

QUICK START GUIDE FOR *CBECC-COM 2016.3.0 SP2*

Version CBECC-Com 2016.3.0 SP2

July 2018

NOTE: Please check <http://bees.archenergy.com/> for any updates to this guide.

Overview

CBECC-COM 2016 is an open-source software program developed by the California Energy Commission for use in complying with the 2016 update to the *Non-Residential Building Energy Efficiency Standards*. This Quick Start Guide for *CBECC-COM 2016* was written to accompany versions of the software released starting in June 2016.

This Quick Start Guide provides brief descriptions of the software program's major features. It is a good idea to review the Quick Start Guide before using the program for the first time or if you have questions while using the program. Additional Help features will be added to future versions of the program.

Capabilities:

Calculate the annual energy use for both the Proposed Design and the 2016 Standard Design of non-residential buildings. The feature set of CBECC-Com is listed at: <http://bees.archenergy.com/>

Bugs Fixed/Enhancements in Version 2016.3.0 SP2:

- Added two new toolbar items. They are next to the perform analysis button. One is "analysis results" (which is equivalent to tools/review analysis results) and the other is "compliance results" which will either open an existing PRF-01 or generate a draft PRF-01 report.
- Added a new feature that allows batch processing, which means running multiple files. It will be useful if you're coming up with options for achieving compliance, or running comparisons. It is accessible from the start-up menu (or from tools/batch processing). When complete, you will have a single log file, a results file, and multiple XML files and PRF-01s.
- Update rules to allow WaterSource condenser to be used for DX coils in AirSystems.
- Updates to rules addressing issue where polyLoop errors occur in simplified geometry model due to extremely shallow window fins & overhangs. Minimum fin/overhang depth increased from 0.001 to 0.05
- Updates to CBECC-Com 2016/19 executables to fix CSE simulation failure when the CSE object name was more than the CSE character limit.
- Updates to CBECC-Com 2016/19 executables to fix a problem related to unreferenced objects not being entirely purged prior to simulation. Updated code to ensure that groups of unreferenced objects (such as SchDay/SchWeek/Sch) that can include references within each other all get cleaned up prior to each simulation.
- Revise baseline DX cooling coil sizing to ensure cfm/ton is between 280 and 450 cfm/ton, including for 100% OA systems.
- Revise rules to ensure fan power is correctly displayed when changing between modeling methods.
- Updates to rules to report Domestic Hot Water (DHW) budget when DHW is excluded in a highrise residential model and no residential DHW system is modeled.

- Updates to rules to add a warning to the user interface and log file when a user has modeled a glazing with VT < prescriptive minimum. This condition triggers a lighting penalty which is implemented by reducing the baseline LPD by a factor of 0.833.
- Updates to various material properties and addition/removal of materials.
- Heat rejection systems now allow use of closed cooling towers and evaporative closed cooling towers. Inputs are similar to those for open cooling towers, with the addition of a water spray flow rate for evaporative closed cooling towers
- Updates to rules and user interface to remove “Zone Designed Without Cooling” option. If the proposed has no cooling, a minimum efficiency air-source DX system is now always added to the zone for compliance analysis.
- Updates to allow 'FPFC' ZoneSystems to be modeled without a chilled water coil (two-pipe heating only system). Currently, only constant volume fan control is allowed for this system configuration. Update includes revise fan sizing ratio to 1.0 for these systems.
- Updates to rules for detailed geometry models to modify the space area calculation to be based on the sum of the floor objects in the space, rather than using the space polyloop. A warning will be added to the log file where the area of the space polygon is not equal to the sum of the floor objects defined in the space
- Updates to the space function table to add an “All Other” category
- Updates to rules for highrise residential domestic hot water heating to include option for credit/penalty for solar thermal when water heating is excluded and is submitted prescriptively for compliance.
- Update ventilation rules to allow residential and nonresidential ventilation rates to be between 95% and 110% of code w/o any adjustments. If the proposed design is greater than 110%, the standard design will be reduced down to 110%.
- Fixed issue where systems supplying ventilation air via DOAS and/or the Primary Air Conditioning System to residential spaces would result in extra infiltration, as if the ventilation was by exhaust fan.
- Fix code minimum efficiency rules for Minisplit AC/HP systems, and revise default ZoneSystem:SubType to be Split1Phase.
- Update calculation of prescriptive minimum VT to include minimum from Table or Equation 140.3-B. If applicable, equation 140.3-B is used only to determine whether a lighting penalty is applied in simplified geometry models. The standard design VT is always determined from Table 140.3-B
- Feature added to speed user input of large, complex models by postponing input defaulting based on actions taken by the user. Options for new properties Proj:DefaultOptionInp, DefaultOptionObj & DefaultOptionDone (editable on Project / Analysis Options) include 'Nothing', 'Modified Object' and 'Entire Model' (all defaulting to 'Entire Model', equivalent to defaulting in past releases). Iconic 'D' buttons added to tabbed dialogs and toolbar to manually force defaulting of active object or entire model.
- When wet-bulb reset is selected as the control method for a fluid system (normally used for condenser water systems), the field for minimum reset supply temperature is now available for user input. Previously, this value was prescribed at 65°F, which may not be low enough for some applications, particularly when a water-side economizer is used.
- The ability to include two metal framed composite layers in an Exterior Wall construction has been added. The two layers are defined as normal with the Code Category of “Composite”, and they are then added to the construction assembly as normal. The layers may be the same layer used twice. The only restriction is that some other layer must be

placed between the two composite layers. Also, only one composite layer is allowed in construction assemblies intended for other surface types, and the two layers in an exterior wall construction must be metal framed.

