CalBEM

California Building Energy Modeling

CBECC-Com Software FAQs

Air Systems and Zone Systems

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

Q: How are Air Systems and Zone Systems different in CBECC-Com?

Air Systems, Zone Systems, or a combination of the two are used when modeling mechanical systems in CBECC-Com to demonstrate energy code compliance. This aid explains the differences and applications of the two system types.

Air Systems	Zone Systems
Can serve multiple zones.	Serves only one zone.
More complex to model – needs air segments, an outdoor air control object, and terminal units for every zone served, in addition to the system object, fan, and heating and cooling coils. Terminal units often need reheat coils in each terminal unit and may require fans as well.	Simpler to model, needs only the system object plus fan and heating and cooling coils.
Single zone air systems can serve multiple zones, but only can have one control zone	Serves only one zone. Systems in residential units are typically zone systems.
Can have economizer.	No economizer option.
More options, complexity, controls – operation scheduling, OA control, variable speed, pressure, temperature reset & optimization, etc.	The only variable fan operation (two-speed) available is with the four pipe fan coil (FPFC) system.
Ventilation – usually integral to the system, but can also be provided by a separate DOAS air system (see Ventilation System Modeling).	Zone systems can provide ventilation, but a separate DOAS or single zone ventilation system is often used (see Ventilation System Modeling).
Fan control can be cycling or continuous. Likely continuous during occupancy to meet ventilation requirements, then off or cycling on load during no occupancy.	Fan control can be cycling or continuous. Cycling if ventilation is provided via a separate DOAS system.

Why is this important?

Air Systems and Zone Systems are the two pathways for modeling mechanical systems in CBECC-Com. This aid lists the major differences between them to help modelers with the selection process. Depending on a given HVAC system, a combination of an air system and zone system may need to be modeled, as seen in the examples on page two. It is important to know which system type to model which can get confusing as some HVAC equipment names are identical between Air Systems and Zone Systems. HVAC system energy use is a significant portion of overall energy use in buildings. To obtain reliable energy use and cost information, the designed HVAC system needs to be modeled accurately. Knowing the differences between system types and descriptions of equipment types helps accomplish an accurate model.

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Key Features and Limitations

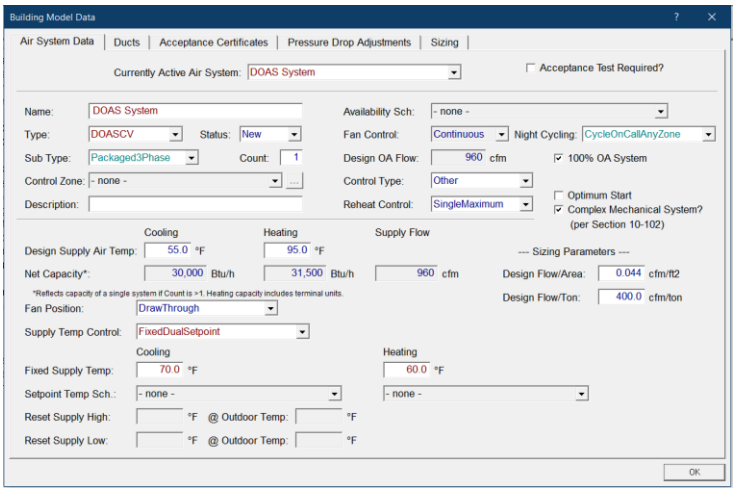
While it is possible that ventilation is integral to the Air System or Zone System, oftentimes separate Air System or Zone System equipment may need to be modeled to reflect building mechanical design. Below are the different ventilation strategies and modeling approaches that can be used:

- Supply – mechanical ventilation/outside air can be brought in directly through the air system or zone system equipment that provide heating and cooling. Note that not all zone systems are capable of this, see zone systems descriptions.
- Supply – a separate DOAS system (air system or zone system)
- Exhaust – if there is no requirement to provide mechanical ventilation via supply, exhaust only ventilation may be in place. This method relies on infiltration and possibly natural ventilation to provide outside air.
- Balanced – the combination of supply and exhaust.

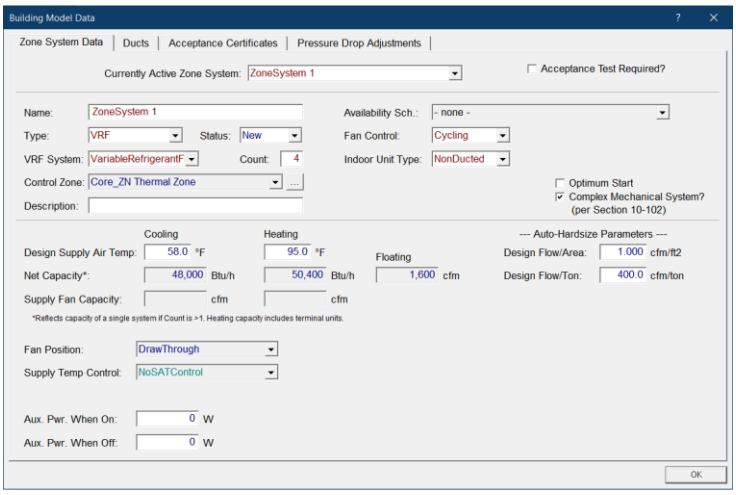
Examples

An HVAC system is modeled for a high-rise multifamily project using both the Air System (DOAS – supply ventilation) and Zone System (VRF – heating & cooling).

Using a DOAS System:



Using VRF System:



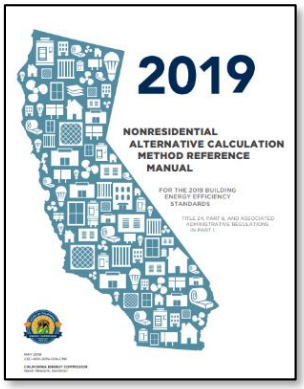
What do the text colors mean?

Dark Blue – Rule Defined. These values are default inputs or ruleset expressions provided by the software.

Dark Red – User Defined. These values are input or specified by the user.

Dark Cyan – Program Default. These values are provided in a dropdown menu of options instead of a single default. Users must select from the list and are not permitted to specify values outside of the list.

Find definitions for all of the input types and color coding in the CBECC-Com 2016 User Manual.



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/

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/questions/