

Why We Should Install Submeters

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Background – Submeters Explained

There are many ways a building/apartment is measured for its electricity. One way they usually follow what is known as “master metering” where the whole building’s electricity is measured, and the owner pays that bill to the electric company. However, some places also has “submeters” that can measure the individual apartment’s electricity.

Without submeters the landlord will likely bill each household a fixed amount. Which is likely to be more than the household will realistically use each monthly as the landlord will want to play it safe incase a household uses a ton of energy. So, if they had submeters, the landlord would bill the exact amount the household consumes.

Background – Submeters Benefits

Consumer's electric bill will be lowered:

The bill will be exactly what the consumer owes and because the landlord will want to play it safe without submeters, the monthly bill will be less.

Consumers will be encouraged to save energy:

Because they will pay what they owe, this will incite them to use less energy to save money.

Landlord's life will be easier too:

Estimating how much to charge for the electric bill can be hard as it is very unpredictable. Submeters will make it, so landlords can simply charge each apartment how much their submeter measures.

Goals of this Project

- Are Submeters useful?
- Can we predict future energy consumption from previous data?

About the Data

For this project we quarried data from a database containing electric info on individual households over a period of about 4 years 2006-2010.

Some of the relevant attributes it has are:

- ❖ Date
- ❖ Time
- ❖ 3 Submeters
 - ❖ Submeter 1: kitchen appliances such as dishwasher, oven and microwave
 - ❖ Submeter 2: laundry room that includes washing machine, dryer, refrigerator and light
 - ❖ Submeter 3: air-conditioner and heater

Prepping the Data

We can't just use the data from the get-go, we must make some modifications to it. For example, each year was split up into separate datasets and they contained extra attributes that are not relevant for analysis. So, we had to remove those and combine the datasets. However, one important thing to note is that we checked to only include years that had data available for the entire year. 2006 and 2010 did not have a full year's entries, so they were left out when we merged the datasets.

Prominent issues with the Data?

We have not discovered any major problems or flaws with the data. Currently the only point of mild concern would be that we only have data for 3 whole years in the master data instead of the 4 years we initially thought we had. However, this should not be a major setback and we believe this is enough information.

Statistics about the Data

sub_metering_1	sub_metering_2	sub_metering_3
Min. : 0.000	Min. : 0.000	Min. : 0.000
1st Qu.: 0.000	1st Qu.: 0.000	1st Qu.: 0.000
Median : 0.000	Median : 0.000	Median : 1.000
Mean : 1.159	Mean : 1.343	Mean : 6.216
3rd Qu.: 0.000	3rd Qu.: 1.000	3rd Qu.: 17.000
Max. : 82.000	Max. : 78.000	Max. : 31.000

Above are some statistics about the submeters.

On average we can see that submeter 3 seems to have the largest average, however, surprisingly, 1 and 2 have a higher max value. This is a bit odd but could be that one uses their kitchen appliances or laundry machines constantly.

High Level Recommendations

We believe adding a thermostat might be a great addition and add good insight to predict power consumption. This is true as if the set temperature is either low or high, it can tell us if they have the heating or cooling on.

We also believe that separating submeter 3 into two groups ,one for ac and one for heater, would be greatly beneficial. This is true as in a household, heating and cooling (assuming both run on electricity instead of gas) tends to use the most energy and we would better off if they were separated.

Lastly, none of the submeter show power usage from regular outlets. Hypothetically if it were available, we think it would be nice to have (even if it may be a lot lower than the other three).

Conclusion

In the end, we believe we should go forward with installing the submeters as there is plenty of benefits for both the consumer and owners.

This time we looked at the data and did initial surface level analysis using statistics. However next time we will do more in depth stuff regarding can we predict submeter usage. We look forward to sharing the info and results we will gather from that!