- Update prescriptive daylighting exceptional condition rules to trigger the exceptional condition only in cases where total project new window area > 0. Added flag to allow users to invoke exceptions 1 and/or 2 to 130.1(d)2 for an entire project, exempting them from prescriptive daylighting requirements.
- Fix to executables that prevented calculation of TDV results for enduse(s) where initial hours/days of simulated energy use were negative values.
- Updates to highrise residential water heating rules to be consistent with the residential water heating rules.
- Various updates to rules for reporting and updates to reporting template.

New in Version 2016.3.0:

Software & User Interface

- Enhancements to dialog that collects primary data following object creation: addition of units labels, better dialog scaling in newer versions of Windows and variable floating point precision for numeric inputs.
- New 'EnableStorageToCustomFileExtensions' INI setting to prevent display of 'Save As...' dialog when File > Save selected on a project read in from a file having an unrecognized or custom file extension. When this option is > 0, the UI will store project data to the same file extension as the original project file, regardless of whether it matches the program default extension.
- Improved report generation security and simplified third party tool distribution requirements.
- Encryption of username and password proxy settings stored in INI file.
- PDF, XML, STD or any combination of reports now returned from report generator following a single transmission of project inputs & results along with parsing and display (and project logging) of errors identified by the report generator.
- Implemented static Resets feature which enables the rules engine to re-default certain user-specified properties when certain other properties are edited by the user in a UI interfacing with the building database.
- Updates to user interface to use checkboxes for selection of Compliance Options.
- ProposedOnly analysis option re-enabled.
- Update user interface tree view object descriptions to include Status.
- Update user interface for cooling coil efficiency input precision to follow the various AHRI certification categories.
- Updates to user interface to display "Bypass Minimum Efficiency" checkbox only when user specifies an efficiency rating that is less than code.
- Updates to user interface to exclude thermal break option from frame when fenestration assembly type is 'FieldFabricated'.
- Added a non-compliance analysis option to bypass mandatory minimum checks for envelope.
- Updated user interface to allow input for cool roof (CRCC) when roof density is > 25 lb/ft²

- Updates to move energy associated with exhaust fans in unconditioned zones out of the compliance calculation, and into a new, non-compliance energy category.
- Revised plant component described in SDD simulation input file to include *Sim suffix. This allows user input capacities to be tracked independent from simulated values, and mitigates user inputs from being overwritten by sizing run values, when appropriate.

Envelope, Lighting & Other Internal Loads

- Added additional compliance insulation materials R1 - R38.
- Added two options for metal building walls to the composite material options - WallMetalSingleLayerBatt and WallMetalDoubleLayerBatt.
- Updates to some material properties and added some new materials to the library.
- Allow selection of R-0 insulation in composite layers.
- Updates to baseline model to specify the reflectance of residential roofs that have no prescriptive reflectance requirement to be 0.08 instead of 0.55.
- Mandatory U-factor checks on mass walls now only apply to those with hollow-core masonry units.
- Added check to ensure that all windows and skylights have exactly 4 vertices.
- Changed checks of mandatory insulation on demising surfaces to apply in all cases, including when exterior surfaces meet mandatory insulation requirements.
- Input of Display Perimeter is now enabled for simplified geometry models.
- Added a project level checkbox that indicates if a building includes conditioned atria with height greater than or equal to 55 ft. This increases the maximum skylight to roof ratio to 10%. This checkbox is checked by default if any spaces in the model have SpaceFunction 'Malls and Atria' with a space height greater than or equal to 55 ft.
- Added methodology to correctly simulate door products with U-Factor > 1.03.
- Updates to residential lighting to classify it as 'Non-Regulated' in the user interface. Additional updates to categorize the residential lighting as 'Non-Compliance' to exclude it from reporting in the 'Compliance Totals'. Residential lighting will now be reported below the 'Compliance Total' in the 'Other Ltg' category.
- Modified calculation of baseline daylighting control fraction to exclude additional lighting allowance power.

HVAC

- Add capability to define active beams (new TerminalUnit:Type = 'ActiveBeam'), and passive beams (new ZnSys:Type = PassiveBeam). Both objects should be defined with a child cooling coil, and additional inputs to describe beam air flow have been provided.
- Added chilled water thermal energy storage systems as a compliance option.
- Add capability to specify MiniSplits as zone systems (ZnSys:MiniSplitHP and MiniSplitAC). Cooling capacity of mini-splits limited to $\leq 135,000$ kBtu/hr.
- Added DOASVAV and DOASCV system types to facilitate modeling 100% OA DOAS systems.
- Add support for modeling buildings/zones designed to not have cooling.
- Added rules to adjust the capacity of central plant equipment for existing building cases where the entire central plant but only part of the building is included in the energy model.
- Add capability to specify 'HasUnknownHVAC' for zones that do not have HVAC designed (shell space). This capability is also available for Existing Addition and Alteration (EAA) projects where the HVAC is not in the scope of compliance.

