EPA ENERGY STAR Climate Controls

Stakeholder working meeting
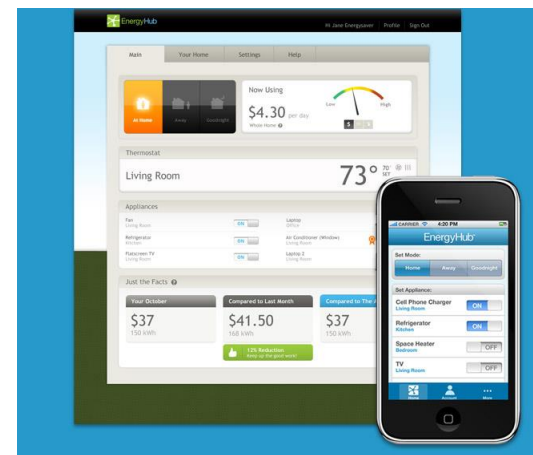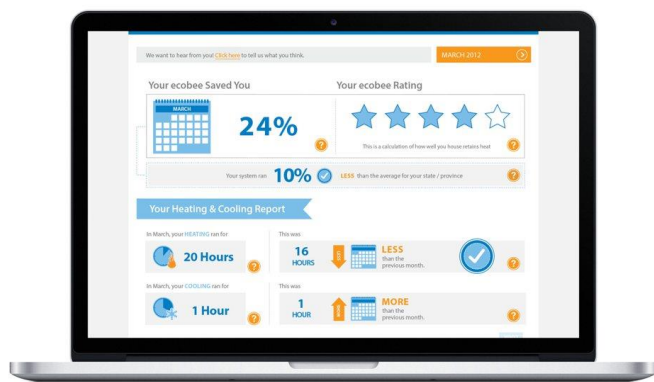
RCCS Field Savings Metric

2/27/2015

Agenda

- Reminder of what EPA is aiming for, purpose of the series of meetings (skip if no new participants)
- Any administrative issues?
- Review of previous topics
  - Data call
  - Any comments/feedback on latest metrics doc
- Today's topics to dig in to
  - Characterizing energy saving control of heat pumps
  - Multi-stage systems (from parking lot)
- Agreed actions
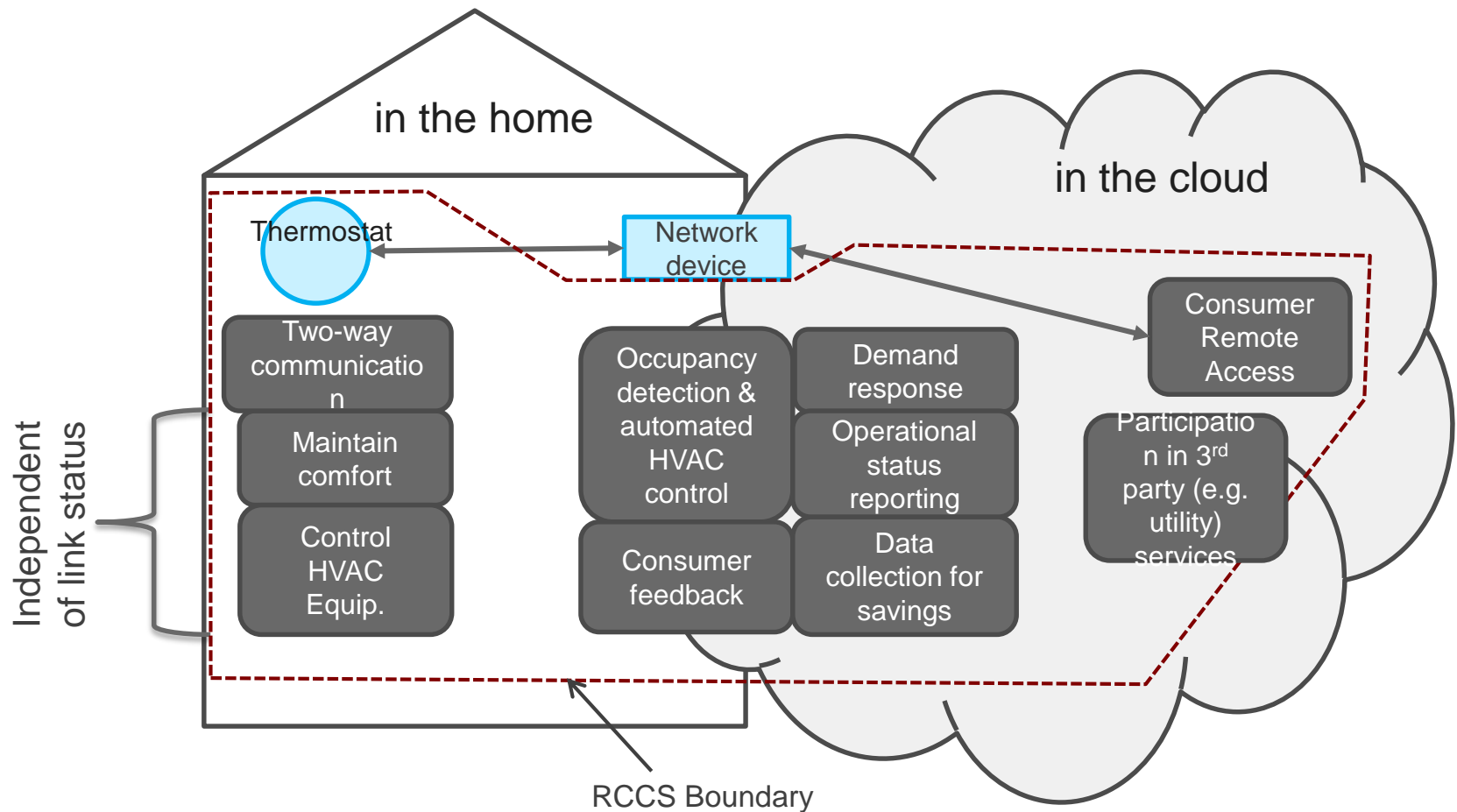- Parking lot review

