



# CABEC Conference 2016

## CBEECC-Res 2016 Software Demonstration

Building Standards Office – Software Tools  
Efficiency Division

CABEC Conference  
Lake Tahoe  
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## Topics

- Resources
- Reporting Issues
- Finding Errors
- Converting files to 2016 format
- Solar credit
- Description of 2016 Standard design bldg
- Energy Design Rating + PV



## Resources

- <http://www.energy.ca.gov/title24/2016standards/index.html>
- From here you pick 2016 Approved Computer Compliance Programs
- Everyone who had a 2013 program has an approved 2016 program
- Also, in the upper right corner is a 2016 Standards Post-adoption Documents link



## Reporting Issues

- Be sure to identify it as 2016
- Provide the Version #
- Provide .ribd16 file (or .ribd if 2013)
- E-mail to [cbecc.res@gmail.com](mailto:cbecc.res@gmail.com)



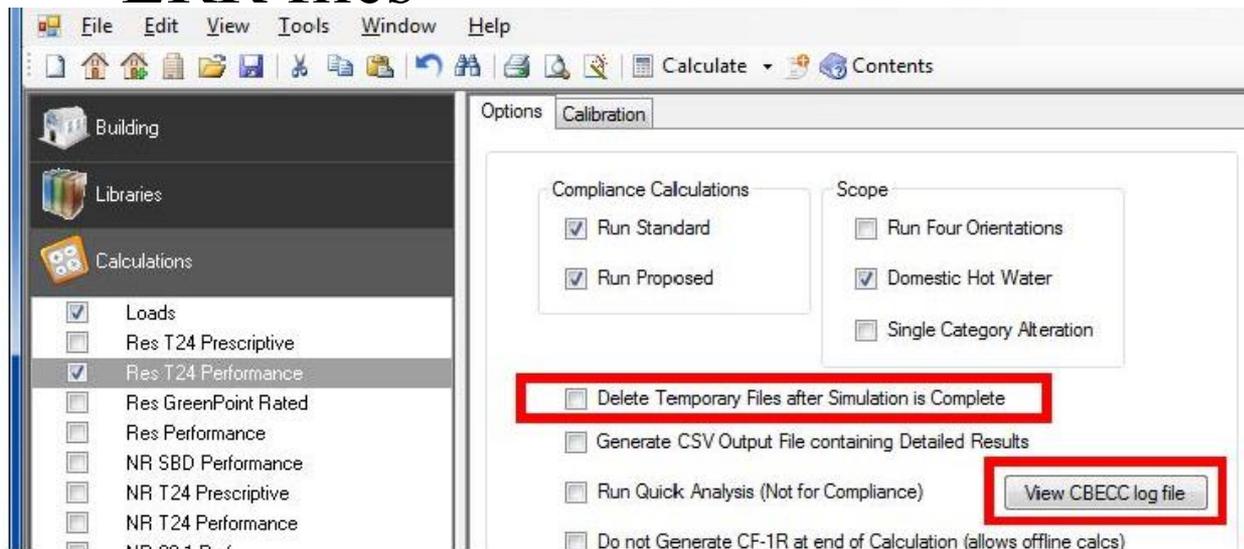
## Finding Errors

- First, if you're using CBECC:
- Select Tools
  1. View Project Log File - if you've worked through several errors, you can delete the file, run it again, and it will only have the one error
  2. View Project Folder – look inside the files ending in Prop.err or Std.err (CSE errors)



## Finding errors in EnergyPro

- View CBECC log file, or
- Uncheck Delete Temporary Files (for the ERR files)





