HVAC Overview Plan

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APRIL 2018

Parallel Path Approach – eTRM / HVAC

Q2'18 **Q3'18** **Q4'18** **Q1'19** **Q2'19**

Path 1: HVAC Measure Consolidation

- Create structure
- Consolidate 50+ HVAC Measures
- Affirmation of 50+ HVAC Measure for eTRM

Path 2: HVAC Measure Analysis and Evolution

- Stakeholder Feedback on Measure Summary Template
- Complete 50+ Measures Summaries
- HVAC Modelling Charette
- Feedback on existing Measures
- Sensitivity analyses
- Prototype comparison
- Develop & validate/ compare modelling approach

Process

- Start: Approximately 55 HVAC measures
- Review and group
  - Subcommittee reviews measure groupings
  - Break subcommittee into two (res and non-res; QI/QM; other(s))
- Develop HVAC Measure Summary
  - Include:
  - Subcommittee feedback on standard results for each measure (end-use energy, hourly profiles, schedules, model metrics (kWh savings per square foot), Cooling and Heating load profiles, vintage profiles, etc.)

HVAC "Types": DEER Measure

- Step 1: From READi, download a Measure ID and savings
- Step 2: Reproduce savings for a few test cases (if you have correct version of MASControl, possible to reproduce)
- Step 3: Using MASControl, generate base case and measure case for all applicable permutations (Building Type, Climate zone)
  - Vintage and HVAC Type may be required
  - Save as documentation in eTRM
- Step 4: Identify key differences between base and measure case (HVAC measure and other parameters)
- Step 5: Prepare "Measure Summary" template
- Step 6: Seek subcommittee feedback (for Stage II) on Measure Summary template
  - "Correctness" of base and measure case
  - Likely sensitive parameters (perhaps this is area for more EM&V)
- Step 7: Review OpenStudio measures to see if measure could be re-run in EnergyPlus to compare with DOE 2.2/eQUEST results.

HVAC "Types": "Roots" Within DEER Measure

- Step 1: From READi, download a Measure ID and savings
- Step 2: Locate building simulation models (from all utilities with WP) and results
  - Probably with utility WP developer consultant
- Step 3: Compare base case and measure case for all applicable permutations (Building, Climate zone)
  - Save as documentation in eTRM
  - Likely many fewer permutations because use "typical" vintage and "typical" HVAC type used
- Step 4: Identify key differences between base and measure case for an individual utility (HVAC measure and other parameters) for each utility model.
- Step 5: Compare utility modeling approaches across utilities: 1. base case models and 2. measure case models
  - Identify key differences between utility base cases and utility measure cases
- Step 6: Complete "Measure Summary" template
- Step 7: Seek subcommittee feedback (for Stage II) on
  - "Correctness" of base and measure case
  - Different approaches taken by each utility
  - Which utility approach is best and run preferred models to fill in gaps throughout state
  - Likely sensitive parameters (perhaps this is area for more EM&V)
- Step 6: Review OpenStudio measures to see if measure could be re-run in EnergyPlus to compare with DOE 2.2/eQUEST results.

HVAC Types: Non-DEER HVAC Measure

- Same approach as used for other non-HVAC measures, examples
  - Review RCT
  - Review savings calculation
  - Etc.

Questions for Cal TF

- Feedback on general approach?
- What should go into “Measure Summary” template?
  - Total energy use
  - Energy use of HVAC
  - Load analysis – how much HVAC per square foot
  - Hours of operation
  - Infiltration
  - Lighting power density
  - Hourly profiles
  - What else?
- What should we be concerned about for HVAC measures?
  - Performance curves . . .?

Questions that Cal TF will be asked

- Are the prototype savings reasonably modeled, do they agree with savings
- Are the base case models reasonable at predicting actual load
  - Should schedule be longer
  - Are internal loads what they think they would be for this building prototype
  - Are the measures being modeled correctly? (Different EER value or change run time variables)
  - Input on most sensitive parameters for measure (e.g. infiltration, hours of operation, LPD, etc.)
  - How are we documenting base and measure case for these measures (for example, why is base case efficiency whatever it is? Is saying it is T24 enough)?
- What other questions should we be asking or planning for?

Other tasks

- Subcommittee feedback
  - Cost documentation
  - Implementation Support Tables
  - Review savings/TRC comparison (current vs. 2017 claims data)
  - Preponderance of evidence