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Introduction – A New Approach

- Large potential savings
- New product types & business models emerge
- Measuring RCCS savings being done today, but…
  - no standard methodology
  - savings claims vary widely

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Blend of local hardware and cloud services provides RCCS capabilities

in the home

in the cloud

Thermostat

Network device

Consumer Remote Access

Independent of link status

Two-way communication

Maintain comfort

Control HVAC Equip.

Occupancy detection & automated HVAC control

Demand response

Operational status reporting

Participation in 3rd party (e.g. utility) services

Consumer feedback

Data collection for savings

RCCS Boundary

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Program Outline

- Recognition for RCCSs that save energy in the field

- To earn the ENERGY STAR:
  - RCCS criteria that enables savings
  - Periodic reporting of savings

- Product includes service component

- ENERGY STAR Partner is service provider

- Periodic field data
  - Calculate program emissions reductions
  - Serve as energy savings data for QPL

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Step 1: Metric

- Ranks RCCSs based on field savings
- Uses data from RCCS or publically available
- Preserves consumer privacy
- Protects proprietary information
- Practical to calculate
- Activities to date
  - Framework 11/5/14; San Francisco meeting 11/19/14
  - Algorithmic framework 1/12/15; Stakeholder call 1/16/15
  - Stakeholder call and next algorithmic framework, 1/30/15

Administrative concerns?

- Anything we need to deal with?

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Review of previous topics

- Data call
  - Anything unclear? Full data call and correlation of zip codes to climate zones available at energystar.gov and on the Google drive.
  - When do participants expect to have data for us?
- Latest metric doc
  - Explored the question of calculating daily degree-days using hourly data or daily averages. Any feedback on that point?
  - Practical question to ponder- if expected to submit summary data including all or most of your installations, could you store a year of hourly data for each and then calculate? Could you store a year of daily data? Or is there a way to do a running calculation?

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Focus topics for today – heat pumps

- Two weeks ago, we started a discussion of how to characterize how well products were avoiding the use of strip heat.

- Last idea we heard was to use compressor utilization (as in the January metrics doc) but report it binned by outside temperature.

- Further discussion
  - daily outdoor temp or hourly?
  - More computation time? Not significant if using daily average outdoor temp
  - Look at it a couple ways to decide what is most useful
  - Recovery from setback? Captured already in set temp savings calc

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Focus topics for today – heat pumps

- Further discussion
  - Bins? 5 F bins down to zero F.
  - Run compressor and strip heat both at the same time – heat pumps continue to provide useful heat (COP > 1) down to 0F
  - Lockout temp protects compressor against super-cold temperatures
  - Metric then should be aux heat run time over total heating run time
  - Will probably include geographic bias because the practice for strip heat installation varies with design temperature
- Lockout controlled by thermostat, generally
- Hot-humid region heat pumps have heat?

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Focus topics for today – multi-stage systems

- Ideas for dealing with them
  - If input power of each stage tends to have a regular relationship to that of other stages (across product models), could do a weighted sum.
  - Other ideas?

- Discussion
  - For multistage gas furnaces, turn down ratios in fairly narrow range
  - For stages with essentially the same efficiency – this would not be useful for dealing with strip heat.
  - For cases where the two stages are the same efficiency, which one runs more doesn't matter to efficiency – base weighting on efficiency only?

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Focus topics for today – multi-stage systems (discussion)

– But weighting by energy consumption makes sense for the run time vs. delta T model, and for modeling with run time proportional to energy consumption.

– Higher capacity stage may be MORE efficient in actually distributed energy, because for example for low speed, you need to keep the leaky ducts warm all the time.

– A good connected thermostat might do something different in a particular home, based on the particularities of the home.

– But, would not generally know the input energy of the various stages.

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Focus topics for today – multi-stage systems (discussion)

– Percent savings from better set point may be the same regardless of the number of stages in a furnace

– The percent savings may be more different for multistage compressor system.

– In multistage system, you would get two sets of run time data, could analyze them to understand relative size of stages.

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Running parking lot

- Will providers use this method to make savings claims?
- Verification and gaming the system?
- Does the customer base bias the metric results, aside from the qualities of the products?
- Add on today's parking lot items…

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