Frequently asked questions about CBECC-Com modeling for California's 2019 Building Energy Efficiency Standards, Title 24, Part 6.

Q: How can modeling issues be solved using output files?

CBECC-COM output files contain information that can help diagnose and troubleshoot models. Common issues that require troubleshooting include models that don't run and models with unmet load hours. Meeting Title 24, Part 6 compliance depends on individual building characteristics, however there are clues for where to make corrections.

1. Make sure the EnergyPlus output files are saved and can be reviewed. To do this, select the preferred option under Tools – Program and Analysis Options – Storage of Analysis Files.
2. Viewing the "Building Model Data" window after the analysis is run and the Log file is a good place to start. Every CBECC project generates a .log file in the same folder the project was saved, or it can be accessed via Tools – View Project Log File.

Confirm the general project facts:

- ✓ Appropriate weather station
- ✓ Building area
- ✓ Review the cooling and heating unmet hours

Note: A warning message will appear if any thermal zone in the project has more than 150 cooling or heating unmet load hours. These can be viewed in the Analysis Results screen, with a fourth tab showing Unmet Load Hours.

3. The main things to look for in the log file are warnings or error messages. These warnings or errors can be written by CBECC-Com or EnergyPlus. If they are from CBECC-Com, they should include adequate description of what changes need to be made to address the problem. EnergyPlus error messages may require investigation of EnergyPlus documentation to identify the needed changes.

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4. CBECC-Com error messages can be in single, two, or three digits. While single or two digit error messages are specific to modeling errors (i.e., "41.DHW simulation not successful"), three digit errors represent simulation run specific errors (i.e., "102: Simulation weather file not found").
5. Beyond a quick review of the Log file, .csv files can be reviewed, which are saved under the "project.name – run" folder. These include hourly results, meter, HVAC specific and envelope outputs, depending on the "Storage of Analysis Files" option selected.

Common Errors & Issues

The most common errors are listed below, with suggestions for potential solutions.

Air System Window Inputs

Review design outside airflow rates, heating and cooling capacity inputs, Supply Temperature Control method, making sure that mechanical schedules, mechanical controls and notes from detail drawing sheets are reviewed and appropriately selected in modeling inputs windows.

External Shading

If the building has external shading attached, this can be modeled and savings claimed, potentially helping with cooling unmet hours. CBECC uses relative coordinates, so shading coefficients depend on the modeled building's location.

Fenestration Construction

Verify that the inputs are assembly values, not center-of-glass. It will most likely slightly increase the U-factor and reduce the SHGC-coefficient, which may affect heating and cooling hours differently.

HVAC Design

Use rule of thumb calculations for heating, cooling, ventilation and fans to verify that sizing of these HVAC components is correct. It is possible, but not a frequent occurrence, that the cause of the unmet hours error is beyond the simulation process, such as typos, old drawing set, etc. The rule of thumb values vary by building type and climate and can be represented per conditioned building area, occupant density and others.

Story Multipliers

Make sure that story multipliers are not being used to model top level or level 1.

Thermal Zones

Ensure they are optimally sized, and reflect design zoning. Oversimplification or extremely small zoning may case unmet hours.
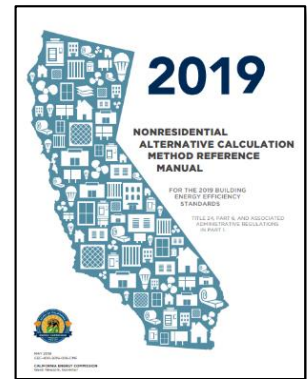
2019 Nonresidential Alternative Calculation Method Reference Manual

Find the Manual here: energy.ca.gov/2019publications/CEC-400-2019-006/CEC-400-2019-006-CMF.pdf

Additional Resources:

CalBEM: calbem.ibpsa.us/

CBECC-Com: bees.archenergy.com/

CEC Energy Code Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov

CEC Online Resource Center: energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center

2019 NR Compliance Manual: energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2019-building-energy-efficiency-1

Energy Code Ace: EnergyCodeAce.com

Unmet Hours Unmethours.com