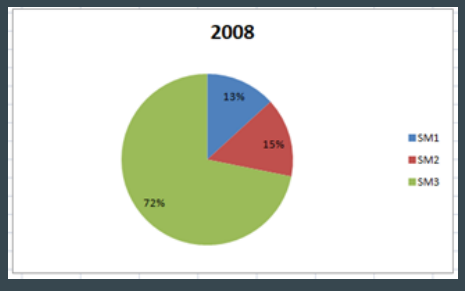
Based on the Data Science framework process that was highlighted in previous session, IOT Analytics team performed a detailed analysis of the data collected from different Submeters and was able to obtain a good insight of the consumer's power consumption behavior.

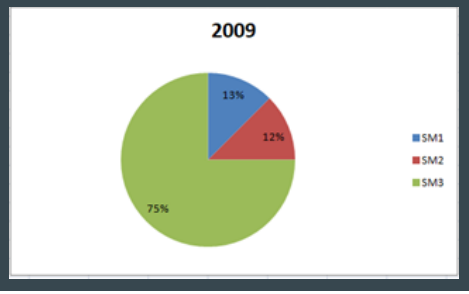


<u>Overall power consumption behavior(2007-2009):</u>

- Submeter 3 – Electric water heater and Air conditioner usage in the house hold is the highest overall through out the years and the trend looks to go upwards.
- Submeter 1 and 2 – The power consumption of various kitchen appliances and other utilities seems to go down after installation of sub meters.



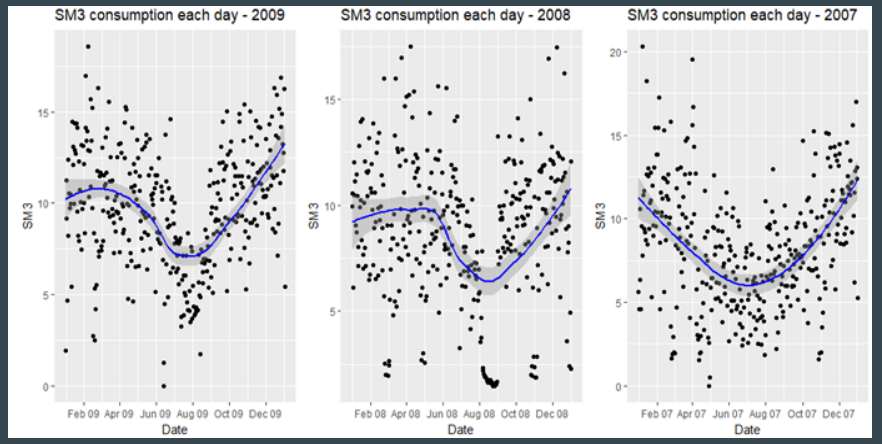




Data Analysis – Cont'd

Closer Look at 'Sub Meter 3' consumption levels on monthly basis (2007-2009)

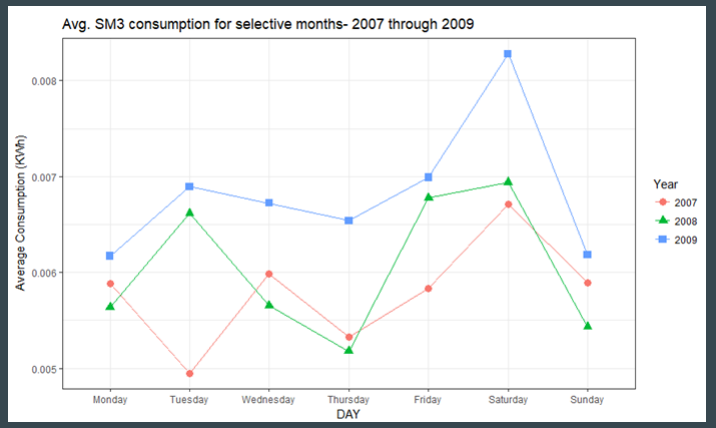
- Overall, July and August are the months consuming lowest power .
- Power consumption trend seems to go upwards after August through the year end in all cases.
- Submeter 3 consumption level was decreasing constantly after January through July in 2007 but years 2008 and 2009 looks little different . In 2008 and 2009, there is a small upward trend initially followed by a downward trend. On doing a detailed analysis on this behavior change, it was found that the consumption of power on 'Tuesday' had increased significantly in 2008 and 2009 compared to 2007.



