

**Further Comments on responses for the original comments
of the IES Software submitted for Approval
September 26, 2018
Muthusamy Swami, FSEC**

Clearly, IESVE is a feature-rich software that is very useful for standard and advanced design and meeting standards such as LEED. There is no doubt of the advantages of IESVE in modelling complex and evolving technologies as stated and supported by Michael P Sheerin of TLC in his letter of support.

For advanced design and LEED ratings, the results and inputs used, in most cases, go through a strict and thorough review where mistakes and unintended errors are caught and corrected through the use of paid reviewers.

However, in the case of code compliance in general and, Florida in particular, the building departments rarely have the time or expertise needed to do a thorough vetting of the results and inputs. Thorough knowledge of the (ASHRAE) standard, the workings of the software and more would be required of the building official – not likely in these days of thin budgets.

These further comments are limited to two issues that need the most attention:

- 1) It is highly recommended that the baseline building be locked so false compliance passing are avoided.
- 2) Since all the data for creating component minimum compliance report already exist in the IESVE software, it is highly recommended that reports such as those outlined in the TAM be included.

In summary, it is recommended that an already feature-rich software, IESVE, be enhanced to make the Florida compliance process smoother both, for the user and building official.

The details of the two issues are discussed next.

Issue#1. Need to lock Baseline building.

FSEC (Dr. Swami) original Comment	Mathew Duffy of IES - Response	Additional Comments: (FSEC, Dr. Swami - 9/26/2018)
<p>“The program does create the baseline model automatically; however, it also allows users to import the baseline model for editing. Some of the baseline HVAC system input characteristics such as cooling and heating coils capacity, heat recovery Heat Exchanger efficiency and auxiliary power, and fan power and efficiency can be modified by users. One is able to modify the budget building model input assumption and reverse the compliance whole building compliance.”</p>	<p>In IESVE Software, the ASHRAE 90.1 ECB model is indeed created automatically, but this ECB model cannot be ‘imported for editing’. The proposed model and ECB model reside in the same project and they are intrinsically tied to one another.</p> <p>In IESVE Software, the ASHRAE 90.1 ECB model utilizes automated sizing routines for its HVAC systems in accordance with ASHRAE 90.1-2013 ECB Method.</p> <p>Coils, fans and equipment are auto-sized and cannot be edited by users. An example fan dialog from an autosized ECB model is shown in Figure 03. As shown, fan power, efficiency and other autosized data cannot be edited by the user.</p> <p>In rare scenarios, edits may be warranted, but will be flagged as edited. Examples:</p> <ul style="list-style-type: none"> • A large amount of unmet load hours often requires airflow rates and coil capacities to be increased manually. This can only result in <i>increased</i> ECB model energy, which nobody would try to ‘game the system’ by doing so. The Unmet Load Hour check keeps this in check. • New construction project adjoined to an existing/protected structure should be modeled as the existing construction on the ECB model. Note, this will be reported/flagged in the output reports. 	<p>This issue probably needs the most attention.</p> <p>In spite of what is stated in the response, one is able to tweak the baseline and make a previously failed case pass.</p> <p>Please see the demonstration of this in two attachments to this document.</p> <p>Attachment#1 is the result from the file A1 CZ1 Miami.mit submitted by IES with their package.</p> <p>Note that on page 1 of 2 of Attachment#1, the project DOES NOT PASS as shown in highlight, since as seen on Page 2 or 2, the budget energy cost is less than the proposed cost, also shown in highlight.</p> <p>Attachment#2 is the result from the file A1 CZ1 Miami.mit submitted by IES with their package, but the baseline building has been tweaked with no change to the proposed building.</p> <p>Note that on page 1 of 2 of Attachment#2, the project is deemed to PASS as shown in highlight, since as seen on Page 2 or 2, the budget energy cost is more than the proposed cost also shown in highlight.</p> <p>One may note that there is absolutely no change in both cases for the proposed building, but the baseline has higher energy use in one category. This could happen unintentionally.</p> <p><u>It is highly recommended that the baseline be locked so that unintended consequences are avoided.</u></p>

Issue#2: Need specific minimum compliance reports.