## CSE Errors: Where are the ERR files?

If input file name is “Ductless”.ribd16 or .bld

*CBECC-2016 Projects* folder

EnergyPro, *Results* folder

*Ductless – Prop.err*      **2 “CSE files”**

*Ductless – Std.err*      **Open in notepad**



## Errors: CBECC log file

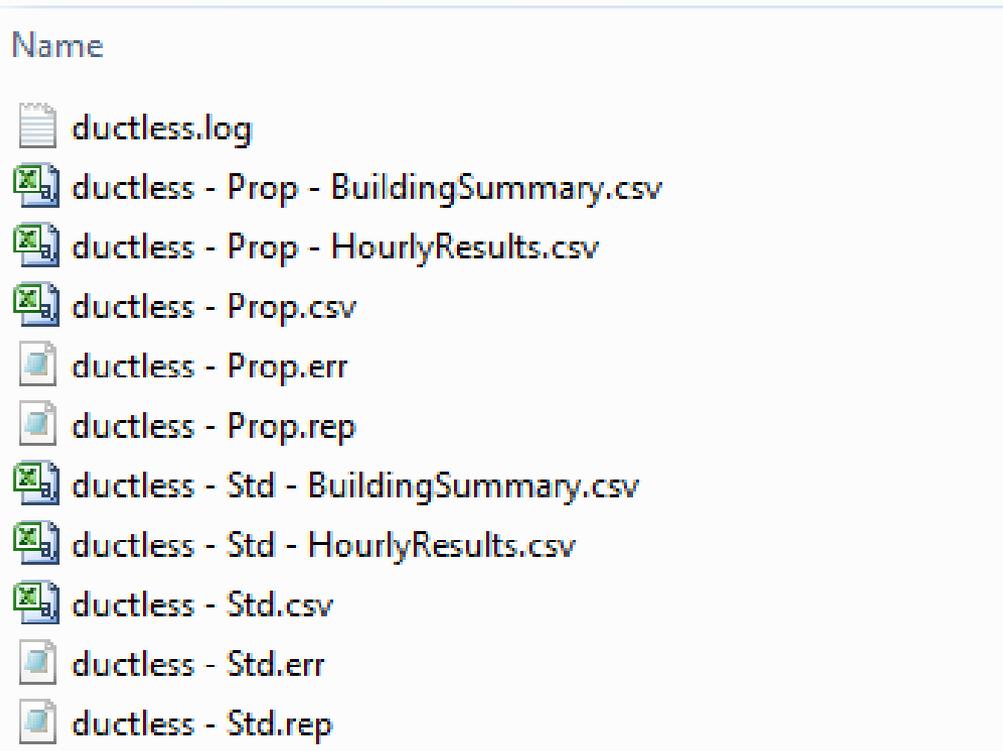
2016-Mar-25 11:37:06 - **Warning:** ...

2016-Mar-25 11:37:06 - Analysis being performed by  
CompMgrVersion 'BEMCmpMgr 2013-4 (744)' via SoftwareVersion  
'EnergyPro 6.6'

2016-Mar-25 11:37:06 - **Error:** Distribution system 'Wall Heat1-dist' -  
system type *DuctsAttic is not valid when ...*



# Directory – Right-click / open in Notepad





## Converting Files

- Select file, open
- Change the default search from *2016...ribd16* to *2013...ribd*
- Find file in 2013 projects folder and open it
- Perform a file-save action (as prompted) and save in a 2016 projects folder



## Solar Title 24 Credit

1. Approximately equal to savings from High Performance Walls (HPW) and High Performance Attics (HPA).
2. A minimum PV system size of 2.0 kWdc required to qualify (more depending on the building size and the climate zone).
3. Only available in zones where HPW and HPA are prescriptively required.
4. No T-24 solar credit in zones 6 or 7.
5. It does not increase or decrease with PV system size.



# Input for compliance credit - PV

1StoryExample1Crawl\_2016

Project Analysis EDR Notes Building Lighting Appliances IAQ Cool Vent People

Run Title: 2,100 ft2 Sample

Analysis Type: Proposed and Standard

Standards Base: CA2016

Standards Ver.: Compliance 2017

Generate Report(s):  PDF  Full (XML)

Simulation Speed Option: Compliance

DHW Calculation Method: CSE

PV System Compliance Credit  
Required minimum PV system size is 2.0 kWdc.

Report Inc File:

Analysis Report: Building Summary (csv)

Run Scope: Newly Constructed

Addition Alone project

Seasonal changeover: 60 °F

Fan vent lockout: 68 °F

OK



# Effects of PV credit on compliance

1StoryExample1Crawl\_2016

Energy Use Details | Summary | Energy Design Rating

Required minimum PV system size is 2.0 kWdc.

End Use	Standard Design Site (kWh)	Standard Design Site (therms)	Standard Design (kTDV/ft <sup>2</sup> -yr)	Proposed Design Site (kWh)	Proposed Design Site (therms)	Proposed Design (kTDV/ft <sup>2</sup> -yr)	Compliance Margin (kTDV/ft <sup>2</sup> -yr)
Space Heating	141	163.6	15.96	152	177.3	17.26	-1.30
Space Cooling	660		23.48	585		20.66	2.82
IAQ Ventilation	112		1.17	112		1.17	0.00
Other HVAC			0.00			0.00	0.00
Water Heating		121.2	9.63		121.2	9.63	0.00
<b>Photovoltaics</b>						<b>-11.66</b>	<b>11.66</b>
Compliance Total			50.24			37.06	13.18
Inside Lighting	1,045		11.48	1,045		11.48	26.2 %
Appl. & Cooking	958	52.5	14.23	958	52.5	14.23	Result: <b>PASS</b>
Plug Loads	2,206		23.37	2,206		23.37	
Exterior	117		1.12	117		1.12	
<b>TOTAL</b>	<b>5,238</b>	<b>337.4</b>	<b>100.44</b>	<b>5,175</b>	<b>351.0</b>	<b>87.26</b>	