Data Analysis – Cont'd

Insights on 'Sub Meter 3' average consumption levels on daily basis (2007-2009)

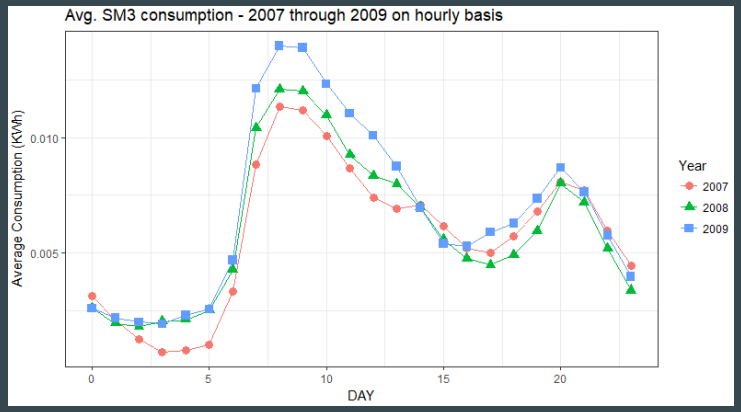
- Saturday was recorded as the highest power consumption day followed by Friday.
- Tuesday was lowest power consuming day in 2007 but in 2008 and 2009, it increased substantially. Additionally , consumption on Friday and Saturday was more in 2008 compared to 2007.
- 2009 readings were recorded high on all days compared to 2007 and 2008 in Sub meter 3.



Data Analysis – Cont'd

Insights on 'Sub Meter 3' average consumption levels on hourly basis (2007-2009)

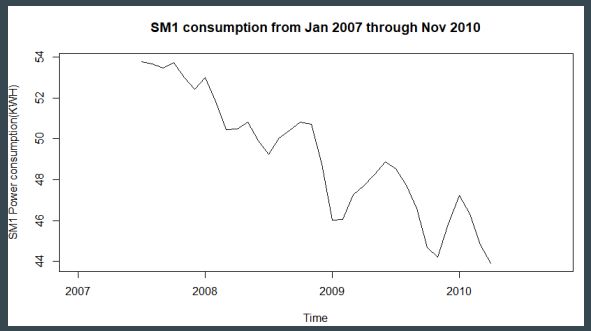
- Power consumption increases substantially from 5 AM and continues through 10 AM.
- Peak consumption is seen around 8-9 AM and then continues to drop until 4 PM
- There is a light increase in trend again around 5 PM through 8 PM .
- Lower readings in Sub meter 3 are seen around 2 AM – 4 AM on average.

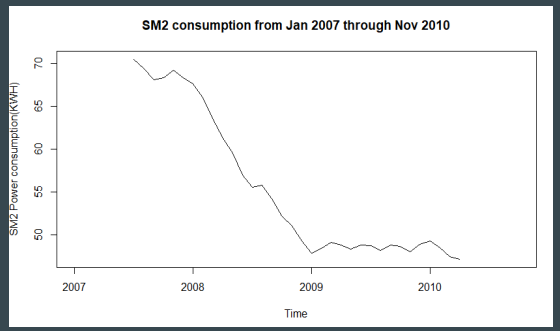


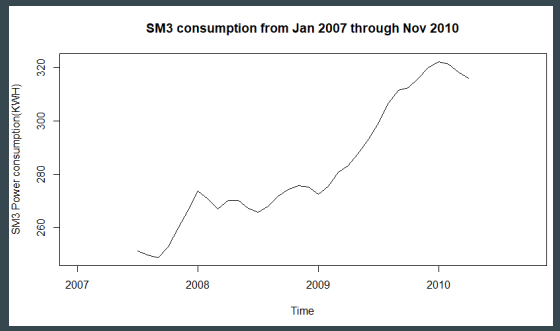
Trend and Forecast

Following graphs shows overall trend of energy consumption of electric sub meters 1 , 2 and 3 from 2007 through 2010.

- The trend of Sub meter 1 (SM1) and Sub meter 2 (SM2) are seen to go downwards over time.
- Sub meter 3 (SM3) consumption continues to move upward over years.



