

Buildings Breakout

Commercial buildings

- Privacy (or lack thereof) in office buildings provides more opportunity for instrumenting office buildings (versus instrumenting homes).
- Commercial BMS already include instrumentation; however sensors are often faulty and data quality is poor. Can we design IT techniques to do anomaly detection, fault identification, sensor (re)configuration. Should these techniques be fully automated or keep the human in the loop?
- Adaptive building envelopes that adapt to the weather: use IT algorithms to adapt (goes beyond adapting to energy usage).

User interfaces:

- how do we design simple interfaces for users to interact with smart homes?
- If programming the clock on a VCR is hard, can we expect a user to express preferences to an energy management dashboard. What interfaces/abstractions are suitable?

Energy storage

- Can we use energy storage (batteries) to flatten peak energy usage? In emerging countries, inverters that include batteries are common - can we exploit them to flatten the peak?
- IT algorithms to determine when to charge, when to draw upon batteries to shape usage
- Energy usage shaping as analogous to network shaping

Renewable energy and buildings

- Can we use renewable energy sources to flatten the peaks?
- How to deal with the intermittent nature of renewable sources to be fully self-sustainable instead of falling back on the grid each time?
- P2P microgrids: surplus power shared with other homes in the neighborhood. What infrastructure is necessary for such distributed microgrids?

Technology adoption

- How can we hasten technology adoption? What market incentives are appropriate to encourage adoption of conservation technologies.
- Behavioral science is important in this context. -- Relation to IT in terms of how users respond to data, how they change behavior etc

Water/gas usage

- Water is not a renewable resource - so need to design similar techniques to monitor usage, identify waste, encourage conservation, reduce usage footprints
- Recycling of water - rain-water harvesting,

Holistic view of gas, water, electricity usage - carbon footprint.

Issues in this field revolve around:

- Type of buildings: office, homes, commercial, industrial
- Type of resource: electricity, gas, water

- Supply versus demand-side management
- From monitoring to control