BLACKWELL

Data Analytics

Smart SubMetering & Innovative Energy Management Systems

Agenda

1. Smart Homes & Electrical Submetering
2. IoT Data Analytics for Smart Homes
3. Initial Data Exploration of Electrical Submeters
4. Innovative Potentials and Recommendations

Business Challenge

smart submetering to monitor electricity consumption of specific rooms & appliances

tracks power usage continiously and transmits the data instantly to user

opens insights into energy consumption in details!

where energy is beeing used, how is it beeing used and who is it beeing using

peaks, wastage, inefficiencies, irregularities

Smart reduction and smoothing of energy consumption

Reducing costs and waste of ressources

Smart Electrical Submeters

Master Meter connects to smart grid
for energy and information exchange

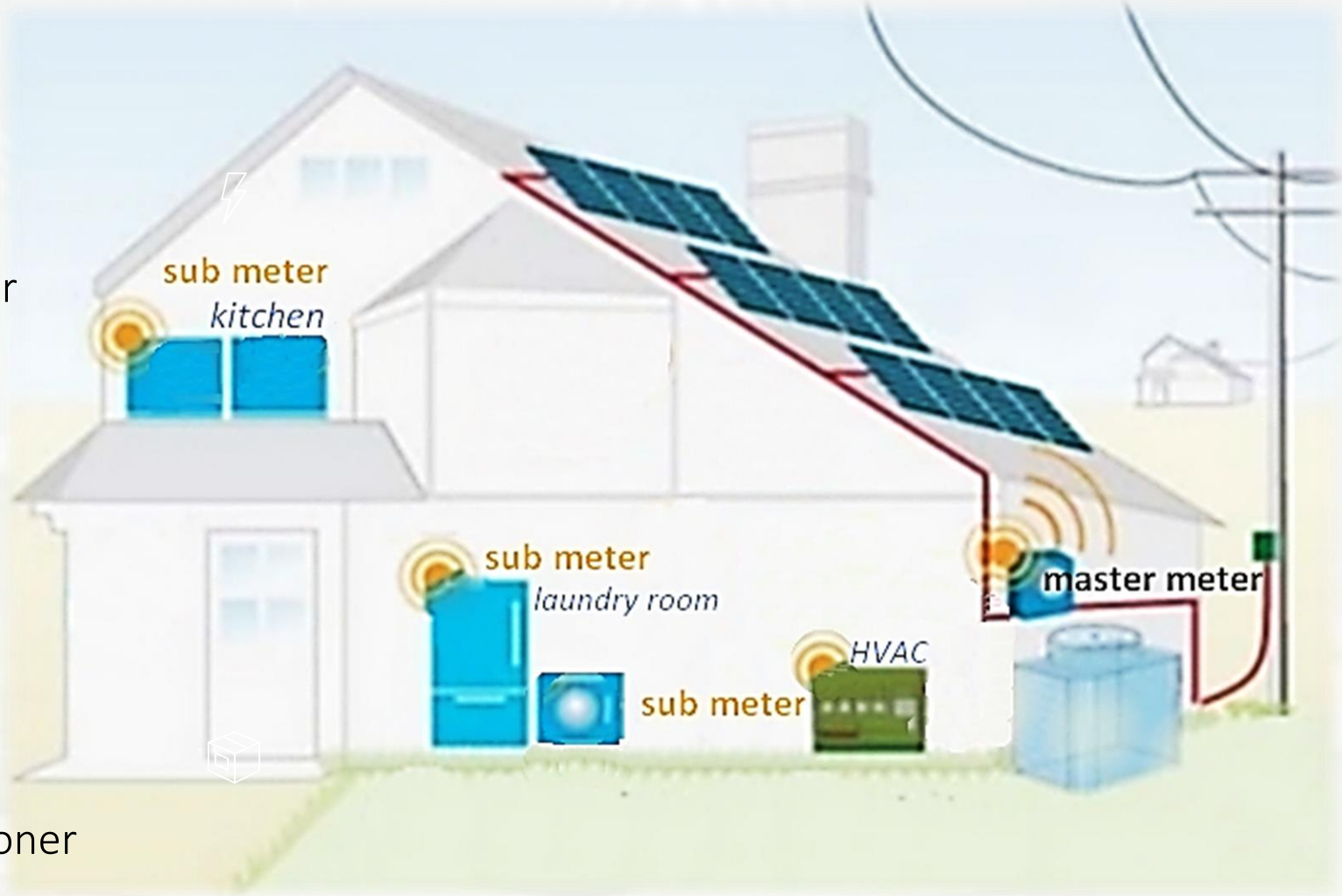
Submeters are connected to Master Meeter

