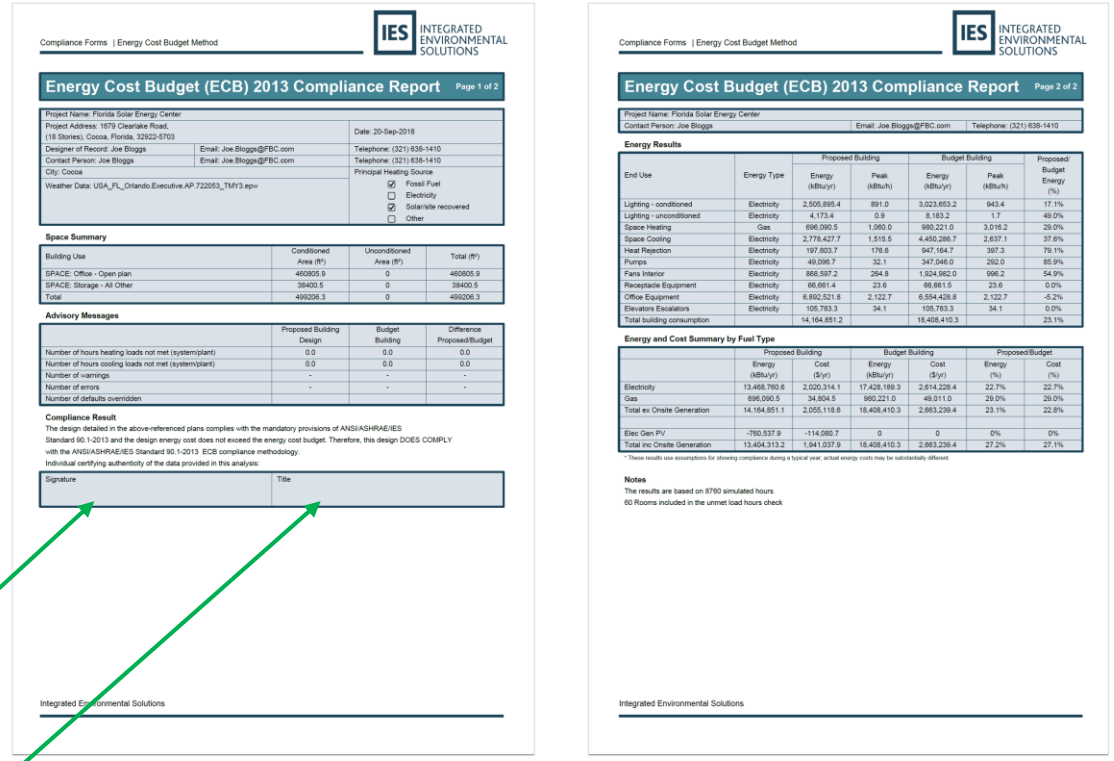
This document responds to the comments presented by Mo Madini and Staff from Florida Department of Business and Professional Regulation on the online document: www.floridabuilding.org/fbc/commission/FBC_1018/Energy_Tac/Staff-Comments.pdf .
The IESVE team thanks Mo and Staff for the comments (in *black text*), and encourage the interested parties to view the following responses (in green text).

Staff Comment #1: *Compliance certificate box should be revised for consistency with Section C103.1.1 of the 6th Edition (2017) Florida Building Code, Energy Conservation*

Response #1: There is space for name, signature, title, registration number, etc. for reviewer as shown in Figure 1 that is on the ECB Compliance Report from IESVE 2018.



Space for additional notes, licensure, stamp, etc.

