EPA ENERGY STAR Connected Thermostats

Stakeholder working meeting

Connected Thermostat Field Savings Metric

7/17/2015

Agenda

- Introduction – anyone new joining the call?
- Administrative updates and issues
- Software module alpha release walk through
  - How to use it
  - Feedback process

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Software Module alpha release

- Source code: https://github.com/impactlab/thermostat
- Documentation: http://thermostat.readthedocs.org/en/latest/index.html
- Regarding request to run modules on server, ability to upload data: after some thought, EPA has no immediate plans for this.
  - For use in certification, transfer and temporary storage of large data files required additional time and computer resources that can be avoided
  - Will keep idea in mind for testing and development purposes
- Introducing Phil Ngo, Impact Labs

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Software Module process

- Question one: Do the modules faithfully reflect the algorithm we intended? Enter directly into GitHub. Two weeks or so?
  - Bugs
  - Cases where code returns unexpected results
- Question two: Does the algorithm (and the code) measure what it is intended to?
  - Does the algorithm matter for any homes?
  - Homes with different setback behavior – different scores?
  - Homes with similar setback behavior, different comfort preferences – similar scores?
  - Regional bias, Demographic bias?
- Comments on performance can be sent to ConnectedThermostats@energystar.gov at any time, or call Doug directly

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Software Module process, cont.

- Eventually will need to decide if the algorithm (and code) adequately capture savings

- See how you and your competitors land with the current algorithm might help with that

- There is also additional work that might need to be done - stakeholders could volunteer to add code to GitHub
  - Expand code to calculate statistics for large data sets
  - Additional tests of variations on the algorithm

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Software module release discussion

- Date time stamp
    - Do we need it anyway? Can we just use date and hour?
    - Time zone: use local time
    - Not used at the moment – can be left blank, probably
    - Will need later if dealing with non-hourly data
    - Hourly data is fine with everyone
- Complications/ambiguities for converting to hourly data
    - Do we average over the hour?
    - How to deal with signals received near the end of an hour

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Software module release discussion

- Do you need to have blanks for columns that are N/A or can it be zero?
    - Various discussion – seems like most like a warning flag in output file, eventually.
- Temperature set point – what if there is both a heating and cooling set point? This can occur on a single day. If you list just one, how do you know if it is heating or cooling.
    - Will change input file format to have cooling set point and heating set point as separate columns

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Software module release discussion

- Daily average HDD and ΔT methods are giving identical results – should be more variation
  - Some question about whether documentation reflects actual code – are the two HDD/CDD methods truncating the same things
  - Phil thinks the code is right – will verify
  - Continue to consider why they are the same
- Looks like not doing ratio estimation, because there are intercepts reported
  - Uses ratio estimator to find balance delta T, then uses a linear regression to find the slope.
  - Slope should be from sum of y values over sum of x values
- Output file please include balance temp for degree day base – useful for evaluating if results make sense

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Software module release discussion

- Useful to have doc that explains all logic and math in English

- Input file: only need 3 columns input data
  - Cooling, heating, aux+emergency
  - Algorithm uses total heating time of compressor plus emergency, need aux and emergency separately
  - Might not matter
  - Do not need heat pump and other heating separately, do not need cooling and heat pump cooling separately. System type includes this data. Increases size of input file and also increases burden of preparing file. Not currently accepting data from dual fuel systems, so nothing is lost.

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Software module release discussion

- Emergency heat column could also be useful to diagnose issues with the system – a system with lots of emergency heat means something is seriously wrong with the heat pump

- In the long term, we may not need hourly data at all – but lets deal with that as we get closer

- There have been a number of suggestions for making the code more efficient in the long term. This will be important, but lets make sure we have the algorithm right first.

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Running parking lot

- Zoned systems? Usually not integrated. Multiple systems in one home? Ask for statistics about how common this is.

- Definition of a "product" – e.g. enrollment in peak control service makes it a different product

- 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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Contact Information

Web site for these notes and all public discussion/comments:

http://www.energystar.gov/products/spec/connected_thermostats_specification_v1_0_pd

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