- Revise rules for lab systems, enforcing baseline exhaust control rules when lab exhaust is \leq 10ACH. Above 10ACH, standard design exhaust control is the same as the proposed design. Remove minimum air change requirement for using VariableFlow exhaust. Improve user interface, check rules, and help to describe defaulting.
- Allow specification of an 'Other' ventilation standard for thermal zones, allowing ventilation rates to deviate from code. If selected, a brief description of the alternate ventilation code must be provided, and the ventilation rate in the proposed and standard design are modeled the same.
- Revise the prescribed 'Retail Merchandise Sales, Wholesale Showroom' OccupantDensity to 16.67 people/1000ft².
- Add new ZnSys:Type = 'Furnace', as well as additional 'SubType' options following the categories in Table E-2 of the 2016 Appliance Standards. Also, add new property ZnSys:FurnaceType to distinguish between 'Gravity' and 'Fan' furnaces. Valid heating coil Type options for new type are 'Furnace' (gas), 'Resistance' (electric), and 'HotWater'. For Gravity furnaces, no fan is modeled.
- Add performance curve tables to the SDD, and revise rules to create a custom EIR_fTemp performance curve for SEER rated systems.
- Added Duct status in the 'Ducts' tab in the Air System/Zone System data screen. Updated reporting of PRF-01 Table E for duct leakage verification
- Updates to reduce the additional outdoor air loads simulated for highrise residential spaces/zones that have operable windows/doors/skylights and new HVAC system that do not meet the prescriptive requirement for interlocks.
- Zones with new operable windows, glazed doors, opaque doors, skylights and new HVAC systems that do not meet the prescriptive requirement for interlocks will be simulated with additional outdoor air loads. Added capability to select auto-closers on doors.
- Addition of warning messages for cases where design water temperatures for primary equipment are different from the design temperatures of the parent loop.

Service Hot Water Heating / Residential Domestic Hot Water Heating

- Added the ability to model heat pump water heaters for service hot water fluid systems serving nonresidential spaces.
- Fixed residential DHWSYS CSE input generation problem caused by numeric vs. string-based switch statements
- Updates to standard design to include hot water pipe insulation on all domestic and service water heating pipes.
- Updates to service hot water heating simulated using EnergyPlus to include the new federal Uniform Energy Factor (UEF) rating for water heaters.
- Updates to residential domestic hot water heating simulated using CSE to include the new federal UEF rating for water heaters.
- Updated residential domestic hot water heating simulated using CSE to include more specific models for NEEA heat pump water heaters.

Bugs Fixed in Version 2016.3.0 SP1 & 2016.3.0:

- Update to CBECC-Com executables to fix issue large log file (re)writing bug.
- Update to CBECC-Com executables adding new Review Results and Compliance Log file toolbar buttons.

- CSE and ruleset mods enabling changes and additions to NEEA HPWH models.
- Update to fix issue where Domestic Hot Water (DHW) budgets were not matching when water heating was excluded.
- Update to fix issue where DHW budgets were not same when DHW was excluded, GasType was Propane and Natural Gas was available on site.
- Update to fix missing 'Altered' status of exterior shading objects in Simplified Geometry models.
- Update to checks to exclude existing demising wall from mandatory checks
- Update to fix issue that resulted in errors when evaluating defaults for lighting status
- Update to fix issue bug in calculation of baseline Terminal Unit (TrmlUnit) air flow that was resulting in 0 for spaces with cooling design flow = 0 but heating design flow > 0.
- Update to fix issue that was resulting in baseline/proposed sizing run errors for models with ventilation systems (not modeled as Exhaust) serving Unconditioned spaces/zones. In this case, ventilation was getting set to 0, resulting in no system flow in the simulation
- Update to keep exhaust fan systems from being purged for compliance reporting.
- Update the minimum efficiency checks for proposed systems with furnace coils <225 kBtu/hr (input), as described below:
 - For all Air Systems (AirSys) and Zone Systems (ZnSys) that support modeling a gas furnace *except ZnSys:Type = 'Furnace'*
 - If the AirSys/ZnSys:SubType = 'Packaged1Phase', the software assumes the system is a weatherized, and the CodeMinAFUE is 0.81.
 - If AirSys/ZnSys:SubType = 'Split1Phase', the software assumes the system is a non-weatherized, and the CodeMinAFUE is 0.80.
 - For all other cases, the software assumes the system is 3-phase, and the CodeMinAFUE is 0.78.
 - For ZnSys:Type = 'Furnace', SubType = 'Room', 'Floor' and 'Wall', the CodeMinAFUE is determined according to Table E-2 of the 2016 Appliance Standards. If ZnSys:SubType = 'Other', the CodeMinAFUE is 0.80 assuming a 1-phase, non-weatherized furnace.
- Revise rules to ensure that baseline lab systems aren't inadvertently added to the model when 'Add Cooling to Meet System Load' is checked at the Thermal Zone (ThrmlZn:AddClgToProp).
- Provide fix as a workaround to an E+ bug resulting in very high cooling loads for residential zones with exhaust fan ventilation.
- Fixes to correct baseline number and type of chillers.
- Baseline Chilled Water pump head now based on plant capacity rather than parent chiller capacity
- Updates to calculation for pump heat
- Auto-hardsizing rules for chilled water pump head now based on total plant capacity. For primary-secondary systems pump power is allocated @ 75% to secondary pumps and 25% to primary pumps
- For Existing Addition and Alteration (EAA) projects, revised the criteria for determining space overall status such that 'New' conditioned space can be served by 'Existing', 'New', or 'Unknown' HVAC systems.
- Add CHECK to ensure Whole Building Is Modeled (Bldg:WholeBldgModeled) is not checked for AdditionEnvelope projects. Other improvements to screens and defaulting for EAA projects.

