

**Comparison of the 6th Edition Florida Building Energy Code
with IECC 2018 & ASHRAE 90.1-2016**

DRAFT PROPOSAL FOR REVIEW ONLY

**A FORMAL PROPOSAL WITH REFINED SCOPE & BUDGET
WILL BE SENT THRU UCF WHEN REQUESTED BY DPBR.**

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Background

The State of Florida desires to compare the 6th Edition Florida Energy Conservation Code (FEC) with 2018 edition of the International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2016 in terms of stringency and perform cost-benefit analysis of updating the 6th edition to the newer codes of those elements that impact energy use.

1. RESIDENTIAL ENERGY CODE

Task 1A: Comparison of Residential Energy Code FEC 6th Ed. vs IECC 2018

Scope: FSEC will review the residential provisions of the 2018 IECC and compare them with the residential provisions of the 6th Edition FEC to determine how 6th Edition FEC compares with the 2018 IECC. The review process will include:

1. Identifying pertinent differences between the 6th Edition FEC and 2018 IECC for the three residential compliance options: Prescriptive, Performance and Energy Rating Index.
2. Conducting a number of computer simulations using EnergyGauge USA, which is currently used for residential FEC and IECC compliance calculations, to estimate overall Prescriptive and Performance stringency differences between the two codes. For the Prescriptive compliance stringency comparison, the simulations will compare a 6th Edition FEC compliant 1-story, single-family sample home with the same home that is 2018 IECC compliant in three Florida cities. The Performance compliance stringency comparison will include 1 and 2-story single-family sample homes, a multifamily sample home and an additional sample home with skylights or other pertinent characteristic, also simulated in three Florida cities. Performance compliance comparisons will include a comprehensive comparison (all 2018 IECC changes to the 6th Edition FEC compared with the 6th Edition FEC) for each of these sample homes, plus up to two additional comparisons for each sample home that include individual changes or smaller groups of changes as warranted.

Since there are minimal differences between the 6th Edition FEC and 2018 IECC Energy Rating Index compliance methods and this compliance option is not

anticipated to be widely used in the state, a summary of the differences will be provided but computer simulations will not be run for this compliance method.

Budget: The estimated budget for all Task 1A activities not including reporting is approximately \$10,000.

Task 1B: Cost Benefit Analysis of moving Residential Energy Code from FEC 6th Ed to IECC 2018 for those items that impact Energy Use.

Scope: FSEC will use EnergyGauge USA simulation software and an existing FSEC-developed economic analysis spreadsheet to evaluate the cost effectiveness of 2018 IECC changes to the 6th Edition FEC that impact energy use.

Costs and estimated lifetimes of components for most or all upgrades will use data available in an ASHRAE report: "Maximum Energy Efficiency Cost Effectiveness in New Home Construction," FSEC-RR-584-15 Research Report May 20, 2015, prepared for ASHRAE SSPC 90.2, authored by Philip Fairey. For the purposes of this study 'cost effective' is to be defined as the case in which the present value of the life-cycle energy cost reductions (the savings) exceeds the present value of the life-cycle improvement costs (the investment). The ratio of these two present values (Savings / Investment) is the savings-to-investment ratio or SIR. If the SIR is greater than unity, there is a net financial benefit derived from the investment.

The cost effectiveness evaluation will include the same Prescriptive and Performance compliance comparisons described above in Task 1A.

Budget: The estimated budget for all Task 1B activities not including reporting is approximately \$7,000.

2. COMMERCIAL ENERGY CODE

Task 2A: Comparison of Commercial Energy Code FEC 6th Ed. vs IECC 2018

Scope: This task will identify differences between the 6th edition Florida Energy Code and the 2018 IECC code that impact energy use. This task allows us to identify quantifiable code differences that has energy impacts that are to be included in the building energy models. Simulations will be performed of the 6th edition Florida Energy Code and the 2018 IECC code prototype building energy models for Florida climates. Annual area-weighted energy savings by buildings type will be developed for comparison of the two codes. This task is predicated upon DOE developing the baseline prototype for IECC 2018, which, in the past, has been a normal part of their development cycle.

Budget: Estimated budget for identifying the code differences and performing simulation to quantify energy impact (excluding the creation of the 2018 IECC energy code model) is estimated at \$5,000.

Note: It is important to note that, should the IECC 2018 prototype building models not be available from DOE in a timely manner, additional budget will be sought to develop the prototypes building energy models in-house.

Task 2B: Comparison of Commercial Energy Code FEC 6th Ed. vs ASHRAE 90.1-2016

Scope: This task will perform simulations of the 6th edition Florida Energy Code and the ASHRAE 90.1-2016 prototype building energy models for Florida climates. This effort will require the fine tuning of DOE's ASHRAE 90.1-2016 commercial prototype building energy models for Florida climates. Annual area-weighted energy savings by buildings type will be developed for comparison of the two codes. Note that ASHRAE 90.1 -2016 now allows the rating methodology in Appendix G to also be used for code compliance. This adds another option, in addition to prescriptive, envelope trade off and ECB methodology, which also has to be dealt with here.

Budget: Estimated budget is \$6,000.

Note: This task anticipates that DOE will release the 2016 ASHRAE 90.1 building energy models by the end of 2017, which they have indicated by email correspondence to FSEC.

Task 2C: Cost Benefit Analysis of moving Commercial Energy Code from FEC 6th Ed to IECC 2018 & ASHRAE 2016 for those items that impact Energy Use.

Scope: Perform cost effectiveness analysis by building type, aggregated for the State of Florida for quantifiable code differences between FEC 6th edition and IECC-2018/ASHRAE 90.1-2016 for the commercial buildings. The cost-benefit analysis will use the annual energy savings determined in Task 2A and Task 2B, the state's average energy rates for electricity and natural gas, and incremental first cost and other costs between alternatives. For the purposes of this study 'cost effective' is to be defined as the case in which the present value of the life-cycle energy cost reductions (the savings) exceeds the present value of the life-cycle improvement costs (the investment). The ratio of these two present values (Savings / Investment) is the savings-to-investment ratio or SIR. If the SIR is greater than unity, there is a net financial benefit derived from the investment.

Budget: Estimated budget is approx. \$14,000.

Note: The cost-benefit analysis will be performed within a subset of the 16 reference commercial prototype buildings. If a change does not impact energy use, then no cost benefit analysis will be performed for that change.

3. Final Report

Task 3: Final Report

Scope: This task will prepare the final report that will include all the details of the analysis and cost-benefit analysis.

Budget: Budget for final report preparation is estimated at \$6000.

4. Schedule, Budget and Deliverables

4A. Schedule: Six months. Note that according to PNNL the some supporting materials that are needed for Task 2 of this project is expected to be available by the end of the year, and some have not yet begun pending funding being in place at PNNL.

4B. Total Budget:

Task	Budget
Task 1A	\$10,000
Task 1B	\$7,000
Task 2A	\$5,000
Task 2B	\$6,000
Task 2C	\$14,000
Task 3	\$6,000
All (Total)	\$48,000

4C Deliverables:

- 1) Final Comprehensive Report