FSEC (Dr. Swami) original Comment	Mathew Duffy of IES - Response	Additional Comments: (FSEC, Dr. Swami - 9/26/2018)
<p>Issue/Comment: The following compliance test results are missing or cannot be generated:</p> <ul style="list-style-type: none"> • External lighting Compliance • Lighting controls Compliance • System report Compliance • Water Heating System Compliance • Plant Compliance • Piping System Compliance • Other Required Compliance <p>Compliance Summary for each major category are missing or cannot be generated:</p> <ul style="list-style-type: none"> • Exterior Lighting • Lighting controls • HVAC System • Plant • Water Heating System • Piping System 	<p>Response: The ASHRAE 90.1-2013 Energy Cost Budget Method allows “Trade-Offs”, it does not utilize the prescriptive method and does not require compliance reports for individual components. The compliance reports in IESVE software conforms to the requirements of ASHRAE 90.1-2013 Section 11.5.1. Comparison between the proposed design and ECB for peak demand, energy consumption and energy costs are included for various individual energy end-uses:</p> <ul style="list-style-type: none"> • External Lighting • Internal Lighting • Heating • Cooling • Heat Rejection • Pumps • Fans • Receptacle Equipment • Office Equipment • Elevators & Escalators <p>The ECB Checklist report also includes additional information, including MEP & lighting controls, etc.</p>	<p>The relevant ASHRAE ECB section says in part: “11.2 Compliance. Compliance with Section 11 will be achieved if a. all requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 are met; b.”</p> <p>Note that these sections refer, in many cases, to minimum efficiencies of components such as systems, plant and others. Regardless of the meeting Energy Cost Budget requirements, these components are to comply with the minimum efficiencies. IESVE software in its compliance report simply has a statement that says: <i>“The design detailed in the above-referenced plans complies with the mandatory provisions of ANSI/ASHRAE/IES Standard 90.1-2013”</i> covering the entire requirements of Section 11.2 (a) in one sentence and leaving it up to the user and building official to figure it out. No comparison of actual efficiencies with minimum requirements appears to be presented anywhere for any component. Should a building official decide to verify whether minimum requirements have been met, it puts enormous burden on the official to review the relevant ASHRAE sections, find the corresponding inputs in the user file, and check for compliance – an invitation to errors and non-compliance. <u>Since all the data for creating component minimum compliance report already exists in the IESVE software, it is highly recommended that reports such as those outlined in the TAM be included.</u></p>

Energy Cost Budget (ECB) 2013 Compliance Report

Page 1 of 2

Project Name: A1 Bldg (New Cons., Office Occupancy) FL Code		
Project Address: 123 Main St, , Orlando, Florida		Date: 27-Sep-2018
Designer of Record: Designer	Email:	Telephone:
Contact Person: Owner	Email:	Telephone:
City: Orlando	Principal Heating Source	
Weather Data: MiamiTMY2.fwt	<input type="checkbox"/> Fossil Fuel <input checked="" type="checkbox"/> Electricity <input type="checkbox"/> Solar/site recovered <input type="checkbox"/> Other	

Space Summary

Building Use	Conditioned Area (ft ²)	Unconditioned Area (ft ²)	Total (ft ²)
SPACE: Office - Open plan	22500.0	0	22500.0
Total	22500.0	0	22500.0

Advisory Messages

	Proposed Building Design	Budget Building	Difference Proposed/Budget
Number of hours heating loads not met (system/plant)	0.0	0.0	0.0
Number of hours cooling loads not met (system/plant)	0.0	0.0	0.0
Number of warnings	-	-	-
Number of errors	-	-	-
Number of defaults overridden			

Compliance Result

This design DOES NOT COMPLY with the ANSI/ASHRAE/IES Standard 90.1-2013 ECB compliance methodology.

Individual certifying authenticity of the data provided in this analysis:

Energy Cost Budget (ECB) 2013 Compliance Report

Page 2 of 2

Project Name: A1 Bldg (New Cons., Office Occupancy) FL Code

Contact Person: Owner

Email:

Telephone:

Energy Results

End Use	Energy Type	Proposed Building		Budget Building		Proposed/ Budget Energy (%)
		Energy (kBtu/yr)	Peak (kBtu/h)	Energy (kBtu/yr)	Peak (kBtu/h)	
Lighting - conditioned	Electricity	224,362.1	69.1	219,874.8	67.7	-2.0%
Lighting - unconditioned	Electricity	13,536.3	2.9	13,536.3	2.9	0.0%
Space Heating	Electricity	4,073.5	242.9	287.5	28.3	-1317.1%
Space Cooling	Electricity	174,391.4	85.1	150,559.3	80.9	-15.8%
Heat Rejection	Electricity	11,131.4	5.4	9,610.2	5.2	-15.8%
Fans Interior	Electricity	40,795.4	11.2	27,014.1	9.9	-51.0%
Services Water Heating	Electricity	121,086.2	39.9	122,226.4	40.3	0.9%
Receptacle Equipment	Electricity	0.0	0.0	0.0	0.0	0.0%
Office Equipment	Electricity	224,362.1	69.1	224,362.1	69.1	0.0%
Total building consumption		813,738.2		767,470.5		-6.0%