- Fix bug in setting lab system type if building area is > 150000 SF
- Fixes to VentilationExhaust.csv to correct the reporting for baseline ventilation specification for residential occupancy ventilation.
- Fix rule processing floating point equality/inequality issue related to computer hardware's inability to physically represent certain floating-point values.
- Remove ventilation adjustment for spaces with 'Existing' HVAC, and fix rules to ensure proposed 'Existing' HVAC systems with air-to-air heat recovery are passed through to baseline design.
- Fix AirSys:FanCtrl rule which was allowing multizone systems with 'Cycling' control specified to be passed through to compliance.
- Fixed issue to resolve translation and reporting of 'Type' for single zone systems (ZnSys:SZ*) in CBECC-Com
- Fixes to secondary side-daylighting control positioning to prevent them from falling inside a primary side daylit area.
- Fixed problem where daylighting controls were positioned too close to windows in some spaces with unusual geometry and/or high ratio of glazing to space area.
- Reporting of surface areas now accounts for multipliers on the parent space or building story.
- Updates to PRF-01 Lighting Table Q to display correct totals when using floor multipliers in the building model
- Fixes to bypass mandatory efficiency checks for existing chillers when using ExistAddAlt compliance option
- Fixes to correct chiller auto-hardsize calculation for Chlr:HtRejLd to use the correct efficiency metric.
- Fixed bug preventing atria exception for skylight area from being implemented if more than one space is identified as being a atria > 55'
- Fixed bug causing minimum ventilation flow for NewEnvelope models with zones that require DCV to not be set correctly in proposed model.
- Fix problem with existing primary equipment getting purged from baseline model when it shouldn't be, including newer objects like ThrmlEngyStor, HX, and Chlr:Type = AbsorptionSingleEffect. Also, update to user interface to show Status of primary equipment components.
- Fixed issue in baseline sizing run where no cooling thermostat schedule is being defined for cases when proposed cooling is using evaporative cooling only.
- Updated Weather File to Climate Zone mapping for two weather files ; San-Diego-Gillespie_722907 changed to CZ10 from CZ07; Camp-Pendleton_722926 changed to CZ07 from CZ10 and also revised default weather station for 32 Zip codes along CZ 07/10 boundary.
- Fixed errors for domestic hot water heating where a highrise residential model has some nonresidential spaces with zero domestic hot water load modeled.
- Updated reporting for duct insulation when modeling ductless systems
- Updates to change warning to error for surface "status" incompatibility.
- Updates to user interface to change 'NRCI-PRC-01-E Refrigerated Warehouse' to 'Covered Processes' on Form 4 tab dialog box and reporting on PRF-01 Table H.
- Updates to user interface to add NRCA-MCH-03-A and NRCA-MCH-04-H checkboxes to Zone Systems Acceptance Certificates tab.
- Updates to reporting and Nonresidential ACM Manual

New in Previous Versions:

- For zones where there is no cooling, modified the baseline to also not have cooling.
- Added efficiency modifiers for zone systems that will not be tested for duct leakage and meet the criteria in Section 140.4(l).
- Upgrade of simulation engine to EnergyPlus 8.5.
- Expand support of partial compliance options for Additions.
- Added new input screens to support Highrise residential modeling allowing input of dwelling unit information such as number of dwellings units for 1 bedroom to 5 bedrooms and average area of dwelling units per bedroom type
- New feature enabling output of hourly EnergyPlus simulation results to CSV files during analysis (via SimOutputVariablesToCSV* INI file settings).
- Added methodology for more accurate simulation of fenestration products with U-Factor > 1.03 via manipulation of EnergyPlus inputs for fenestration inside film coefficient. Modified structure of inputs to allow specification of luminaires as new/altered/existing within a single InteriorLightingSystem.
- Updated criteria for specification of prescriptive lighting power in Standard Design for Alterations compliance types to exclude cases where < 10% of luminaires are affected by the alteration.
- Zones with new operable windows and new HVAC systems that do not meet the prescriptive requirement for interlocks will be simulated with additional outdoor air loads.
- Add the capability to identify load ranges for chilled water or hot water plant systems, and then specify the chillers or boilers that are to be used in each load range.
- Add new HeatRecovery object, which can be added to AirSystems that are 100% outside air.
- Add support for modeling single-packaged vertical units (SPVAC and SPVHP) as new Types for AirSystem and ZoneSystem.
- Add ability to specify fixed seating for nonresidential spaces.
- Added support for water coils for supplemental heating for Single Zone Heat Pumps
- Incorporated 2016 residential DHW use and profile updates and upgraded simulation to use CSE (California Simulation Engine – for residential DHW).

Known Issues:

- General Issues
 - No resizing of baseline systems if unmet load hour (UMLH) requirement is not met.
- HVAC Secondary Systems
 - Simulation of supply air temperature and flow controls may not match ACM requirements.
 - Specifying DCV for all zones of a multi-zone system results in unexpectedly high energy use.
- HVAC Primary Systems
 - All pumps on primary loop of primary/secondary pumping systems will run if there is any demand on the secondary loop

Example Input Files: A series of example models are installed along with CBECC-Com in the Projects directory. These models are of various building types and HVAC systems. **Note:** *For the RC (beta) version of the software all the example models listed below may or may not be included with the installation.*

CEC Standard Tests

1. 010012-SchSml-CECStd
2. 020012-OffSml-CECStd
3. 020012S-OffSml-CECStd
4. 030012-OffMed-CECStd
5. 030012S-OffMed-CECStd
6. 040012-OffLrg-CECStd
7. 050012-RetlMed-CECStd
8. 060012-RstntSml-CECStd
9. 070012-HotSml-CECStd
10. 080012-Whse-CECStd
11. 090012-RetlLrg-CECStd

