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2019 Title 24 ACM Comments

Additional submitted attachment is included below.

GLUMAC
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MEMORANDUM

To: California Energy Commission

Dockets Office, MS-4
Re: Docket No. 19-BSTD-01
1516 Ninth Street
Sacramento, CA 95814-5512

Date: February 28, 2019
From: Adams, Michael

Project Name: Draft 2019 Alternative Calculation Method Reference Manuals and Compliance Software Tools Docket Number 19-BSTD-01
Subject: Glumac Comments

This memo summarizes the Glumac's comments for the 2019 Alternative Calculation Method Reference Manual (ACM) and Compliance Software Tools (CBECC-Com).

COMMENTS

Baseline HVAC System Map

Glumac has concerns that the baseline heating energy source is not typical of actual designs in the state. This unfairly penalizes electric heating sources due to the differences in time-dependent value (TDV) factors for electricity and natural gas. This does not align with the electrification goals of the state of California.

Examples:

- SZAC (>8 stories) has furnace heating system
    - The typical design in California for this building type would be a split system heat pump that utilizes electricity for heating operation.
- When the proposed project HVAC system has either little or zero natural gas heating
    - The baseline system heating energy allocation per individual system or overall building should align with the proposed system heating energy. This is consistent with ASHRAE 90.1 energy modeling methodology in both ASHRAE 90.1 Chapter 11 & ASHRAE 90.1 Appendix G. This gives a fair comparison for electric heating systems especially with the impact associated with their respective TDV factors.

Baseline Domestic Hot Water (DHW) System

Glumac has concerns that the baseline DHW heating energy source prevents the usage of projects to utilize electricity as their proposed DHW heating energy source. The TDV factors associated with electricity and natural gas penalizes electric heating sources. This is exaggerated for residential, hotel and dormitory style projects. This does not align with the electrification goals of the state of California.

Examples:

- Air-Water Heat Pump DHW Systems
    - Sole DHW Heating System
    - With Natural Gas Boiler Assist
- Water-Water Heat Pump DHW Systems
    - Sole DHW Heating System
    - With Natural Gas Boiler Assist

VRF Modeling

Pipe Length Impacts to Simulation Results

Glumac would like to confirm the calculations and curves utilized for the following parameters with relationship to both vertical & total pipe length. The FSEC curves only provide piping correction factors for capacity of system and only at total pipe length. Glumac would like to see how vertical pipe length is taken into account for this degradation.

1. Efficiency
   a. How is efficiency degraded in relationship to vertical and total pipe length?
   b. How were these calculations/curves determined?
2. Capacity
   a. Glumac assumes that FSEC piping correction factors were utilized in relationship to total pipe length.
   b. How is capacity degraded in relationship to vertical pipe length?

Indoor Fan Power Inputs

Glumac noted during the 2019 Nonresidential ACM Workshop on Wednesday, February 13, 2019 9:00 AM, a public comment was made regarding the request to allow indoor fan power input to be user-editable in the CBECC-Com software. While Glumac agrees that indoor fan power will vary upon fan coil selection, duct layout (if applicable), and fan motor type, we also note that certain manufacturer-provided indoor fan coil powers are unrealistically low in provided modeling guidance documentation when compared to actual installations. Indoor fan coil powers are determined using ASHRAE 1230 test procedures, which allows the associated external static pressure (ESP) of the system to be considerably lower than expected in actual building designs. The ESP associated with various capacity equipment is shown below, and comes from ASHRAE 1230 test procedure, of which VRF systems are tested by.

Table 8. Minimum External Static Pressure (ESP) for Individual Ducted Indoor Units

Indoor Unit Nominal Cooling[1] or Heating[2] Capacity, Btu/h	Minimum External Static Pressure[3]	
	Small-duct High-velocity Systems, in H_2O	All Other Systems[4], in H_2O
Up through 28,800	1.10	0.10
29,000 to 42,500	1.15	0.15
43,000 to 70,000	1.20	0.20
71,000 to 105,000	-	0.25
106,000 to 134,000	-	0.30
135,000 to 210,000	-	0.35
211,000 to 280,000	-	0.40
281,000 to 350,000	-	0.45
351,000 and above	-	0.55

Notes:
1. For air conditioners and Heat Pumps, the value cited by the manufacturer in manufacturer's instructions for the unit's Capacity when operated at the A_{Full} Test conditions for Air Source systems <65,000 Btu/h and the Standard Rating Test, Cooling test conditions for irir Source systems ≥ 65,000 Btu/h and Water SourceSource systems.
2. For heating-only Heat Pumps, the value the manufacturer cites in manufacturer's instructions for the unit's Capacity when operated at the $H1_{FULL}$ Test conditions for Air Source systems <65,000 Btu/h and the Standard Rating Test (High Temperature Steady State Heating) conditions for Air Source systems ≥ 65,000 Btu/h and Water Source systems.
3. For ducted units tested without an air filter installed, increase the applicable tabular value by 0.08 in H_2O.
4. If the manufacturer only has Low-static ducted models and if the manufacturer's specified maximum external static pressure is less than 0.10 in H_2O, then the Indoor Unit shall be tested at 0.02 below the maximum external static pressure.

Zone System Modeling

Glumac has noted the incapability of CBECC-Com to model zone systems with fan speed capabilities other than constant (two-speed, three-speed and variable speed). With the update to the EnergyPlus 9.0.1 engine, Glumac requests capability to be updated to allow zone systems to operate with different fan speed options. With this capability, the ability to model a zone system to stay at minimum speed constantly to provide ventilation air to the space (given ventilation air is provided by this conditioning system) and allowed to ramp up to higher fan speeds dependent on space load.

Noncompliance Simulation Modeling

Glumac has requested the inclusion of ability in CBECC-COM software to allow for accurate building operating schedules and load profile for usage outside of demonstrating compliance with Title 24. Whether the CEC has intended or not, the CBECC-Com compliance software is used by various entities throughout the state to demonstrate project energy goals beyond solely meeting Title 24 Compliance (performance approach). Allowing building operating schedule can significantly impact the results of these various required thresholds. Some of these thresholds have been noted below for the reference of the CEC. Please note, these references are only a portion of requirements throughout the state.

- California State University (CSU) Systemwide
    - Minimum 10% savings overall building
    - Minimum 0% savings in envelope only, lighting only, mech/DHW only (broken out separately)
- University of California (UC) Systemwide
    - Minimum 20% savings overall building
- Collaborative for High Performance Schools (CHPS)
    - LAUSD required levels require various % savings overall building for CHPS scorecard
- Environmental Impact Report (EIR) Requirements
    - Various % savings overall building
        - Ex. - Hotel in Anaheim required minimum 10% savings overall building
- Various City Requirements
    - City of Chino requires 5% savings overall building
    - Santa Monica requires 10% savings overall building
- Utility-Based Incentive programs
    - Savings by Design requires minimum 10% savings overall building
    - CAHP (multifamily) requires minimum 10% savings overall building
- State Building Requirements
    - DGS government buildings requires minimum 15% savings overall building