<u>3 Submeters</u>

Kitchen: dishwasher, oven, microwave

Laundry: washing machine, tumble dryer,
refrigerator and a light

HVAC: electric water heater and air conditioner



Data Analytics for Submeters

Technology isn‘t the problem, but decision what to measure

Continious flow of huge amount of private data

-data protection through anonymisation

-efficient data management and storage

Converting data into actionable items

Provide analysis and visualisations for Smart Home users

Task: uncovering energy conservation opportunities

Time
Active Power
Reactive Power
Voltage
Global Intensity
sub-meter 1
sub-meter 2
sub-meter 3

total energy consumption

Submeters contain only 50% of energy consumption

Clearer definition of submeters and allocation of electric appliances useful

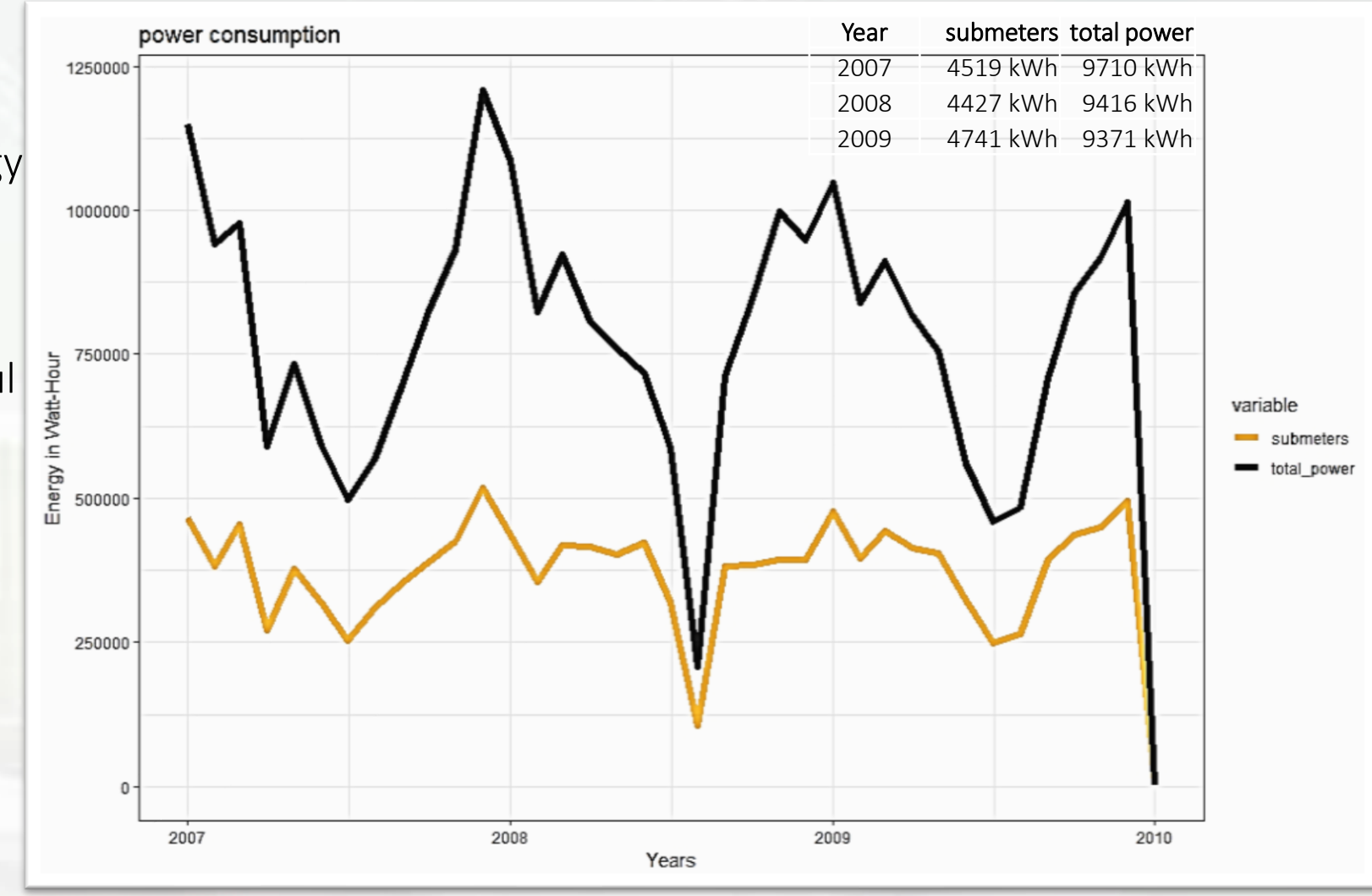
Total power consumption

2010: **9710 kWh**

Average household in France:

2010: **6343 kWh**

Source: World Energy Council



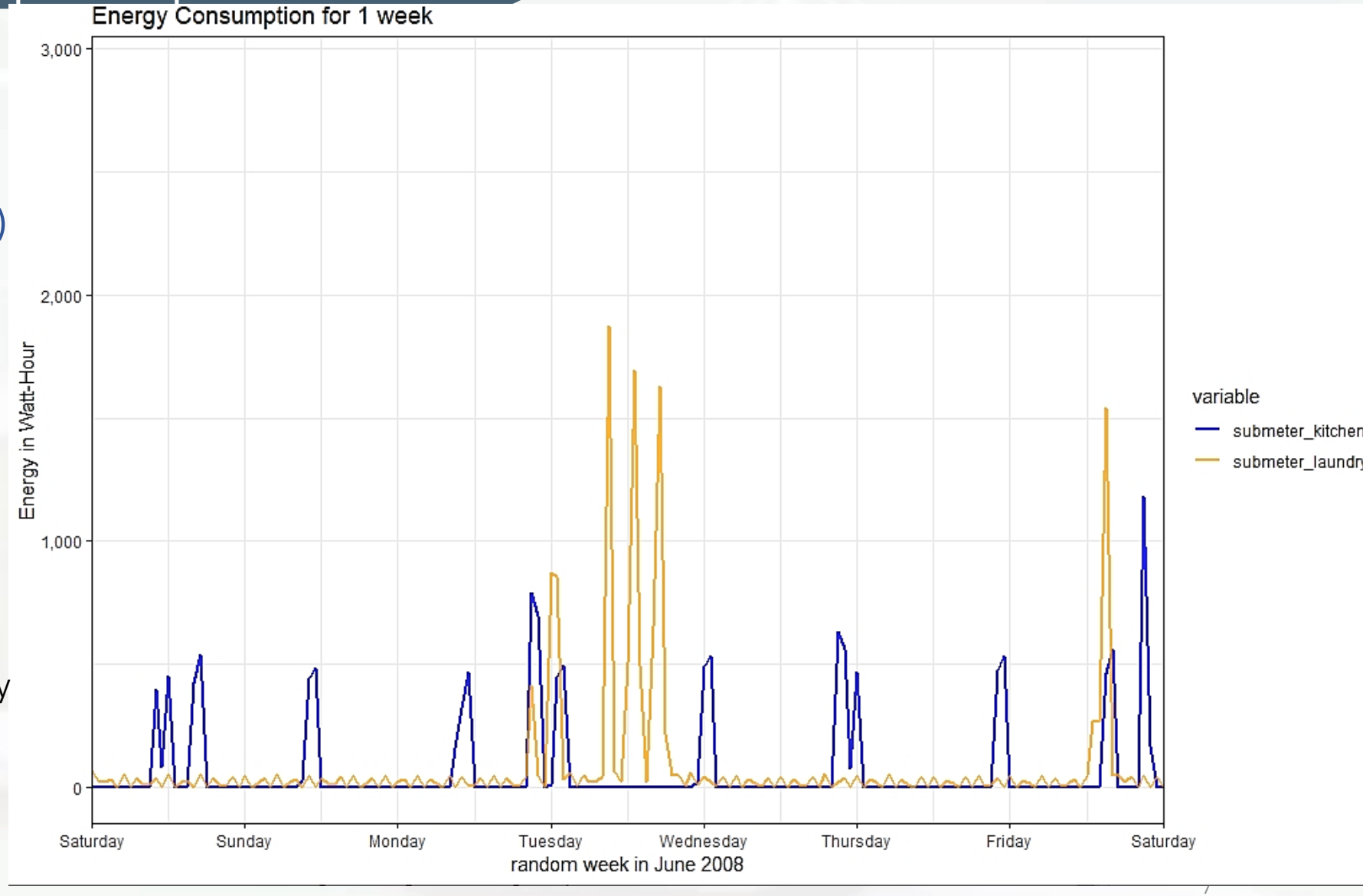
Example:
Energy consumption per week

Kitchen (oven, microwave,dishwasher)

- during weekdays dinner
- during weekend lunch & dinner

Laundry (Washing Machine, Dryer, Refrigerator,Light)