Other Tests

1. 010112-SchSml-PSZ16
2. 010212-SchSml-PVAVAirZnSys16
3. 010312-SchSml-VAVFluidZnSys16
4. 040112-OffLrg-AbsorptionChiller16
5. 040112-OffLrg-VAVPriSec16
6. 040112-OffLrg-Waterside Economizer16
7. 050112-RetlMed-SZVAV16
8. 050312-RetlMed-Alterations16
9. OffLrg-PlenumsFPBsData16
10. OffLrg-PrkgExhaust16
11. OffLrg-PrkgLab16
12. OffLrg-PrkgLabKitchen16
13. OffLrg-ThermalEnergyStorage_ChillerPriority
14. OffLrg-ThermalEnergyStorage_StoragePriority
15. OffMed-CoreAndShell
16. OffSml-ActiveBeams
17. OffSml-CombDHWSpcht16
18. OffSml-CommKit_SZVAV16
19. OffSml-Data_SZVAV16
20. OffSml-Lab_SZVAV16
21. OffSml-MiniSplit
22. OffSml-Office_SZVAV16
23. OffSml-PassiveBeams
24. OffSml-PassiveBeams-DOASCV+HtRcvry
25. OffSml-PassiveBeams-DOASVAV
26. OffSml-PSZ-Evap16
27. OffSml-WSHP16
28. RetlMed-PVAV-IndirDirEvap16
29. RetlSml-DOAS+FPFC16
30. RetlSml-DOAS+GravityFurnace

Tip: Input Units

The input screens show the units for numerical inputs. For example, boiler efficiency is input as a fraction like 0.8, not as a % like 80.

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Updates and New Project Website

We plan to issue updates to CBECC-Com often. You can check the new project website (<http://bees.archenergy.com/>) where a link to the latest version will always be posted.

Starting a New Project

When CBECC-Com is first started, a dialog box will appear with the options (No. 2 option may not be available on new CBECC-Com installations):

1. Open Recent Project
2. Select an Existing Project to Open
3. Create a New Simplified Geometry Project

Option 1 and Option 2 are essentially the same, except that the “Open Recent Project” option automatically selects the project that was being worked on the last time CBECC-Com was open. The “Select an Existing Project to Open” option simply requires browsing to the desired project.

If “Select an Existing Project to Open” is selected, the default file type in the browse window is a .cibd16 file. However, this can be changed to .cibd16x or .xml, allowing you to open a SDD XML file. This option should be used when working on a Detailed Geometry project.

Users can take either approach (Detailed or Simplified – see User’s Manual for more information) to modeling their project; however, the preferred workflow is to use the *Detailed Geometry* approach using OpenStudio to create building model geometry using SketchUp with the OpenStudio plug-in. OpenStudio includes an option for exporting an SDD file, which CBECC-Com can then open. The *Simplified Geometry* approach is recommended for simpler buildings since this approach comes with certain limitations that could prevent the project from getting credit for certain efficiency measures included in the design.

For more information on the recommended workflow, please view the tutorials at <http://bees.archenergy.com/faq.html>.

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Analysis Types

Title24ProposedOnly: This will simulate the building input by the user with the 2016 compliance rules.

Title24Compliance: In addition to simulating the Proposed Design, this will simulate the Standard Design building which complies with the 2016 Prescriptive Standards and establishes the energy budget for compliance.

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Analysis Scope Options

The scope of analysis is specified through use of a series of checkboxes. Use of these checkboxes results in specification of Compliance Type, which was input directly in CBECC-Com 2016.2.1 and earlier versions.

New and Existing. One (and only one) of these two boxes must always be selected. In the CBECC-Com UI, checking or unchecking either of these options results in the other option automatically being set the opposite way.

New should be selected when the project involves construction on a site where there is not an existing building or where the subscope (described below) has not been previously constructed. For example, if a new building has been built with tenant spaces that did not have lighting or mechanical systems, a subsequent analysis addressing the lighting or mechanical systems for those tenant spaces is still *New*, even though the building shell is existing. On the other hand, if that same tenant space is remodeled later, analysis of that project would use *Existing*.

Existing should be selected when the project is an addition to an existing building or when an existing building is being altered, or both.

Addition and Alteration. When *Existing* has been selected, the *Addition* and *Alteration* checkboxes must be used. At least one of these must be selected, and both may be selected. An *Addition* means that new conditioned floor area is being added to the building, and the construction related to that new floor area is treated in the same way as new construction. *Alteration* means that portions of the existing building are being changed in ways that affect the energy performance, but without adding new conditioned floor area. When alterations are analyzed, determining the characteristics of the baseline follows different rules than new construction.

When an *Existing* building is described in CBECC-Com, careful attention must be paid to properly specifying the *Status* of all components to be *New*, *Existing*, *Altered*, or *Future*, in order to achieve a valid analysis.

Envelope, Lighting, Mechanical, DHW. These checkboxes allow analysis of partial compliance options. These options are used when only the specified aspects of the building are included in the building permit and energy performance analysis.

Partial Lighting, Partial Mechanical. These checkboxes allow analysis of core and shell projects, where a portion of the lighting or mechanical systems in the building are included in the building permit and energy performance analysis, but other portions have either already been built or will be built in the future.

Note that if some combinations of *Existing*, *Addition* and *Alteration* are selected, then *Envelope*, *Lighting*, *Mechanical*, *Partial Lighting*, and *Partial Mechanical* may be automatically checked or

unchecked and the user may not be able to change those selections. In this case, the *Status* of individual components in the model will determine how the analysis will proceed.

Envelope. For all models, the building envelope, including opaque surfaces and fenestration must be described in the user's input model, which will provide the basis of the proposed model. When Envelope is not checked, it is assumed that the envelope is existing and the envelope in the baseline model will match the proposed model. If the project includes any new or altered envelope components, then *Envelope* must be checked and the status of envelope components will determine how the baseline model is specified.