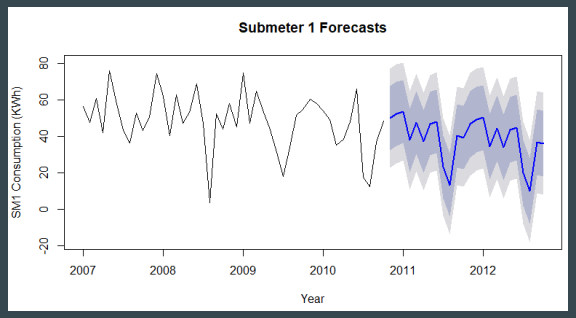


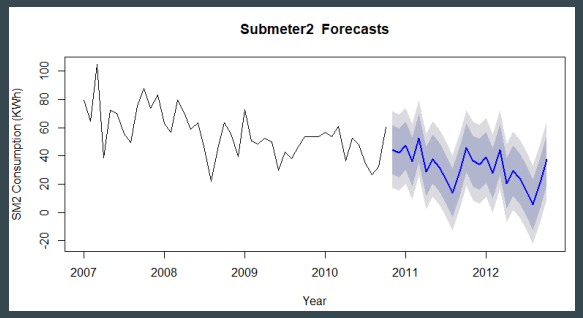


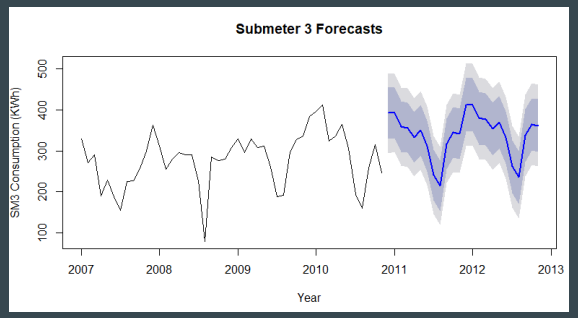
Trend and Forecast – cont'd

Following charts showcases the forecast of total power consumption of Submeters 1 ,2 and 3 over the next 2 years.

- Submeter 1 and 2 had a decreasing trend as seen in the previous slide and the forecasts is also seen to go down a bit where as forecast for sub meter 3 consumption is set to increase further over the next couple of years.
- Forecasts for 2011 and 2012 are plotted as blue line , the 80% prediction interval as dark gray shaded area and 95% prediction interval as light gray shaded area.

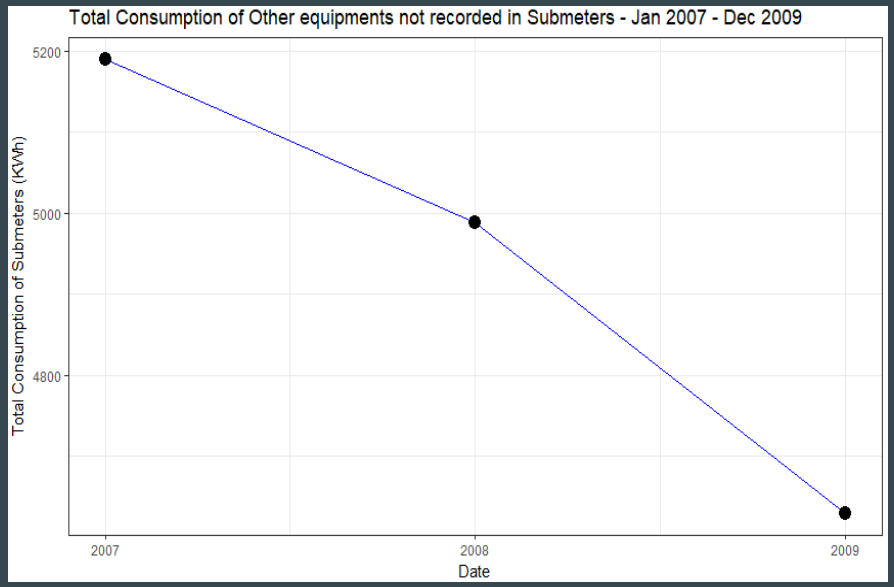






Trend and Forecast – cont'd

• Total power consumption in the household by electrical equipment that was not measured in sub meters 1 , 2 and 3 had also come down after installation of electric sub meters.



Recommendations

Total power consumption seems to increase over time after installation of sub meters and the primary reason for it is because of the higher power consumption by equipments as part of sub meter 3 which are electric heater and air conditioner. Sub meter 1 and 2 are under control. Following are some of the key points that can be considered to help optimize the sub meter 3 readings -

- Electric Heater and Air Conditioner which are being recorded in 'Sub Meter 3' needs to be checked for maintenance. This is because the power consumption of these equipments are constantly increasing over time .
- Thermal Insulation of the house needs to be cross checked to make sure the heat is being retained properly during Winter season.
- Check with the household members and understand their air conditioner and electric heater usage patterns on Saturday compared to Sunday since the usage of these equipments on Sunday is less than that of Saturday .
- Since the average usage of electric heater and air conditioner in the house hold is lowest on Sunday, we can check with the household member to move some of their cooking / washing activities from Saturday to Sunday to any avoid peak charges.
- Cross check whether the Air conditioner/ Heater settings in the household are set at optimum values even though there is no one present at home.

Questions?

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