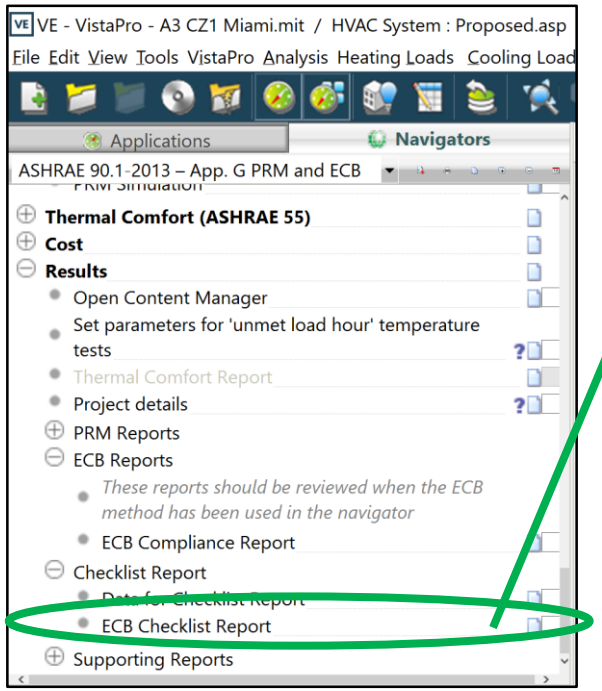
Field for Signature of Reviewer

Field for title, licensure, etc.

Figure 1: The IESVE auto-generated ECB Report

Staff Comment #2: *Compliance report should be revised to provide for specific documentation of the proposed building design energy measures for the applicable building systems (building Envelope, Lighting, HVAC, Service Water Heating…etc.)*

Staff Comment #3: Compliance report should document compliance with the mandatory requirements of Section 11; Energy cost Budget Method of ASHRAE 90.1 – 13.



Comparison of Proposed versus Budget Design

Model Input parameter Construction	Proposed Description	Proposed Input U value / % (area weighted)	Budget Description	Budget Input U value / % (area weighted)
Exterior wall construction	A3 External Wall	0.06	CZ1 Ext Wall (Non-Res) - Steel Framed; R-13.0; U=0.124 (0.704)	0.12
Roof construction	A3 Roof	0.05	CZ1 Roof (Non-Res) - Ins Above Deck; R-20 c.i; U=0.048 (0.272)	0.05
Floor/slab construction	A1 Ground Floor Slab	0.11	Ground contact floor: U=F(0.73)*Floor perim. (131.234ft)/Floor area(1076.39ft^2)	0.09
Floor/slab construction			CZ1 Floor (Non-Res) - Steel Joist; R-0; U=0.350 (1.99)	0.35
Window to gross wall ratio	Overall	31%	Overall	31%
Window to gross wall ratio	North / South / East / West	31 / 31 / 31 / 31%	North / South / East / West	31 / 31 / 31 / 31%
Fenestration U-Value (North)	A1 CZ1 External Window	1.00	CZ1 Window (Non-Res)Metal framing (fixed)U=0.57; SHGC=0.25; VT=0.275	0.57
Fenestration U-Value (non - North)	A1 CZ1 External Window	1.00	CZ1 Window (Non-Res)Metal framing (fixed)U=0.57; SHGC=0.25; VT=0.275	0.57
Fenestration SHGC - North	A1 CZ1 External Window	0.19	CZ1 Window (Non-Res)Metal framing (fixed)U=0.57; SHGC=0.25; VT=0.275	0.25
Fenestration SHGC - non - North	A1 CZ1 External Window	0.19	CZ1 Window (Non-Res)Metal framing (fixed)U=0.57; SHGC=0.25; VT=0.275	0.25
Fenestration visual light transmittance (N)	A1 CZ1 External Window	0.71	CZ1 Window (Non-Res)Metal framing (fixed)U=0.57; SHGC=0.25; VT=0.275	0.28
Fenestration visual light transmittance	A1 CZ1 External Window	0.71	CZ1 Window (Non-Res)Metal framing (fixed)U=0.57; SHGC=0.25; VT=0.275	0.28
Shading devices	Overhangs canopy on south facing glazing	Geometric	No shades	n/a

Response to Comment #2 and #3: The auto-generated ECB Checklist Report has three sections that show the inputs of the proposed versus ECB Budget (Baseline). The first section shown in Figure 2 is the Envelope; the section in Figure 3 is the Model Input; the last section in Figure 4 is HVAC.