Energy and Cost Summary by Fuel Type

	Proposed Building		Budget Building		Proposed/Budget	
	Energy (kBtu/yr)	Cost (\$/yr)	Energy (kBtu/yr)	Cost (\$/yr)	Energy (%)	Cost (%)
Electricity	813,738.2	122,060.7	767,470.5	115,120.6	-6.0%	-6.0%
Total ex Onsite Generation	813,738.2	122,060.7	767,470.5	115,120.6	-6.0%	-6.0%
Total inc Onsite Generation	813,738.2	122,060.7	767,470.5	115,120.6	-6.0%	-6.0%

* These results use assumptions for showing compliance during a typical year; actual energy costs may be substantially different.

Notes

The results are based on 8760 simulated hours

Proposed Energy Cost exceeds Budget Energy Cost

5 Rooms included in the unmet load hours check

Energy Cost Budget (ECB) 2013 Compliance Report

Page 1 of 2

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City: Orlando		Principal Heating Source	
Weather Data: MiamiTMY2.fwt		<input type="checkbox"/> Fossil Fuel <input checked="" type="checkbox"/> Electricity <input type="checkbox"/> Solar/site recovered <input type="checkbox"/> Other	

Space Summary

Building Use	Conditioned Area (ft ²)	Unconditioned Area (ft ²)	Total (ft ²)
SPACE: Office - Open plan	22500.0	0	22500.0
Total	22500.0	0	22500.0

Advisory Messages

	Proposed Building Design	Budget Building	Difference Proposed/Budget
Number of hours heating loads not met (system/plant)	0.0	0.0	0.0
Number of hours cooling loads not met (system/plant)	0.0	0.0	0.0
Number of warnings	-	-	-
Number of errors	-	-	-
Number of defaults overridden			

Compliance Result

The design detailed in the above-referenced plans complies with the mandatory provisions of ANSI/ASHRAE/IES Standard 90.1-2013 and the design energy cost does not exceed the energy cost budget. Therefore, this design DOES COMPLY with the ANSI/ASHRAE/IES Standard 90.1-2013 ECB compliance methodology.

Individual certifying authenticity of the data provided in this analysis:

Signature	Title
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Energy Cost Budget (ECB) 2013 Compliance Report

Page 2 of 2

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Lighting - unconditioned	Electricity	13,536.3	2.9	13,536.3	2.9	0.0%
Space Heating	Electricity	4,073.5	242.9	320,778.6	198.1	98.7%
Space Cooling	Electricity	174,391.4	85.1	150,559.2	80.9	-15.8%
Heat Rejection	Electricity	11,131.4	5.4	9,610.2	5.2	-15.8%
Fans Interior	Electricity	40,795.4	11.2	27,014.1	9.9	-51.0%
Services Water Heating	Electricity	121,086.2	39.9	122,226.4	40.3	0.9%
Receptacle Equipment	Electricity	0.0	0.0	0.0	0.0	0.0%
Office Equipment	Electricity	224,362.1	69.1	224,362.1	69.1	0.0%
Total building consumption		813,738.2		1,087,961.6		25.2%

Energy and Cost Summary by Fuel Type

	Proposed Building		Budget Building		Proposed/Budget	
	Energy (kBtu/yr)	Cost (\$/yr)	Energy (kBtu/yr)	Cost (\$/yr)	Energy (%)	Cost (%)
Electricity	813,738.2	122,060.7	1,087,961.6	163,194.2	25.2%	25.2%
Total ex Onsite Generation	813,738.2	122,060.7	1,087,961.6	163,194.2	25.2%	25.2%
Total inc Onsite Generation	813,738.2	122,060.7	1,087,961.6	163,194.2	25.2%	25.2%

* These results use assumptions for showing compliance during a typical year; actual energy costs may be substantially different.

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The results are based on 8760 simulated hours
5 Rooms included in the unmet load hours check