Lighting and Partial Lighting. If the project includes any new or altered lighting systems, then *Lighting* or *Partial Lighting* must be checked. The status of the lighting in each space will be used to determine the characteristics of the lighting in the baseline.

For a *New* project, if lighting will be designed and permitted at some point in the future, *Lighting* must be left unchecked. The *Status* of lighting in all spaces will default to *Future*. In both the proposed and baseline models, lighting will be specified by the rules and will normally be identical. If the lighting in all spaces has been designed and is being permitted, then *Lighting* should be checked. If the lighting for some spaces is designed and included in the permit, but the lighting for other portions of the building will be designed and permitted in the future, such as for a core and shell project, then *Partial Lighting* should be checked.

For an *Existing* project, if *Lighting* is unchecked, then the *Status* of the lighting in each space may be set to either *Existing* or *Future*. If the *Status* of the lighting in a space is set to *Existing*, that same lighting will be used in the baseline. If the *Status* is set to *Future*, then the rules will determine the lighting for both the proposed and baseline (same as for *New* without lighting).

If the *Status* of the lighting in any space will be *New* or *Altered*, then either *Lighting* or *Partial Lighting* (but not both) must be checked. In this case, the baseline lighting will be different from the lighting in the proposed model. If a project is *New* or an *Addition* where the *Status* of the lighting in some spaces is *Future* along with other spaces with the *Status* of the lighting being *New* or *Altered*, then *Partial Lighting* should be checked. If all spaces have the *Status* of lighting set to *New*, *Altered* or *Existing*, then *Lighting* should be checked.

Mechanical and Partial Mechanical. If the project includes any new mechanical system components, then *Mechanical* or *Partial Mechanical* must be checked. The status of the systems serving each thermal zone will be used to determine the characteristics of the baseline HVAC systems.

For a *New* project, if the HVAC systems will be designed and permitted at some point in the future, *Mechanical* and *Partial Mechanical* must be left unchecked. The HVAC systems in both the proposed and baseline models, will be specified by the rules and will normally be of the same type, with system capacities determined by sizing runs.

If the HVAC systems for the entire building have been designed and are being permitted, then *Mechanical* should be checked. If the systems serving some thermal zones are designed and included in the permit, but for other portions of the building will be designed and permitted in the future, such as for a core and shell project, then *Partial Mechanical* should be checked.

For an *Existing* project, if *Mechanical* is unchecked, then the *Status* of the systems may be set to *Existing* or at the Thermal Zone, "HVAC is unknown" should be checked. This checkbox is used for either existing systems where the details are unknown or for systems that will be designed in the future. In either case, the rules will determine the system configuration for both the proposed and baseline models with sizing determined by sizing runs.

DHW. *DHW* may be checked or unchecked regardless of other analysis scope options. If it is included, then DHW systems must be specified and all spaces assigned to a residential DHW system or a fluid system of type service hot water. If *DHW* is not checked, the rules will create systems for both the proposed and baseline models.

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Menu Bar

This section explains the program features you access by selecting the options on the menu bar at the top of the screen.

File – The *File* menu contains the standard functions for file management, loading recently used files, saving a newly created file, print a file and exiting the program.

Edit – In addition to the standard Windows™ *Cut*, *Copy*, and *Paste* commands, the *Edit* menu contains several commands for editing building descriptions. They are:

- *Edit Component*
- *Create Component*
- *Delete Component*

These menus allow you to edit all building components, including components that are not displayed on the tree control. Use this method to edit components like schedules and performance curves.

Ruleset – *CBECC-Com 2016* is designed to support multiple rulesets that implement the requirements in different codes. However, different codes can require different information, and therefore, compliance projects and model inputs defined using one ruleset will likely need to be revised to work with other rulesets. This function may or may not be enabled in this version of the software.

View – Enables you to toggle the display of the Tool Bar and the Status Bar on and off.

Tools – The *Tools* menu contains the following options of interest to end-users:

- *Program and Analysis Options* – Allows users to set the various options related to storage of simulation output and analysis files. Also allows users to set the proxy server settings to enable access to the online report generator if the computer is behind a firewall
- *View T-24 Compliance Report* – Allows users to open an approved CBECC-Com2016 compliance report in the local PDF document viewing software; typically Acrobat Reader. If no valid report or results file is found it will prompt the user to perform the compliance analysis before generating and/or viewing the compliance report.
- *View Project Folder* - Allows easy access to users to open the folder where all the project files are stored and/or generated on analysis.
- *View Project Log File* - Allows users to open the project log file in the local text editor software; typically Notepad.
- *Delete Project Log File* - Allows users to delete the project log file generated for the project. Typically the project log file gets appended with information on opening/saving and running the project. So if the user wishes to start with a fresh project log file this option allows the user to delete the old log file.
- *Perform Analysis* – Performs compliance input checks and simulations based on the current building description.
- *Review Analysis Results* – Allows users to review the results of the last simulation analysis that was performed for the project. Please note that if any changes to the project were made after the analysis and the project was not simulated again, the displayed results would not be current.
- *Generate Draft T-24 Compliance Report* – Generates a watermarked compliance report (pdf) for review/printing. This watermarked report cannot be used to submit for compliance.

Help – The *Help* menu contains the following options of interest to end-users:

- *Quick Start Guide* – Opens up the Quick Start Guide for the software in the local PDF document viewing software.
- *User Manual* - Opens up the User's Manual for the software in the local PDF document viewing software.

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Tool Bar

This section explains the program features you access by selecting the icons on the tool bar at the top of the screen.