Figure 2: Auto-generated ECB Checklist Report from IESVE 2018 (Envelope)

Model Input parameter MEP	Proposed		Budget	
	Description	Input (area weighted)	Description	Input (area weighted)
Interior lighting power density	Total power density (Btu/h•ft^2)	3.41	Total power density (Btu/h•ft^2)	3.34
Day lighting controls	Radiance simulation	No	Radiance simulation	No
Exterior lighting power	Total power consumption (kBtu/h)	0.00	Total power consumption (kBtu/h)	0.00
Process lighting	Total power density (Btu/h•ft^2)	0.00	Total power density (Btu/h•ft^2)	0.00
Receptacle equipment	Total power density (Btu/h•ft^2)	3.41	Total power density (Btu/h•ft^2)	3.41
Elevators/escalators	Total power consumption (kBtu/h)	0.00	Total power consumption (kBtu/h)	0.00
Refridgeration equipment	Total power density (Btu/h•ft^2)	0.00	Total power density (Btu/h•ft^2)	0.00
Cooking equipment	Total power density (Btu/h•ft^2)	0.00	Total power density (Btu/h•ft^2)	0.00
Data processing/centre equipment	Total power density (Btu/h•ft^2)	0.00	Total power density (Btu/h•ft^2)	0.00
Other Lighting Controls	Continuous daylight dimming in perimeter office zones	sensors	Automated	sensors

Figure 3: Auto-generated ECB Checklist Report from IESVE 2018 (Model Input)

Model Input parameter HVAC	Proposed		Budget	
	Description	Performance SCop / SSEER Cfm / SFP / kW	Description	Performance SCop / SSEER Cfm / SFP / kW
Primary HVAC system	DOAS FCUs - Chilled Water & Hot Water		VAV - Reheat [DX cool - HW blr]	ECB System 04
Other HVAC system	Radiant panels	2 kW panels	n/a	n/a
Fan supply power	43 kW	40,000 cfm	45 kW	38,000 cfm
Fan power	CAV	45 kW	VAV	45 kW
Economiser control	Dry-bulb high-limit economizer with mixed-air target	55F	Dry-bulb high-limit economizer with mixed-air target	55F
Demand control ventilation	DCV in Conference Rooms	1200 ppm CO2	n/a	n/a
Unitary equip cooling efficiency	n/a	n/a	DX Cooling	11 IEER
Unitary equip heating efficiency	n/a	n/a	n/a	n/a
Chiller	Electric Water Cooled Screw Chiller	5 COP	n/a	n/a
Chilled water loop and pump	Primary-secondary	4.4 W/gpm	n/a	n/a
Boiler	1 Condensing Boiler	92% Efficient	2 Boilers	230 kBtu/h each
Hot water loop and pump	Primary Only	19 W/gpm VSD	Primary only	19 W/gpm
Cooling tower	2-speed fan	1432 kBtu/h	n/a	n/a
Condenser water loop and pump	300 gpm	19 W/gpm	n/a	n/a

Figure 4: Auto-generated ECB Checklist Report from IESVE 2018 (HVAC)

Staff Comment #3: Compliance report should document compliance with the mandatory requirements of Section 11; Energy cost Budget Method of ASHRAE 90.1 – 13.

Response #3 Part 2: The auto-generated ECB Report is based on the layout and requirements prescribed by ASHRAE and the example compliance form on the ASHRAE website, https://xp20.ashrae.org/UM90.1-2013/ECB-Method-Compliance-Form-2013.pdf as shown in Figure 5.

