



CABEC Conference 2016

Questions about the 2013 Energy Standards - RESIDENTIAL -

Building Standards Office – Software Tools
Efficiency Division

CABEC Conference
Lake Tahoe
April 29, 2016



Necessary Resources

- CBECC User Manual (if you use CBECC)
- Energy Standards (a legal document)
- Reference Joint Appendices (climate zone, HERS required measures)
- Residential Compliance Manual (use with caution – not as much review, not legally “approved”)
- Blueprint
- CBECC FAQs (whether you use CBECC or not) available under Additional Information
www.energy.ca.gov/title24/2013standards/2013_computer_prog_list.html



Resources (continued):

Reference Appendices (RA3 vs RA4)

- The rules for when HERS tests are required.
- If you specify HERS pipe insulation, what does that mean?
- General information, so you're not just clicking things to make it comply.

Alternative Calculation Method (ACM)

Reference Manual

- Software guidelines for standard and proposed



Another Useful Tool

www.energy.ca.gov/title24/2013standards

A screenshot of a web browser window. The address bar shows the URL "www.energy.ca.gov/title24/2013standards/". The page content includes a list of links: "Ventilation Worksheet" (Posted October 1, 2015 (Excel file, macro-enabled)) and "2013 Title 24 Solar Water Heating Calculation for built up system". Below this is a section titled "Compliance Software & Alternative Calculation Methods" with a sub-section "Approved Compliance Modeling Software" containing a link "2013 Approved Computer Compliance Programs" which is highlighted by a blue arrow pointing left.



On the software page are links to “Approval/Expiration Dates”

Residential Buildings, 2013 Standards		
Approved versions usable for permit	Contact Information	Additional Information
<p>CBCEC-Res 2013-4b (812) was approved 1/20/2016 for demonstrating performance compliance with the residential provisions of the 2013 California Building Energy Efficiency Standards.</p> <p>CBCEC-Res 2013-4 (744) was approved 5/13/2015 and shall continue to be valid for demonstrating compliance with the residential provisions of the 2013 California Building Energy Efficiency Standards.</p> <p>All CBCEC-Res 2013 resolutions can be found here.</p>	<p>California Energy Commission Building Standards Office 1516 9th Street, MS 37 Sacramento, CA 95814 ATTN: Dee Anne Ross 916-654-6560 deeanne.ross@energy.ca.gov</p>	<p>CBCEC-Res Website</p> <p>Approval/Expiration Dates</p> <p>FAQs</p> <p>Reported Software Issues</p> <p>Support: cbec.res@gmail.com</p>

Same document accessed for any of the residential programs



Specific Expiration Dates (excerpt)

Program Name	Version	Approval	Expiration*
CBECC-Res			
	3c	02/24/2015	08/01/2015
	4	05/13/2015	
	4b	01/20/2016	
EnergyPro			
	6.5	03/04/2015	08/01/2015
	6.6	05/26/2015	
	6.7		
Right Energy Title 24	1.0	06/18/2014	10/13/2014
	1.1	09/05/2014	08/01/2015

*New permit applications made on or after the listed date must be made using approved software.



Software tips / CF1R issues

- Some things can be fixed within a day
 - Missing information
 - Picking up incorrect information
 - Error 202 / is usually on your end – Wi-Fi problems
- Other things require a software update
 - HERS triggered or not triggered
 - Language of HERS message
 - Special Feature notes



Software Tips (continued)

- Could be a HUGE # of files on your computer
- Likely in a folder with the input file name
 - In Projects folder for CBECC
 - In Results folder for EnergyPro (only if you have manually unchecked delete temporary files)
- Keep RIBD or BLD file / XML file
- Finding errors - I'll tell you how to find errors for yourself in either program at the end



Mini-Split, Multi-Split, VRF

2013 ACM:

Until there is an approved compliance option for ductless heat pumps (mini-split, multi-split VRF systems) they are simulated as a split system equivalent to the standard design with default duct conditions.

- Ductless Mini-Split / no credit / done
- Multi-Split and VRF / no credit / future
- Model minimum efficiency
- If a future release locks down the efficiency, this will make it less painful



Is treatment of mini-splits punitive or generous?

