Energy Efficient Behavior Interventions on a Smart Apartment Residents

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1. E-sogo Smart Apartment Project?

- E-sogo project: Zero Energy House in Apartment type
- Total floor space: 36,000 sq ft
- Room: 24 Living units, about 800 sq ft/room
E-sogo main facilities and passive design

- PV system
- HEMS
- Windows for aeration
- Surrounded green

- Solar heat system
- Highest level of thermal envelope
- Solar heat system

- Solar power panel
- Hot water storage tank
- SOLAMO (Share Roof)
- SOLAMO (balcony)
- Gas water heater
- ENE-FARM
- FC system
- HEMS
- Aggregate electricity
- Battery
- Charger
- EV
- Water supply
- Transformer
- Electricity
- Heat
- Water

CEMS
2. How much primary energy reduction was achieved?

The result of the first study (2012)

- Energy Efficiency Envelope and Architectural Design: 21%
- On site energy system: 9%

About 30% reduction

Comparison

E-sogo apartment

Equivalent Size apartment with a conventional design and system
The breakdown of electricity demand

Electricity demand/supply balance in 2012

Average demand (Total Apartment) (kWh/Day)

The power Dependency is 48% (kWh/day)
3. How can we achieve more energy savings by IHD?
Visualization of energy

- Home screen
- Energy usage history
- Ranking of the least energy use
Reservation of energy-saving action

- **Peak Shift action**
  Incentive points are provided to residents who shift their using time from regular time to the time which have excess to on site energy supply. They can engaged that on the tablet.

- **Peak Cut action**
  Incentive points are provided to residents who cut their energy use in the case of electricity supply tight.
Access log with HEMS

- Number of days with HEMS access
  January: Visualization of energy service to start
  July: Demand shift behavioral studies with incentives to start

- Very least access
- Beginning to access
- Always conscious
- Losing interest
4. What elements effect the energy usage?
The room temperature preferences

A: Room temperature of a living dining room
B: The use situation of an air-conditioner or a floor heater

Sample 1
Sample 2
Sample 3

By courtesy of Hitachi Ltd.,
Graphs are based on Life Tapestry* style

A: Room temperature of a living dining room
B: The use situation of an air-conditioner or a floor heater

Temperature (centigrade)
Plug loads

Electric power demand graph (average day) 2012 Dec.3

Average temperature: 5.8 degree centigrade

Typical load curve

This family likes watching television.

This family keeps

Electric Energy [Wh]

Other Plug Loads

Refrigerator
Washing machine
air conditioning (living room)
dishwasher
air conditioning (bed room)
television
air conditioning (second bed room)
Electric power demand
Living schedules

- The schedule is constant.
- The schedule varies.
5. Next Challenge
What is next?

We understood some elements effect on energy usage such as the room temperature preferences, plug loads, living schedules.

We need to understand more …

Who?

What?

How?
Thank you for your attention!!