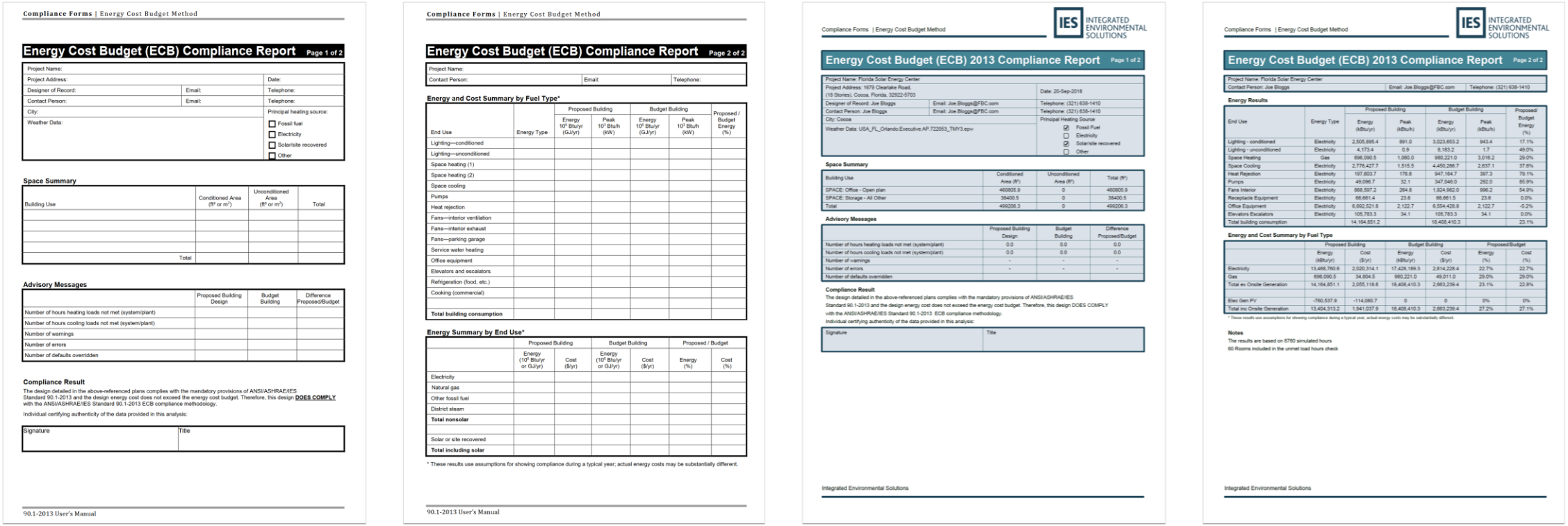
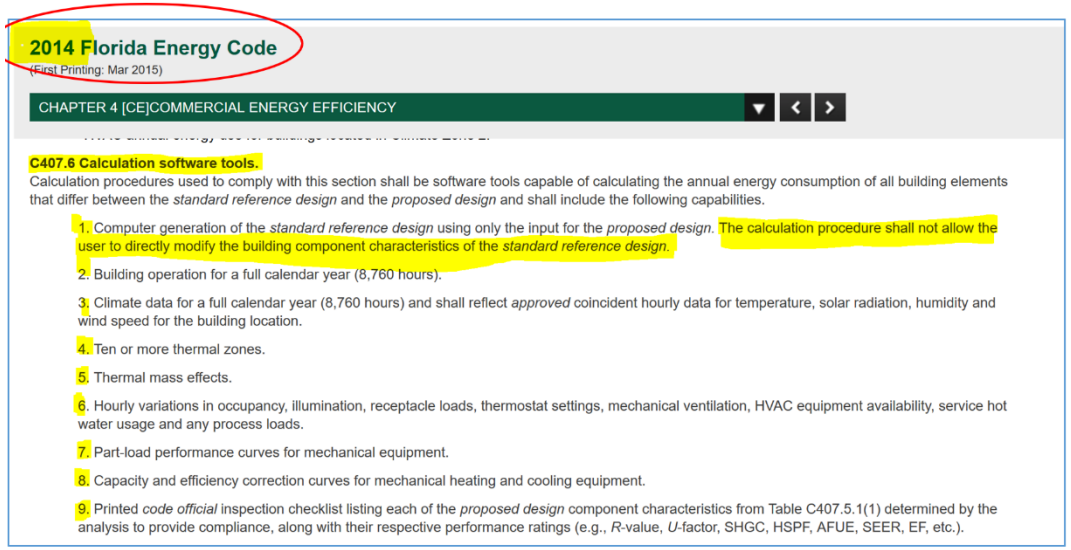