- Findings are that the system will not deliver comfort throughout house unless carefully designed – decision was to not give credit for ductless if not adequately delivering conditioned air.
- Field inspection protocols are designed to provide a guarantee that consumers get the expected performance, but there are no protocols for airflow, fan watt draw.
- The SEER test conditions that give 18 or 21 are the same for mini-split as split. Should they be?



Duplex/Townhome = Single Family – CF1R per Dwelling Unit

- Definitions from 100.1:
- **LOW-RISE RESIDENTIAL BUILDING** is a building
.. Occupancy Group:
 - R-3, single family; or
- **TOWNHOUSE** is a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.



Duplex, Townhome vs Multi-family – How/Why are they different

- Duct Leakage (Section 150.0(m)11 [Ref Appendices Table RA3.1-2] – different
 - Single family and townhomes = 6%
 - Multi-family = 12% Total Duct Leakage
- Ventilation rates (Section 150.0(o))
- Duct location default (ACM Table 2-12)
 - Single family and townhomes = 1 attic, 2 crawl, 3 cond space
 - Multi-family = conditioned space
- Building air leakage testing not allowed for multi-family (ACM 2.2.5.1)



Additions / Are they more difficult?

- This is a new, more stringent code
- No credit for deleted surfaces
- No credit* for improvements until you exceed (see Table 150.2-B):
 - ❖ R-13 walls
 - ❖ R-30 ceiling
 - ❖ 0.40/0.35 windows

*Unless using verified existing conditions



Addition Alone

- Were almost always more difficult
- Standards for new construction apply
- What are the biggest hurdles for addition alone?



500 ft² addition in zone 13 standard design (budget) comparison

Existing + Addition

- R13 Walls
- 25% fenestration

Addition Alone

- R15+R4 Walls
- 20% fenestration

- If you're asked "can you make it work for the addition alone", they need to understand that it is much more difficult than E+A+A.
- Don't forget prescriptive (it is very user friendly for a small addition) / fillable forms at www.energy.ca.gov/Title24.



A better fit for your small addition is likely Prescriptive Compliance

- If CZ 10-15 and ≤ 300 ft² no cool roof
- If Pkg A has radiant barrier, it is always req'd
- R-13 walls (≤ 700 ft²)
- Fenestration
 - 30% (or 75 ft²) maximum for ≤ 400 ft²
 - 25% (> 400 to ≤ 700 ft²)
 - If in a zone with a 5% limit, can have up to 60 ft² west-facing



Alterations

- Almost no reason to model an alteration alone
- No longer get credit for improving the building unless you:
 1. Verify existing conditions or
 2. Exceed*
 - A. Mandatory requirements, or
 - B. Current prescriptive

*Which one? See next page.



Table 150.2-B

Altered Component	Standard design w/o 3rd Party Verification is based on*
• Ceiling, Wall, Floor	Mandatory
• Fenestration	0.40 U-factor/0.35 SHGC
• HVAC	Package A
• Duct Sealing	Alteration requirements
• Duct R-value	Proposed / no credit
• Water Heating Systems	Package A
• Roofing	Alteration requirements

*With verification, credit from existing to proposed reverts to as it was pre-2013.



FAQ Timely Topics

- MF1R
- Plan azimuth vs. orientation
- Saving space on your CF1R if you didn't model overhangs
- Error Code 202
- Finding CSE errors



Metal roof/floor workaround - Joint Appendix

- Metal roof and metal floor (alternative to not building a building). Find the U-factor.

Table 4.2.4 – U-factors of Metal Framed Attic Roofs

R-25	19	0.047	0.043	0.040	0.037	0.035	0.034	0.032	0.028
R-30	20	0.039	0.036	0.034	0.032	0.031	0.030	0.028	0.025
R-38	21	0.030	0.028	0.027	0.025	0.025	0.024	0.023	0.021
R-44	22	0.026	0.025	0.024	0.022	0.022	0.022	0.021	0.019

- Model a wood frame assembly with equal or higher U-factor.



For example, R-38 is 0.030, so . . .