Done



## Energy Design Rating (EDR)

- For use with Title 24, Part 11 (CALGreen)
- An EDR score of zero represents efficiency and renewable generation
- Includes nonregulated energy (such as lighting, appliances, and plug loads)



## EDR Reference\* Design Home

Loosely based on 2006 IECC

- Climate Zones:
  - CZ 1 uses 2006 IECC requirements for Zone 4 marine
  - CZ 2 - 15 uses 2006 IECC requirements for Zone 3
  - CZ 16 uses 2006 IECC requirements for Zone 5
- Air handler fan watt draw is 0.8 W/cfm
- Building air infiltration rate is 7.2 ACH50

**\*Will be in ACM Reference Manual**



- Duct R-value is R-8
- Duct System Efficiency 80 percent
- HVAC is set to 78% AFUE Gas-Fired Heating, 13 SEER DX Cooling
- Water heating is set to a 40 gallon gas-fired storage with an Energy Factor of 0.594
- Walls:
  - CZ 1, 16 = R-19
  - CZ 2-15 = R-13



- Roof/ceiling:
  - CZ 1, 16 = R-38 / no radiant barrier
  - CZ 2-15 = R-30 / no radiant barrier
- Floor:
  - CZ 1, 16 = R-30
  - CZ 2-15 = R-19
- Slab edge: CZ 1, 16 = R-10, 24-in deep
- Windows:
  - CZ 1, 16 = 0.35 U-factor / 0.40 SHGC
  - CZ 2-15 = 0.65 U-factor / 0.40 SHGC
- Window area:
  - 18 percent glass-to-floor area



## PV Calculator Overview

- PVWatts algorithms Integrated in CBECC-Res 2016
- Solely for Energy Design Ratings (EDR) (not compliance credit)
- User input options
  - simple using California Flexible Installation (CFI)
  - detailed for multiple arrays, orientations, components



## California Flexible Installation (CFI)\*

- Allows PV credit where full design details are not known
- Sets azimuth from 150 to 270 degrees
- Tilts at same slope as roof - 4:12 to 7:12
- Must meet minimal shading criteria to limit obstructions (see the user manual)

\*From New Solar Home Partnership (NSHP)



# CBECC-Res Detailed PV Input

Project | Analysis | EDR | Notes | Building | Lighting | Appliances | IAQ | Cool Vent | People

Detailed Energy Design Rating Inputs

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Energy Design Rating PV System Credit:      Inputs: Detailed

DC System Size (kW)	Module Type		Azimuth (deg)	Tilt Input	Array Angle / Tilt: (deg)	(x in 12)	Inverter Eff. (%)
<input type="text" value="1"/>	<span style="border: 1px solid black; padding: 2px;">Standard</span>	<input type="checkbox"/> CFI?	<input type="text" value="190"/>	<span style="border: 1px solid black; padding: 2px;">pitch</span>	<input type="text" value="26.56"/>	<input type="text" value="6"/>	<input type="text" value="96"/>
<input type="text" value="1"/>	<span style="border: 1px solid black; padding: 2px;">Standard</span>	<input type="checkbox"/> CFI?	<input type="text" value="170"/>	<span style="border: 1px solid black; padding: 2px;">deg</span>	<input type="text" value="22.61"/>	<input type="text" value="5"/>	<input type="text" value="96"/>
<input type="text" value="2"/>	<span style="border: 1px solid black; padding: 2px;">Standard</span>	<input checked="" type="checkbox"/> CFI?	-	-	-	-	<input type="text" value="96"/>
<input type="text" value="3"/>	<span style="border: 1px solid black; padding: 2px;">Premium</span>	<input type="checkbox"/> CFI?	<input type="text" value="200"/>	<span style="border: 1px solid black; padding: 2px;">pitch</span>	<input type="text" value="30.25"/>	<input type="text" value="7"/>	<input type="text" value="90"/>
<input type="text" value="4"/>	<span style="border: 1px solid black; padding: 2px;">Thin Film</span>	<input type="checkbox"/> CFI?	<input type="text" value="290"/>	<span style="border: 1px solid black; padding: 2px;">deg</span>	<input type="text" value="35"/>	<input type="text" value="8.402"/>	<input type="text" value="96"/>