Figure 5: Example report from ASHRAE Website and Auto-generated ECB report from IESVE 2018

Staff Comment #4: Baseline energy measures should be locked and users should not be allowed to edit them.

Response #4 Part 1: Baseline energy measures for the ECB Budget Building should **not** be locked, as per the **2017 Florida Building Code - Energy** [see https://codes.iccsafe.org/public/document/FEC2017/chapter-4-ce-commercial-energy-efficiency] Section C407.6. Note that the **2017 Florida Building Code - Energy** (8 requirements) removed this requirement from the previous **2014 Florida Energy Code** (9 requirements). Please see Figure 6 below for reference.



2014 Florida Energy Code

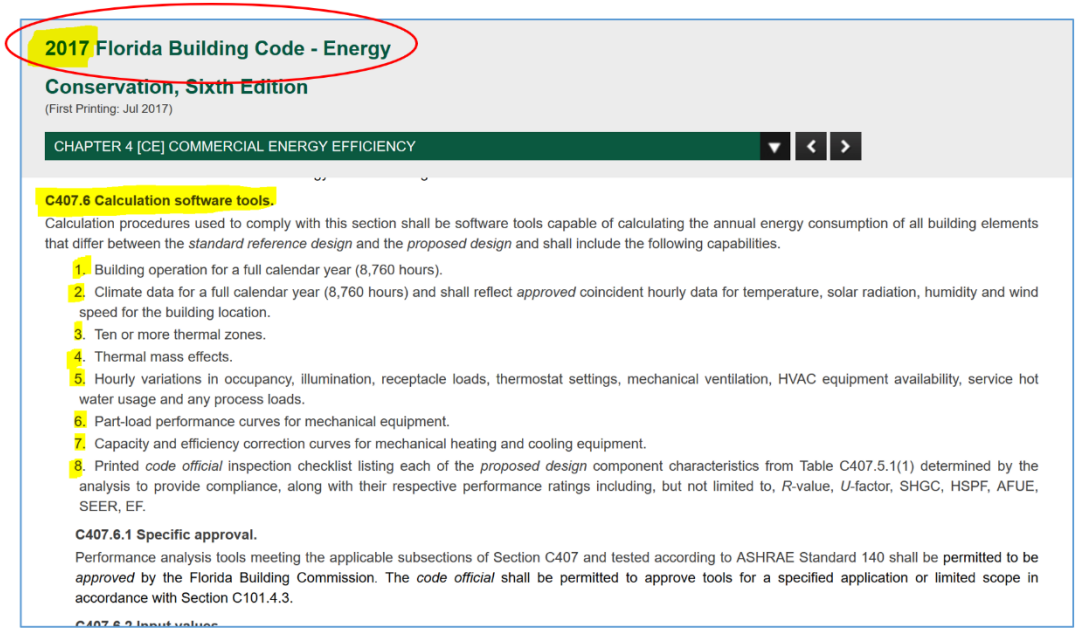
(First Printing: Mar 2015)

CHAPTER 4 [CE]COMMERCIAL ENERGY EFFICIENCY

C407.6 Calculation software tools.

Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities.

1. Computer generation of the *standard reference design* using only the input for the *proposed design*. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *standard reference design*.
2. Building operation for a full calendar year (8,760 hours).
3. Climate data for a full calendar year (8,760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
4. Ten or more thermal zones.
5. Thermal mass effects.
6. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.
7. Part-load performance curves for mechanical equipment.
8. Capacity and efficiency correction curves for mechanical heating and cooling equipment.
9. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).