New File



This button closes the current file (if one is open) and opens a new file.

Open Existing File



This button closes the current file (if one is open) and launches the *Open* dialog to enable you to select an existing file to open.

Save File



This button saves the file under its current name or, if you have not named the file, launches the *Save As* dialog to enable you to provide a new file name.

Cut Selected Item



This button is not currently enabled in *CBECC-Com 2016*.

Copy Selected Item



This button enables you to copy the selected item on the tree control (along with any child components) to the Windows clipboard. The *Copy* button is not available from within program dialogs, but you can use the keyboard equivalent, Ctrl+C, to copy selected text.

Paste Contents of Clipboard



This button enables you to paste components copied from the tree control to the selected location in the tree control (provided that location is compatible with the stored component). The *Paste* button is not available from within program dialogs, but you can use the keyboard equivalent, Ctrl+V, to paste text from the Windows clipboard to the selected input field.

Print



This function is not available in *CBECC-Com 2016*.

Building Creation Wizard



This function is not available in *CBECC-Com 2016*.

Perform Analysis



This button enables you to launch a compliance analysis using the currently loaded building description. The behavior of this button identical to the Tools menu option. You must save the current building description before performing the analysis.

Analysis Results



This button enables you to view the analysis results screen. The behavior of this button is identical to Tools>Review Analysis Results menu option.

Compliance Reports



This icon opens an approved *CBECC-Com2016 Report* in your local document viewing software; typically Acrobat Reader. The behavior of this button identical to the Tools menu option - "View Compliance Report". You cannot open an approved report unless an analysis has been performed and

the model has not been modified since the analysis has been performed. This button may or may not be enabled in this version of the software.

About CBECC-Res 2016



This button enables you to view program license and version information.

Print Preview



This function is not available in CBECC-Com 2016 and will be removed in future versions.

Help



Not yet implemented. For help with the program, please refer to this Quick Start Guide.

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Main Screen

The main screen of the *CBECC-Com 2016* program is used primarily for editing building descriptions. There are two folder tabs at the top of the main screen—Envelope and Mechanical. These tabs provide different views of the building description and provide access to two different subsets of the building description data.

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Right Mouse Button Menu Options

The *CBECC-Com 2016* program makes extensive use of menu accessible by clicking the right mouse button. The functions available through these menus depend on whether you are on the main screen or in an input dialog window.

Main Screen Right Mouse Menu. When clicked over a building component, the following choices are available:

- *Edit* – Opens the input dialog window for the selected component
- *Rename* – Enables you to rename the selected component
- *Delete* – Deletes the selected component
- *Copy* – Copies the selected component with all of its child components
- *Paste* – Adds copied components and their children to the selected component
- *Move Up in list, Move Down in list* – Moves the component up or down in the list of components that share a common parent. The input file is reordered accordingly. HVAC components are reordered and will be simulated with components in the displayed order, except for fans which are ordered based on the Fan Position parameter. For example, an evaporative cooler placed before or after a cooling coil will have different effects in the simulation.
- *View Space Footprint* – Displays in your browser a diagram of the space (available for space components only)
- *Expand/contract* – Expands or contracts the list of children components attached to a selected component
- *Create* – Enables you to create new child components for the selected component

Input Dialog Right Mouse Menu. When clicked over an input value in the window, the following choices are available:

- *Item Help* – Not yet implemented. Accesses Help information applicable to the selected input field.
- *Topic Help* – Not yet implemented. Accesses Help information applicable to the selected component.
- *Restore Default* – Returns the value of the field to its default value (if applicable)
- *Critical Default Comment* –Not yet implemented. Opens a dialog enabling you to enter a justification for overriding values designated by the Code as critical defaults, i.e., a value that should only be overridden with special justification.

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Building Tree Controls (Parent/Child Relationships)

In order to analyze a building's energy use, it is necessary to track relationships among building components. *CBECC-Com 2016* displays these relationships using the familiar tree control, found in Windows™ Explorer and many other applications. For example, under the Envelope tab, exterior walls are shown as parents to windows (windows are connected to exterior walls and appear underneath walls) and children to spaces. The tree controls vary in the components they display and depend on which folder tab is currently selected.

Use the Tree Control for Rapid Editing

The tree control can be used to move and copy components or groups of components. To move a component, just drag and drop. If an association isn't allowed, the program will prevent the move from being carried out. To copy a component, select the component, copy, and paste. It is advisable to rename copied components to maintain readability. Whenever parents are moved, copied, or deleted, all related child components are also moved, copied, or deleted.

Components shown on the tree can be moved using a drag-and-drop technique to other components provided it results in a compatible parent-child relationship. For example, you can drag a window onto a different wall, but not vice versa. Re-ordering of child objects assigned to the same parent is currently not supported.

A set of right mouse menu edit commands can be used with the tree control. These are described in the [Right Mouse Button Menu Options](#) section. Double-clicking on any component on the tree opens its input dialog window.

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Input Dialog Windows

The attributes of each building component can be edited by opening the input dialog window for the component. The dialog can be opened by double-clicking on the component on the tree control, using the *Edit* option on the right mouse menu, or using the *Edit Component* option on the *Edit* menu. (The tree control does not appear until you have created a project description using the wizard or loaded an existing project file [Ctrl+O]).

In keeping with good practice for use of any software, we recommend that you save your building description often and revise the file name once you have substantial effort invested in editing the description under the current file name.