# Results Screen for EDR

Energy Use Details		Summary		Energy Design Rating			
		EDR of Proposed Design: <b>55.4</b>		EDR of Proposed PV: <b>38.0</b>		Final Proposed EDR: <b>17.3</b>	
		EDR of Standard Design: <b>62.1</b>					
End Use	Reference Design Site (kWh)	Reference Design Site (therms)	Reference Design (kTDV/ft <sup>2</sup> -yr)	Proposed Design Site (kWh)	Proposed Design Site (therms)	Proposed Design (kTDV/ft <sup>2</sup> -yr)	Design Rating Margin (kTDV/ft <sup>2</sup> -yr)
Space Heating	50	41.4	4.18	14	14.4	1.44	2.74
Space Cooling	10,108		156.60	4,447		80.56	76.04
IAQ Ventilation	112		1.12	112		1.12	0.00
Other HVAC			0.00			0.00	0.00
Water Heating		150.0	12.09		90.0	7.25	4.84
Photovoltaics				-8,481		-91.75	91.75
Inside Lighting	2,135		22.73	1,045		10.94	11.79
Appl. & Cooking	930	65.4	14.54	958	52.5	13.82	0.72
Plug Loads	2,638		27.12	2,206		22.32	4.80
Exterior	298		2.76	117		1.08	1.68
<b>TOTAL</b>	<b>16,270</b>	<b>256.8</b>	<b>241.14</b>	<b>418</b>	<b>157.0</b>	<b>46.78</b>	<b>194.36</b>



## 2016 Building

- Tankless water heater
- Attics/Roofs have an Option A, B or C
- Things that vary by roof option:
  - Roof insulation
  - Ceiling insulation
  - Radiant barrier
  - Duct location assumption
  - Duct insulation



## PRESCRIPTIVE Attic/Roof (from Section 150.1(c)1.A.)

- Option A: A minimum R-value of continuous insulation installed *above* the roof rafters in contact with the roof deck and an additional layer of ceiling insulation located between the attic and the conditioned space . . . ; or
- Option B: A minimum R-value of insulation installed between the roof rafters in contact with the roof deck and an additional layer of ceiling insulation located between the attic and the conditioned space . . . ; or
- Option C: A minimum R-value of ceiling insulation located between the attic and the conditioned space\*

\*Requires ducts in conditioned space (see Note on p. 248)



## Zone 4 / Prescriptive Attic

<b>Option A - Continuous Insulation above deck</b>	
No air space . . . . .	R-8
With Air Space. . . . .	R-6
Ceiling Insulation. . . . .	R-38
Radiant Barrier. . . . .	REQ
<b>Option B - Continuous Insulation below deck</b>	
No air space . . . . .	R-18
With Air Space. . . . .	R-13
Ceiling Insulation. . . . .	R-38
Radiant Barrier. . . . .	NR



## What is the standard design roof?

- Option B is the basis for your allowed energy budget
- If you forget this
  - See User Manual (search on attic)
  - Also in ACM Reference Manual (but more difficult to find)



## Option B Attic/Roof all Zones

<b>Proposed Design Roof</b>	<b>Details</b>
Roof Deck Insulation	CZ 4, 8-16 = R-13 below deck w/ air sp
Ceiling Below Attic / Cathedral Ceiling	CZ 1, 2, 4, 8-16 = R-38 ceiling CZ 3, 5-7 = R-30 ceiling
Radiant Barrier	CZ 2, 3, 5-7 REQ CZ 1, 4, 8-16 NR
Steep Slope (cool roof)	CZ 10-15 > 0.20 Reflectance, > 0.75 Emittance
Low Slope (cool roof)	CZ 13, 15 > 0.63 Reflectance, > 0.75 Emittance



## Duct Insulation included in Budget

Attic/Roof Option A/B:

CZ 1-2, 4, 8-16 = R-8

CZ 3, 5-7 = R-6

NOTE: Option C (pre-2016 typical attic roof) has the *ducts in conditioned space*:

CZ 1-16 = R-6



## Summary

- If your clients are stuck in the 80s or 90s, your job is going to be very difficult
- I'll be running in **quick** compliance mode, which is why all of my CF1Rs will show “not useable”.



## Let's open software

- Time for questions at end