2017 Florida Building Code - Energy Conservation, Sixth Edition

(First Printing: Jul 2017)

CHAPTER 4 [CE] COMMERCIAL ENERGY EFFICIENCY

C407.6 Calculation software tools.

Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities.

1. Building operation for a full calendar year (8,760 hours).
2. Climate data for a full calendar year (8,760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
3. Ten or more thermal zones.
4. Thermal mass effects.
5. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.
6. Part-load performance curves for mechanical equipment.
7. Capacity and efficiency correction curves for mechanical heating and cooling equipment.
8. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings including, but not limited to, *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF.

C407.6.1 Specific approval.

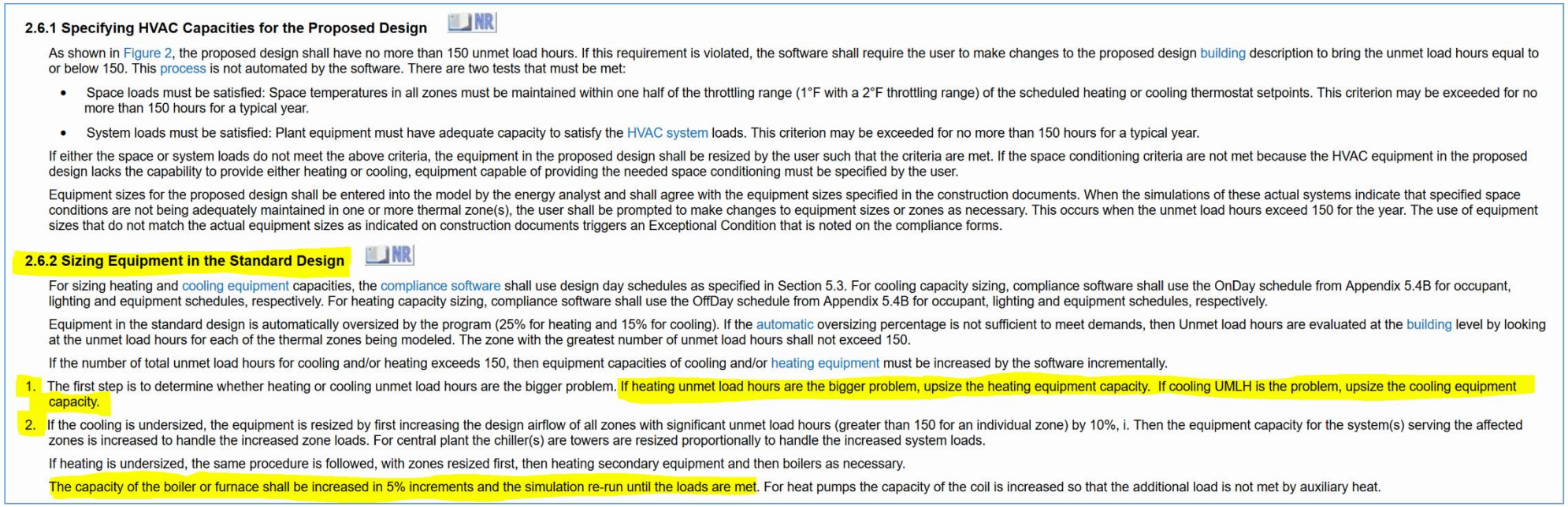
Performance analysis tools meeting the applicable subsections of Section C407 and tested according to ASHRAE Standard 140 shall be permitted to be *approved* by the Florida Building Commission. The *code official* shall be permitted to approve tools for a specified application or limited scope in accordance with Section C101.4.3.

Figure 6: The 2014 and 2017 Florida Energy Code, Chapter 4 [CE]COMMERCIAL ENERGY EFFICIENCY

Staff Comment #4: Baseline energy measures should be locked and users should not be allowed to edit them.

