Overview of TRM 3.1/4.0 Updates

Energy Efficiency Implementation Project

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FRONTIER ASSOCIATES

TRM 3.1 Residential Updates

- Lighting:
  - Default lamp wattages provided for upstream programs
  - In-service rate adjusted to include storage lamps
  - Interactive effects specified for additional heating/cooling type combinations
  - Replaced measure life algorithm with deemed values
- Duct Efficiency:
  - Updated savings coefficients based on updates to existing references
  - Corrected HDD conversion for demand calculation
- Central AC/HPs:
  - Added higher efficiency options to early retirement tables
- Ceiling Insulation:
  - Corrected column headings for winter demand savings tables
- Low-Flow Showerheads:
  - Clarified that savings should be claimed on a per showerhead basis
- DHW Replacement:
  - Clarified HPWH baseline for systems greater than 55 gallons

TRM 3.1 Commercial Updates

- Lighting:
  - Removal of reference to T12s from high-efficiency condition
  - Removal of utility specific exception to deemed outdoor coincidence factor
  - Removal of EUL for linear fluorescent fixtures replacing magnetically ballasted T12s
- HVAC:
  - Added table of building type definitions, assumptions, and examples

TRM 4.0 Residential Updates

- General review of federal standards and ENERGY STAR specifications

- Lighting:
  - Review operating hours assumptions
  - Update IEF factors using updated simulation models
  - Provide alternate inputs for outdoor lighting

- Duct Efficiency:
  - Update coincidence factors for consistency with updated peak definition

TRM 4.0 Residential Updates

- Central HPs:
  - Develop early retirement heating savings tables for HP to HP replacements
- Envelope Measures:
  - Updated simulation models
- Solar PV:
  - Move from single deemed value for whole state to heavier reliance on PVWatts for energy savings
  - Deemed demand values will be developed to maintain consistency with peak demand definition
- Other EM&V Research Issues:
  - Example: Potentially incorporate actual flow rate values for Faucet Aerators and Low-Flow Showerheads

TRM 4.0 Commercial Updates

- General review of federal standards and ENERGY STAR specifications
- Lighting:
  - Review possibility of developing interactive effects by building type and/or weather zone (may not actually result in updated values for TRM 4.0)
  - Consider additional outdoor spaces types
- HVAC:
  - Update annual operating hours and coincidence factors using updated building simulation models
- Solar PV:
  - Update consistent with Residential Solar PV measure

TRM 4.0 New Measures

- Residential:
  - Mini-split AC/HPs
  - AC Tune-up
- Commercial:
  - HVAC Optimization (RTU Controls)

Residential Modeling Objectives

- Create up-to-date and transparent models
  - Use latest publicly available software (BEOpt/EnergyPlus)
  - Update and calibrate prototypes
  - Make model files available to stakeholders for testing and review
- Update basis for peak demand savings (kW)
  - Use new summer and winter peak demand savings (kW) definition included in TRM 3
- Re-think certain measures
  - Floor Insulation - particularly, review how it should be done and potentially replace the measure with a new Encapsulated Crawl Space measure
  - Attic Encapsulation (new)

Residential Modeling

- **Envelope Measures to Update:**
  - Air Infiltration
  - Ceiling Insulation
  - Wall Insulation
  - Floor Insulation
  - ENERGY STAR Windows
  - Solar Screens

Residential Modeling

- Set up prototypes of participant homes
  - Industry sources
  - Supplement w/tracking data as available
- Calibrate prototypes (total energy, load shape)
  - Utility data (e.g. CNP - load research sample stratified by level of consumption and high/low winter ratio)
  - Other utilities – data requested
  - ERCOT data (agg by ERCOT weather zone and hi/lo WR values)
- Run cases for the measures, extract deemed savgs

Commercial Modeling Objectives

- In TRM 3.0, we set up a streamlined set of building types
- TRM 4.0 –
  - Update HVAC energy and demand coefficients in the HVAC and Chiller Replacement measures
  - Add system types (for some building types)
  - Create up-to-date and transparent models
    - Use latest publicly available software (OpenStudio/EnergyPlus)
    - Use DOE reference bldg models for available bldg types
    - Where ref bldg model not available, use coeff's for the most similar bldg type

Commercial Modeling

- Based on DOE Commercial Reference Buildings (typ post-1980) for each principal building activity from CBECS 2012

- Create prototypes per climate zone, per HVAC eqmt type

- Run cases, extract demand and energy coefficients for TRM

- Use models for new measures going forward

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