CalBEM
California Building Energy Modeling

CBECC-Com Modeling FAQs
Process Loads

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

Q: Which Process Loads can be modeled for compliance credit?

Computer Server Rooms

Fixed | **Neutral** | **Compliance Credit** Inputs

- Plug Load (Server Load) Schedules - fixed
- Plug Load Setpoint – fixed
- Plug Loads– minimum 20 W/ft^2
- Fan Control Method
- HVAC System Type
- Opaque Envelope – no wall insulation for baseline when process ≥750 kW

Commercial Kitchens

Fixed | **Neutral** | **Compliance Credit** Inputs

- Kitchen Exhaust Schedule
- Process Load (Gas, Electric Equipment)
- Exhaust Hoods: Style, Duty, Length, Flow (cfm)
- Air Handling Unit Options:
  - Makeup Air
  - Energy Recovery Ventilator (ERV)
  - Transfer Air

Laboratories

Fixed | **Neutral** | **Compliance Credit** Inputs

- Flow Schedule
- Exhaust Flow Rate (ACH)
- Fan Power
- Flow Control (CAV/VAV)
- Fume Hood Length
- Vertical Sash Fume Hood Exhaust Flow
- Vertical Sash Automatic Control Fraction
- Total Other Exhaust Flow

Fixed – the value is fixed in both the standard reference design, also called the baseline, and proposed design. Setpoints and schedules are defined in the Appendix 5.4C of the Nonresidential ACM Reference Manual
Neutral – the value of the input can be modeled by the user, but the standard design value always matches the proposed design
Compliance Credit – the user can enter a value that is above the code minimum requirement for a "compliance credit" or below for a "compliance penalty"

Why is this important?

Computer server rooms, commercial kitchen exhaust and laboratory exhaust are covered processes that can be modeled in CBECC-Com to demonstrate compliance or receive compliance "credit" for tradeoffs between efficiency of building components. The process itself (computer server or data center, cooking equipment) is not included in the compliance total (green neutral inputs above), but the conditioning and exhaust systems that serve the process are covered and must be included when using the performance approach. Process loads that do not have corresponding prescriptive requirements, such as commercial refrigeration or compressed air systems, can be modeled as neutral systems (the baseline system always matches the proposed design) and documented on compliance forms.

CBECC-Com allows for the user to model equipment that is above or below performance minimums established in Section 140.9 of the 2019 Title 24, Part 6 Standards.

Key Features & Limitations

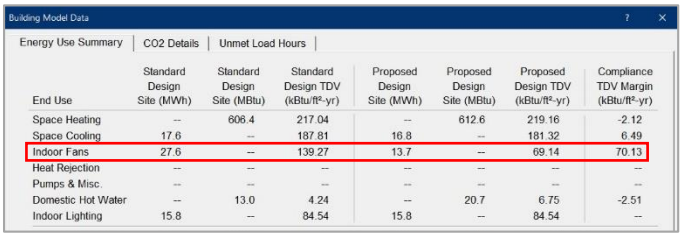
CBECC-Com allows for compliance credit for computer room cooling systems that are more efficient than the prescriptive minimum. The software does not permit modeling humidification of computer rooms or data centers (140.9(a)3), and does not cover hot aisle-cold aisle containment (140.9(a)5). The software uses fixed plug load schedules and a fixed cooling setpoint of 80°F for computer room spaces.

CBECC-Com provides a means to model Type I and Type II kitchen hoods, with options to specify transfer air, energy recovery ventilators or makeup air to meet ventilation requirements. The prescriptive demand ventilation option (140.9(b)2Bii) is not supported.

The compliance software sets a standard reference design (baseline) constant-volume exhaust fan system for spaces with a minimum exhaust rate of 10 ACH (air changes per hour), and a variable volume exhaust for others on a fixed fan schedule as defined in Appendix 5.4B of the Nonresidential ACM Reference Manual. Users can also model laboratory exhaust systems and impacts of fume hood sash controls on exhaust systems. Anemometer and contaminant-based fan control methods (140.9(c)3C, 140.9(c)3D) are not directly modeled by CBECC-Com, but instead are options that cause the proposed design fan power to match the baseline fan power.