***RESPONSE #4 Part 2*:** In addition, ASHRAE Standard 90.1-2013 ECB Method does also **not** require any baseline energy measures to be locked.

Finally, many jurisdictions will require the baseline/budget/standard building's coil sizes and airflows to be increased in the event of excessive unmet load hours. It is important to note that the Unmet Load Hour check safeguards any equipment from being undersized in proposed and baseline/budget buildings. For example, see Figure 7 for California's State Energy Code recommendations for this scenario on the baseline (Standard) model:



2.6.1 Specifying HVAC Capacities for the Proposed Design NR

As shown in Figure 2, the proposed design shall have no more than 150 unmet load hours. If this requirement is violated, the software shall require the user to make changes to the proposed design building description to bring the unmet load hours equal to or below 150. This process is not automated by the software. There are two tests that must be met:

- Space loads must be satisfied: Space temperatures in all zones must be maintained within one half of the throttling range (1°F with a 2°F throttling range) of the scheduled heating or cooling thermostat setpoints. This criterion may be exceeded for no more than 150 hours for a typical year.
- System loads must be satisfied: Plant equipment must have adequate capacity to satisfy the HVAC system loads. This criterion may be exceeded for no more than 150 hours for a typical year.

If either the space or system loads do not meet the above criteria, the equipment in the proposed design shall be resized by the user such that the criteria are met. If the space conditioning criteria are not met because the HVAC equipment in the proposed design lacks the capability to provide either heating or cooling, equipment capable of providing the needed space conditioning must be specified by the user.

Equipment sizes for the proposed design shall be entered into the model by the energy analyst and shall agree with the equipment sizes specified in the construction documents. When the simulations of these actual systems indicate that specified space conditions are not being adequately maintained in one or more thermal zone(s), the user shall be prompted to make changes to equipment sizes or zones as necessary. This occurs when the unmet load hours exceed 150 for the year. The use of equipment sizes that do not match the actual equipment sizes as indicated on construction documents triggers an Exceptional Condition that is noted on the compliance forms.

2.6.2 Sizing Equipment in the Standard Design NR

For sizing heating and cooling equipment capacities, the compliance software shall use design day schedules as specified in Section 5.3. For cooling capacity sizing, compliance software shall use the OnDay schedule from Appendix 5.4B for occupant, lighting and equipment schedules, respectively. For heating capacity sizing, compliance software shall use the OffDay schedule from Appendix 5.4B for occupant, lighting and equipment schedules, respectively.

Equipment in the standard design is automatically oversized by the program (25% for heating and 15% for cooling). If the automatic oversizing percentage is not sufficient to meet demands, then Unmet load hours are evaluated at the building level by looking at the unmet load hours for each of the thermal zones being modeled. The zone with the greatest number of unmet load hours shall not exceed 150.

If the number of total unmet load hours for cooling and/or heating exceeds 150, then equipment capacities of cooling and/or heating equipment must be increased by the software incrementally.

1. The first step is to determine whether heating or cooling unmet load hours are the bigger problem. If heating unmet load hours are the bigger problem, upsize the heating equipment capacity. If cooling UMLH is the problem, upsize the cooling equipment capacity.
2. If the cooling is undersized, the equipment is resized by first increasing the design airflow of all zones with significant unmet load hours (greater than 150 for an individual zone) by 10%, i. Then the equipment capacity for the system(s) serving the affected zones is increased to handle the increased zone loads. For central plant the chiller(s) are towers are resized proportionally to handle the increased system loads.

If heating is undersized, the same procedure is followed, with zones resized first, then heating secondary equipment and then boilers as necessary.

The capacity of the boiler or furnace shall be increased in 5% increments and the simulation re-run until the loads are met. For heat pumps the capacity of the coil is increased so that the additional load is not met by auxiliary heat.

Figure 7: **California Energy Code Recommendation for Removing Unmet Load Hours**