Background Colors

The following background color convention has been used in displaying data on the dialogs:

- White background = available for user input
- Gray background = not user editable

Text Colors

The following text color convention has been used in displaying data on the dialogs:

- Dark blue or cyan text = default values as defined by the current ruleset
- Red text = values that have been changed from their default values

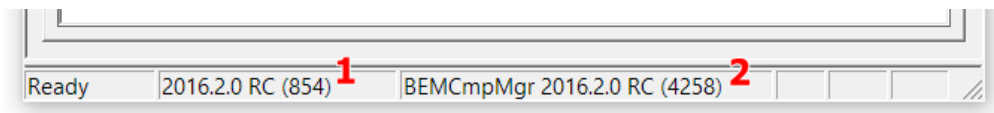
For information on editing features available from the input dialog windows, see the [Right Mouse Button Menu Options](#) section.

To understand what information you are required to enter, see the [Status Bar](#) section.

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Status Bar

The second and third panes of the program status bar now report detailed version IDs of (1) the software and (2) the ruleset that is referenced by the project currently loaded into the program:



Note: The following features of the Status Bar have not been implemented in this version of CBECC-Com.

The status bar at the bottom of the screen provides useful information about each input field you select. There are three panes on the status bar that provide context-sensitive information. This same information is displayed in the ToolTips if you allow your mouse pointer to linger over an input field.

1. Input Description Pane – Concise descriptions of the selected input field are displayed at the far left of the status bar.
2. Input Classification Pane – The next pane to the right on the status bar displays a set of labels that indicates which inputs you are required to provide, which are optional, and which are unavailable for input. The [input classification](#) labels are explained in the table below.
3. Data Source Pane – The pane at the far right of the status bar displays a set of labels that identify the source of the information (if any) contained in the field. This can help you distinguish between information that is dictated by the compliance checking process and

the information you have entered and for which you are responsible. The [data source](#) labels are explained below.

Input Classification Explanations

No field selected	No building data field is currently selected.
Input is compulsory	You are required to enter data in the selected field; the program cannot perform a compliance analysis unless you do.
Input is required	You are required to enter data in the selected field if the field is applicable to your project.
Input is optional	You may enter data in the selected field if the field is applicable to your project, but you are not required to do so. If the field contains a default value, you are permitted to simply use that value without considering its suitability for your project.
Input is critical default	You may overwrite the data in the selected field with an entry more appropriate for your project than the default. However, if you do overwrite this "critical default" value, you must be prepared to provide documentation substantiating the value you have chosen.
Field is not editable	You cannot enter data in the selected field. The data in this field are defined by the compliance rule set or a supporting process. In some cases, the field may also be an intermediate calculated parameter or one that is not applicable to the currently selected compliance rule set.
Navigation input	The purpose of the selected field is to enable you to select a component for editing without having to exit the current component and choose the next component from the tree

Data Source Explanations

No field selected	No building data field is currently selected.
Value from user	The data shown have been defined by the user either directly through a user input or indirectly through wizard selections.
Value from simulation	The data shown have been defined by an energy simulation.
Value undefined	No data have yet been defined for the field.
Value from program	The data in this field have been defined by the program either to implement requirements and procedures specified in the energy code or to conform to building energy modeling conventions.

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Defining New Components

There are two main ways to define new components (e.g., walls or equipment) in the main program interface.

Define a New Physical Component

To define a new physical component, follow these steps from the Main Program Screen:

- Right-click on the component on the tree control to which you want to add the new component.
- Select *Create*, then the type of object you want to add. (Only applicable component types will appear on the list.)
- Accept the default name, parent, and existing component to copy from or edit these fields and click OK.
- Edit the input fields with white backgrounds to describe the new component and click OK.

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Deleting Project Files

If you have created multiple projects under different project names, you may want to delete project files to free up hard disk space on your computer. By default, project files are stored in the C:\Users\\My Documents\CBECC-Com 2016 Projects\ directory, although where the files are stored may differ on your computer depending upon where you installed the program and if you selected a different location for storing files.

In the Projects folder, you will find several files with the same project name you used but with differing file extensions. If you have no further use for information on a project, delete all files using the primary file name. If you would like to retain a project but store it as efficiently as possible, delete all files using the primary file name EXCEPT the one having a .cibd (input building design) file name extension. The other project files are recreated when an analysis is performed, with the exception of the project .log file. The log file lists compliance analysis warnings and errors shown in the UI, as well as other information related to processing/simulating models. Each time analysis is performed; new messages are appended to the end of this file, and should be reviewed when troubleshooting your compliance analysis.

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How to Report a Problem

This software is released for testing purposes and we anticipate the user running into errors and problems. We appreciate your willingness to help us make progress by taking the extra time to document and report issues in a way that will help us fix them quickly.

When you come across an issue, please log an issue at the CBECC-COM website at:

<http://bees.archenergy.com/issue.html>

If you experience any issues submitting an issue through the website, please send an email to:

CBECC-COM Support <cbec.com@gmail.com>

And include as much of the following as possible (copy and paste this template into your email):

Type of Issue

CBECC-COM version (Version can be found in the Help-> About menu) and is represented as show below: CBECC-COM 2016



Describe the error, using as much detail as possible.

List the steps taken to produce the error, using as much detail as possible.

1. Step 1
2. Step 2 etc.

If there is an error message, what is the message? If possible, take a screenshot of the error message and attach it to the email as a file.

Please attach your <ProjectName>.cibd16 file. This is the file you open and save from inside CBECC-Com. By default, this file is located in the following directory, **C:\Users\<your username>\My Documents\CBECC-Com 2016 Projects**.

If you include your name and phone number, we may call you to clarify the problem or ask for more details. We will not share your name, phone number or email address with anyone outside the CBECC-Com development team or use it for any purpose other than responding to your report.

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