

Scope of Work

Comparison of the 7th Edition Florida Building Energy Conservation Code with IECC 2021 & ASHRAE 90.1-2019

Presented to the
State of Florida Department of Business and Professional Regulation

Florida Building Commission

And

University of Central Florida/Florida Solar Energy Center (FSEC)

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1. Introduction

The University of Central Florida, Florida Solar Energy Center (FSEC) shall compare the 7th Edition Florida Building Code Energy Conservation (FBCEC) with the 2021 Edition of the International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2019 for stringency. FSEC shall also perform a cost-benefit analysis of updating the 7th Edition FBCEC to the newer FBCEC for those elements that impact energy use.

2. Scope of Work:

a. Residential Energy Code Review

- FSEC shall review the changes between the 7th Edition FBCEC and IECC-2021 based upon the IECC-2018 to IECC-2021 code changes comparison matrix document consisting of a complete listing “monograph” of all of the approved changes to the 2021 IECC to be provided by the Department of Business and Professional Regulation (DBPR). FSEC shall list each change and then identify the changes, in their interim report and final report, which have potential energy and cost impacts.
- FSEC shall conduct computer simulations using EnergyGauge[®] USA to estimate overall Prescriptive and Performance stringency differences between the two codes.
- The computer simulations run by FSEC shall compare sample homes that are compliant with the 7th Edition FBCEC with sample homes that are compliant with the 2021 IECC. The Prescriptive simulations shall compare a 7th Edition FBCEC compliant 1-story, single-family sample home with the same home that is 2021 IECC compliant in three (3) Florida cities: Miami, Tampa and Jacksonville. The Performance compliance stringency comparison shall include 1 and 2-story single-family sample homes, one (1) multi-family sample home, and one (1) additional sample home with to be determined pertinent characteristics in the same three cities. For both the Prescriptive and Performance compliance comparisons, the pertinent

characteristics of the FBCEC and IECC homes used for the comparisons will be included in sample home characteristics tables.

- Performance compliance comparisons shall include a comprehensive comparison (all 2021 IECC changes to the 7th Edition FBCEC) for each of these sample homes, plus up to two (2) additional comparisons for each sample home that include individual changes or smaller groups of changes as warranted.
- FSEC shall provide a summary of the differences between Energy Rating Index (ERI) compliance requirements in the 7th Edition FBCEC and the 2021 IECC; however, since the ERI compliance option is not anticipated to be widely used in the state, computer simulations will not be run for this compliance method.

b. Cost Benefit Analysis of moving Residential Energy Code from 7th Edition FBCEC to IECC 2021 for those items that impact Energy Use.

- FSEC shall use EnergyGauge USA simulation software and an existing FSEC-developed economic analysis spreadsheet to evaluate the cost effectiveness of 2021 IECC changes to the 7th Edition FBCEC identified in Item 2a. that impact energy use.
- Costs and estimated lifetimes of components for most or all upgrades shall 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 shall include the same prescriptive and performance compliance comparisons described above in Item 2a.

c. Commercial Energy Code Review

- FSEC shall review and provide a list of code changes from the 7th Edition FBCEC to the IECC-2021 based upon IECC-2018 to IECC-2021 comparison matrix document consisting of a complete listing “monograph” of all of the approved changes to the 2021 IECC to be provided by the DBPR.
- FSEC shall review and provide a list of code changes from ASHRAE 90.1-2016 to ASHRAE 90.1-2019 based upon a qualitative analysis report from PNNL anticipated to be released by December 2020 or other sources such as published addenda list to the 2016 ASHRAE 90.1 Standard.
- FSEC shall identify code changes from the lists above that have potential energy impacts.