- doing the laundry on Tuesday,
- refrigerator pulls energy frequently

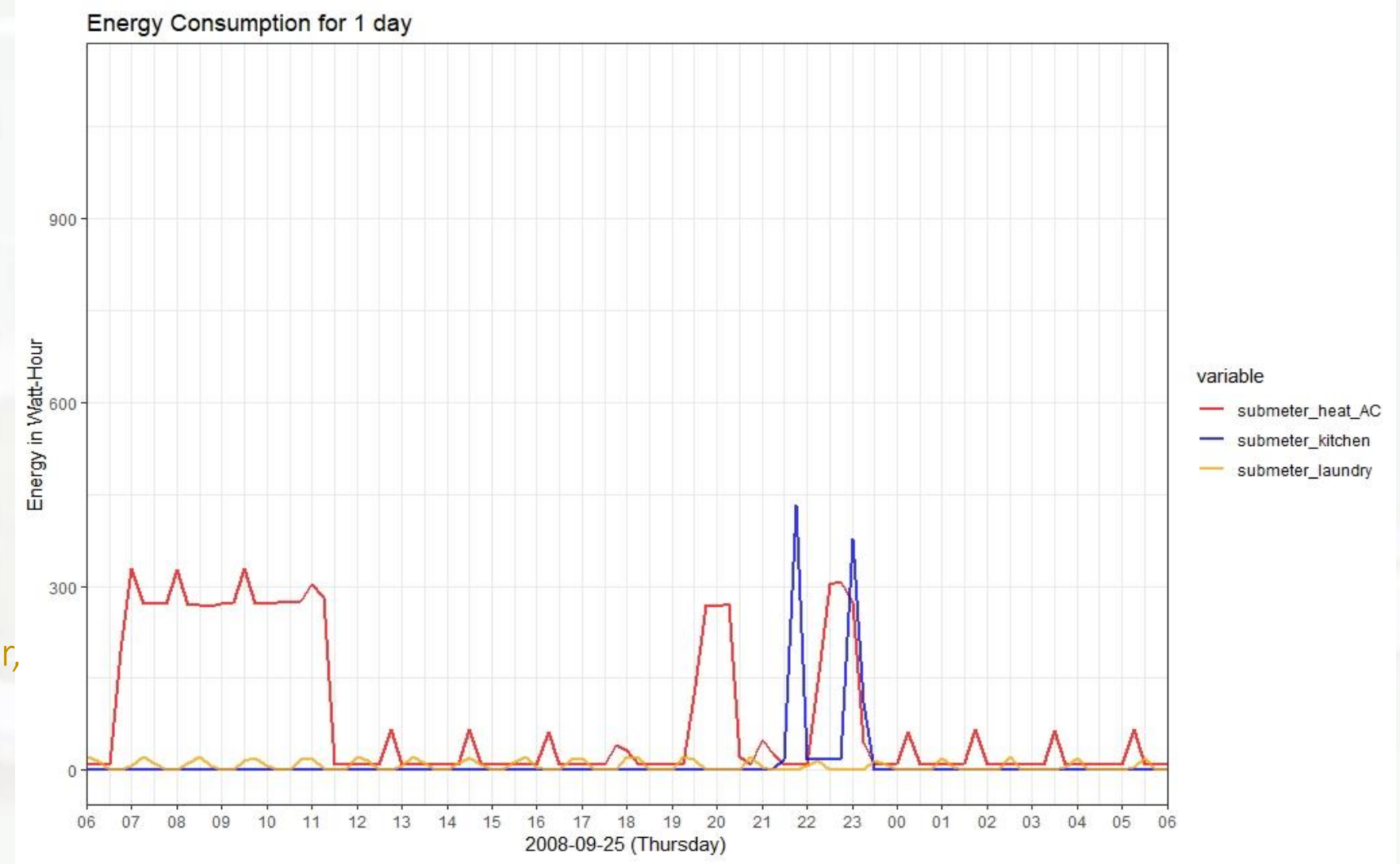


Example:
Energy Consumption of a day

Heater/AC
used in the morning

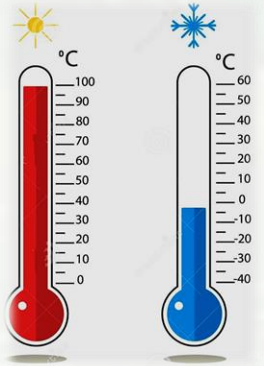
Kitchen(oven, microwave, dishwasher)
used late night for dinner

Laundry(washing machine, dryer, refrigerator, light)
not used except refrigerator



Change Data Configuration

- separating water heating system from air conditioning system
- Average household: 1/3 of energy for HVAC
- Heating and AC anticyclical during season
- Measure outdoor temperature, humditity



- measuring energy costs
- Important for customers applications

- About 50% of energy consumption not captured
- new submeter? New partitioning of appliances?

Potential Applications

- Listing Submeters: App for energy consumption
- Warning-System: energy peaks or unusual energy levels
- Smart Self-Scheduling-System: appliances used when prices low
- Security System: warning when power usage rises during absence


THANK YOU