Examples: Covered Processes in Compliance

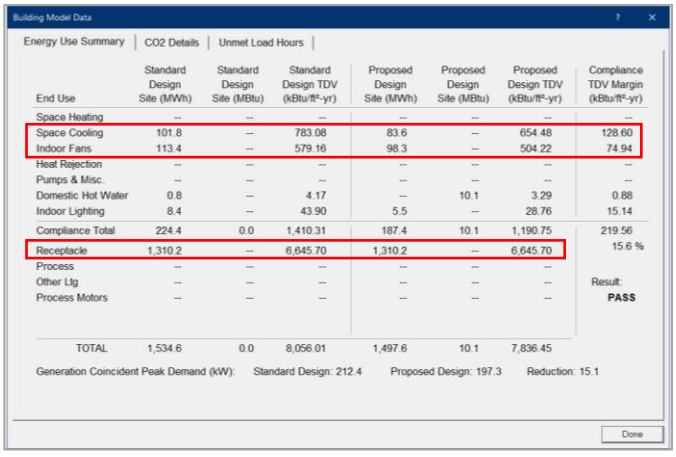
Laboratory process Energy Use Summary shows exhaust fans as *Indoor Fans* in the compliance total.


Building Model Data

Energy Use Summary | CO2 Details | Unmet Load Hours

End Use	Standard Design Site (MWh)	Standard Design Site (MBtu)	Standard Design TDV (kBtu/ft²-yr)	Proposed Design Site (MWh)	Proposed Design Site (MBtu)	Proposed Design TDV (kBtu/ft²-yr)	Compliance TDV Margin (kBtu/ft²-yr)
Space Heating	--	606.4	217.04	--	612.6	219.16	-2.12
Space Cooling	17.6	--	187.81	16.8	--	181.32	6.49
Indoor Fans	27.6	--	139.27	13.7	--	69.14	70.13
Heat Rejection	--	--	--	--	--	--	--
Pumps & Misc.	--	--	--	--	--	--	--
Domestic Hot Water	--	13.0	4.24	--	20.7	6.75	-2.51
Indoor Lighting	15.8	--	84.54	15.8	--	84.54	--

The Computer Room process Energy Use Summary has the HVAC system serving the computer room or data center under *Space Cooling* and *Indoor Fans*, and Computer Room (Server) load as a neutral *Receptacle* load. Items below the "Compliance Total" line, including Receptacle and Process loads, are not included in the compliance evaluation, but are reported as part of building energy consumption.

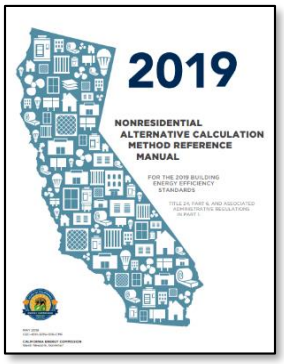

Building Model Data

Energy Use Summary | CO2 Details | Unmet Load Hours

End Use	Standard Design Site (MWh)	Standard Design Site (MBtu)	Standard Design TDV (kBtu/ft²-yr)	Proposed Design Site (MWh)	Proposed Design Site (MBtu)	Proposed Design TDV (kBtu/ft²-yr)	Compliance TDV Margin (kBtu/ft²-yr)
Space Heating	--	--	--	--	--	--	--
Space Cooling	101.8	--	783.08	83.6	--	654.48	128.60
Indoor Fans	113.4	--	579.16	98.3	--	504.22	74.94
Heat Rejection	--	--	--	--	--	--	--
Pumps & Misc.	--	--	--	--	--	--	--
Domestic Hot Water	0.8	--	4.17	--	10.1	3.29	0.88
Indoor Lighting	8.4	--	43.90	5.5	--	28.76	15.14
Compliance Total	224.4	0.0	1,410.31	187.4	10.1	1,190.75	219.56
Receptacle	1,310.2	--	6,645.70	1,310.2	--	6,645.70	15.6 %
Process	--	--	--	--	--	--	
Other Ltg	--	--	--	--	--	--	Result:
Process Motors	--	--	--	--	--	--	PASS
TOTAL	1,534.6	0.0	8,056.01	1,497.6	10.1	7,836.45	

Generation Coincident Peak Demand (kW): Standard Design: 212.4 Proposed Design: 197.3 Reduction: 15.1

Done



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:

https://www.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/

High Performance Laboratories: A Design Guidelines Sourcebook

pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/Labs_BestPractices.pdf