- FSEC shall present an interim report comprising the list of code changes, potential energy impacts, and comments for consideration and approval for subsequent detailed quantitative and cost benefit analysis.

d. Comparison of Commercial Energy Code 7th Edition FBCEC vs. IECC 2021

- FSEC shall quantify the energy use differences between the 7th Edition FBCEC and the 2021 IECC code.
- This task shall identify quantifiable code differences with energy impacts that are to be included in simulations and prototype building energy models created by FSEC.
- Simulations shall be performed for the FBCEC 7th Ed. and the 2021 IECC code prototype building energy models for Florida climates. Annual area-weighted energy savings by buildings type shall be developed for comparison of the two codes.

e. Comparison of Commercial Energy Code 7th Edition FBCEC vs. ASHRAE 90.1-2019

- FSEC shall perform simulations of the 7th Edition FBCEC version of ASHRAE 90.1-2016 and the ASHRAE 90.1-2019 using prototype building energy models for Florida climates. This effort will require the fine-tuning of DOE's ASHRAE 90.1 commercial prototype building energy models for Florida climates. Annual area-weighted energy savings by buildings type shall be determined for comparison of the two codes.

f. Cost Benefit Analysis of moving Commercial Energy Code from 7th Edition FBCEC to IECC 2021 & ASHRAE 90.1-2019 for those items that impact Energy Use.

- FSEC shall perform a cost effectiveness analysis by building type, aggregated for the state of Florida for quantifiable code differences between the 7th Edition FBCEC and IECC-2021/ASHRAE 90.1-2019 for commercial buildings.
- The cost-benefit analysis shall use the annual energy savings determined in Items 2d. and 2e., 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.

- The cost-benefit analysis shall be performed within a subset of the reference commercial prototype buildings developed by PNNL/U.S. Department of Energy. If a change does not impact energy use, then no cost benefit analysis shall be performed for that change. For code change incremental cost estimate, FSEC shall rely upon DOE/PNNL report - National Cost-effectiveness of ANSI/ASHRAE/IES Standard 90.1-2019, its accompanying data, and other sources.
- ASHRAE 90.1-2019 code change cost-benefit analysis is contingent upon DOE/PNNL releasing the 2019 ASHRAE 90.1 cost-benefit analysis report anticipated to be released by end of 2020.

3. Method of Payment and Schedule

A purchase order will be issued to FSEC. This project shall start upon the issuance of the purchase order to FSEC and end at midnight on June 30, 2021. The project shall not exceed \$75,000.00 and shall cover all costs for labor, materials, and overhead. Payment will be made for the work after the final report has been approved by the Contract Manager and the Florida Building Commission.

4. Deliverables

- a. FSEC shall deliver an interim report comprised of the lists of residential and commercial code changes that have potential energy impacts on March 15, 2021 contingent upon all necessary documentation being available from the United States Department of Energy. The interim report shall consist of tables summarizing code changes, comments for each code change category, energy impact if applicable, and link to relevant sources for each code change. The interim report shall be presented to the Florida Building Commission's Energy Technical Advisory Committee at a time agreed upon by the Contractor and Department's Contract Manager.
- b. FSEC shall deliver a final report on June 15, 2021 or six months after the contract begin date and after all relevant materials are obtained from PNNL/DOE, whichever comes later. The final report shall include the lists of code changes that have potential energy impacts, cost-benefit analysis results, discussion, and conclusions. The final report shall be presented to the Florida Building Commission's Energy Technical Advisory Committee at a time agreed upon by the Contractor and the Department's Contract Manager.
- c. A breakdown of the number of hours or partial hours, in increments of fifteen (15) minutes, of work performed and a brief description of the work performed shall be provided with the invoice for this project. The Contractor agrees to provide any additional documentation requested by the Department to satisfy an audit.

5. Performance Measures and Financial Consequences

FSEC is solely and uniquely responsible for the satisfactory performance of the tasks and completing the deliverables described in this SOW.

Failure to complete the deliverables in the time and manner specified in Section 4 shall result in a non-payment of invoice until corrective action is completed as outlined in the work authorization.

6. Contract Manager

The Contract Manager for this purchase order is Barbara Bryant.