Construction Layers (topmost to bottom)

	Cavity Path	Frame Path
Attic Floor:	- no attic floor -	- no attic floor -
Cavity / Frame:	R 32	2x4 @ 24 in. O.C.
Sheathing / Insulation:	- no sheathing/insul. -	- no sheathing/insul. -
Inside Finish:	Gypsum Board	Gypsum Board

Non-Standard Spray Foam in Cavity
 Raised Heel Truss

↓

Winter Design U-value: 0.030 Btu/h-ft²-°F

Don't forget about mandatory max. U-factors in 150.0



Workaround for an E+A+A not attached to the house

Assuming it is an addition

- Add some wall connecting the two
- Surfaces between two conditioned spaces do not appear on the CF1R (so no one will know what you did to get it to run)



What is a party surface?

- Separates two conditioned spaces
- Other space not part of the current model
- For example:
 1. Addition Alone
 2. Multi-family between dwellings



My Tips

- Pay close attention to your CF1R.
- Know if something makes a difference or not (refrigerant charge, EER verification) before including it.
- Are all of your garage walls facing left?
- Are your angled walls facing the right orientation?
- What are your standard design values.
- Where is the building out of compliance.



Finding Errors

- If your input file is Ductless
- Look for files named:
 - Ductless – Prop.err
 - Ductless – Std.err

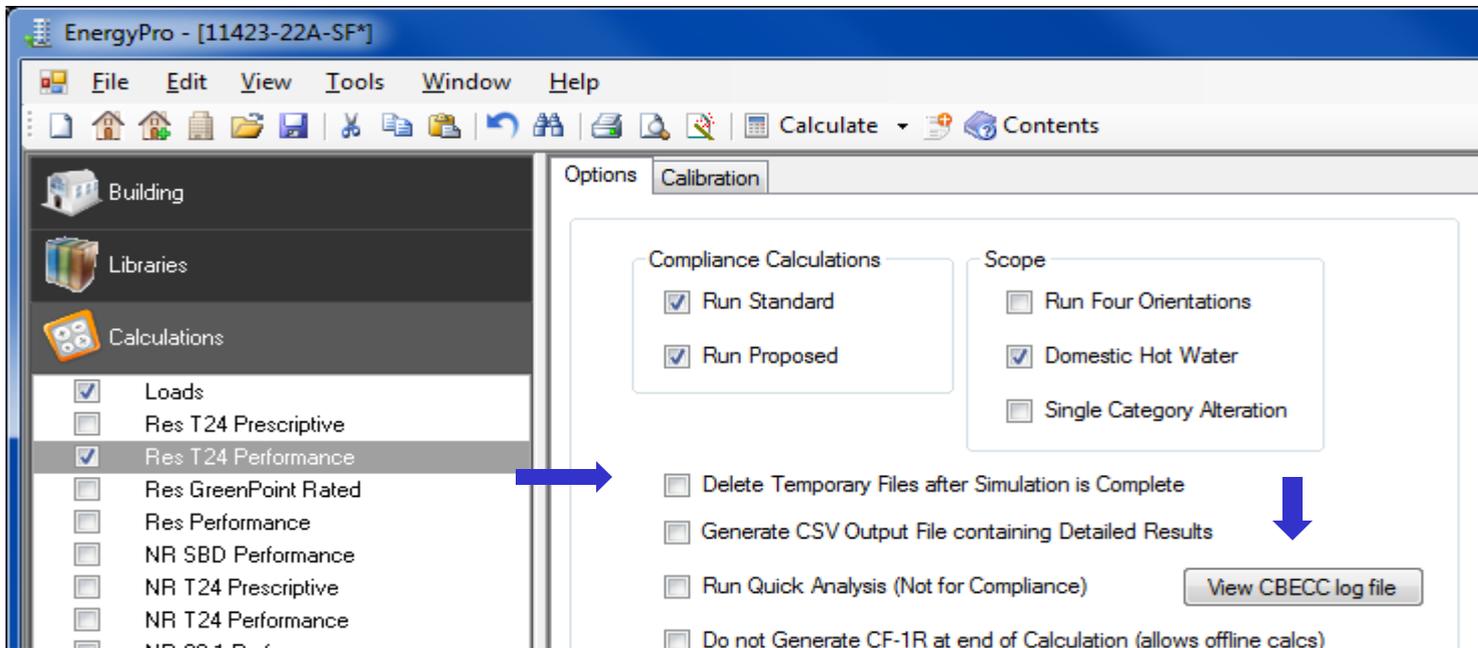
In what folder

- Ductless – Comp13 [**in Projects**] **CBECC**
- Ductless ResT24Perf [**in Results**] **EnergyPro**



EnergyPro

- First, uncheck delete temporary files
- Also note “view CBECC log file”





Directory with error files

Name	Date modified	Type	Size
ductless.log	7/7/2015 1:50 PM	Text Document	5 KB
ductless - Prop - BuildingSummary.csv	7/7/2015 1:49 PM	Microsoft Excel C...	7 KB
ductless - Prop - HourlyResults.csv	7/7/2015 1:49 PM	Microsoft Excel C...	1,345 KB
ductless - Prop.csv	7/7/2015 1:49 PM	Microsoft Excel C...	1,626 KB
ductless - Prop.err	7/7/2015 1:49 PM	ERR File	1 KB
ductless - Prop.rep	7/7/2015 1:49 PM	REP File	61 KB
ductless - Std - BuildingSummary.csv	7/7/2015 1:49 PM	Microsoft Excel C...	6 KB
ductless - Std - HourlyResults.csv	7/7/2015 1:49 PM	Microsoft Excel C...	1,343 KB
ductless - Std.csv	7/7/2015 1:49 PM	Microsoft Excel C...	1,623 KB
ductless - Std.err	7/7/2015 1:49 PM	ERR File	1 KB
ductless - Std.rep	7/7/2015 1:49 PM	REP File	69 KB
ductless - Prop.cse	7/7/2015 1:49 PM	CSE File	37 KB
ductless - Rpt - BuildingSummary.csv	7/7/2015 1:49 PM	Microsoft Excel C...	7 KB
ductless - Std.cse	7/7/2015 1:49 PM	CSE File	44 KB
ductless.xml	7/7/2015 1:49 PM	XML Document	19 KB
CTZ03S13b.CSW	3/19/2012 12:35 PM	CSW File	892 KB





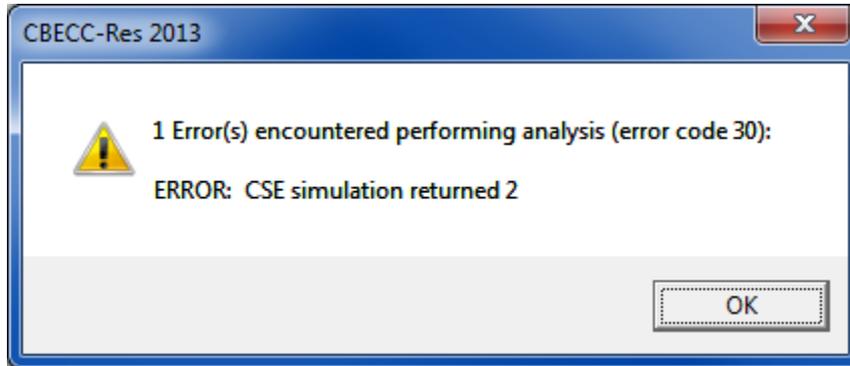
Contents of a CBECC log file

2016-Mar-25 11:37:06 - **Warning:** . . .

2016-Mar-25 11:37:06 - **Error:** Distribution system 'Wall Heat1-dist' - system type *DuctsAttic* is not valid when attic area above conditioned rooms < 10% of total conditioned area evaluating rule: Rule 372, 60, 'Rules_ModelChecks.rule' Line 894: Check for valid distribution system type'



Contents of an ERR file



CONSTRUCTION "cc-R13 R4 Stucco Wall "

^

C:\CBECC-RES 2013 PROJECTS 4\ File name - COMP\ -
PROP.CSE(628): **Error:**

S0228: *duplicate construction name* 'cc-R13 R4 Stucco Wall'

Look for word Error.



Another ERR file

C:\CBECC-RES 2013 PROJECTS 4\File name - COMP\File name -
PROP.CSE(1913): Error:

RSYS 'rsys-Ex System': rsSEER (8.9) must be > rsEER (9)

C:\CBECC-RES 2013 PROJECTS 4\File name - COMP\File name -
PROP.CSE(1964): Info:

S0214: No run due to error(s) above

Type: SplitAirCond - Split air conditioning system

SEER: 8.9 (kBtu/h)/kW

EER: 9 kBtuh/kW Use this EER in compliance analysis



Time for Questions