FLORIDA ENERGY CODE WORKGROUP

REPORT TO THE FLORIDA BUILDING COMMISSION

FEBRUARY 3, 2010—MEETING X

TAMPA, FLORIDA

FACILITATION, MEETING AND PROCESS DESIGN BY

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FLORIDA BUILDING COMMISSION
FLORIDA ENERGY CODE WORKGROUP

OVERVIEW

Governor Crist directed the Commission to increase building energy efficiency requirements by 15% in his July 2007 Executive Order 127. In addition, the 2008 Legislature through passage of The Energy Act of 2008 created a suite of energy related assignments for the Building Commission. The Energy Code provisions were a major focus of the Commission during 2008, and the Commission increased the thermal efficiency requirements for the Florida Energy Code by 15% and integrated the enhanced requirements into the 2007 Florida Building Code. The Commission reviewed energy related code amendments adopted in the 2007 Florida Building Code Update to determine their cumulative level of increased efficiency, and adopted additional amendments required to achieve Governor Crist's directive of 15% increased efficiency. During 2008 the Energy Code was amended by administrative rule and then the revised Energy Code was adopted into the 2007 Florida Building Code during the 2008 "glitch" cycle concurrently with the March 1, 2009 effective date for the 2007 Florida Building Code. Working with stakeholders using consensus-building workgroups, the Commission was able to achieve the 15% increase in efficiency in buildings and implement code amendments that are efficient, consistent, understandable and enforceable for the full spectrum of Energy Code users. The Commission's Energy Code Workgroup will develop recommendations regarding energy conservation measures for increasing efficiency requirements in the 2010 FBC by 20% as required by law.

MEMBERS AND REPRESENTATION

Raul L. Rodriguez, AIA, Chair of the Florida Building Commission, made the following appointments to the Florida Energy Code Workgroup (below). Members are charged with representing their stakeholder group's interests, and working with other interest groups to develop a consensus package of recommendations for submittal to the Commission.

2010 Florida Energy Code Workgroup

Steve Bassett, Rusty Carroll, Bob Cochell, Phillip Fairey, Dale Greiner, Jeff Gross, Jeff Householder, Bill Kent, Tom Larson, Larry Maxwell, Rafael Palacios, Donny Pittman, Paul Savage, Drew Smith, Jeff Stone, and Rob Vickers.

Meeting Schedule

February 3, 2009: Melbourne, March 5, 2009: Cape Canaveral, March 27, 2009: Tampa, April 30, 2009: Tallahassee, May 28, 2009: Tallahassee, September 3, 2009: Gainesville, October 14, 2009: Tampa; November 12, 2009: Gainesville; December 9, 2009: Orlando; February 3, 2010: Tampa; April 5, 2010 Gainesville.

REPORT OF THE FEBRUARY 3, 2010 MEETING

Opening and Meeting Attendance
Rusty Carroll, Bob Cochell, Phillip Fairey, Dale Greiner, Jeff Gross, Jeff Householder, Bill Kent, Tom Larson, Larry Maxwell, Rafael Palacios, Donny Pittman, Paul Savage, and Drew Smith.

Members Absent:
Steve Bassett, Jeff Stone, and Rob Vickers.

DCA Staff Present
Rick Dixon, Mo Madani, and Ann Stanton.

FSEC Staff Present
Mangesh Basarkar.

Meeting Facilitation
The meeting was facilitated by Jeff Blair from the FCRC Consensus Center at Florida State University. Information at: http://consensus.fsu.edu/

FCRC CONSENSUS CENTER

Project Webpage
Information on the project, including agenda packets, meeting reports, and related documents may be found in downloadable formats at the project webpage below:
http://consensus.fsu.edu/FBC/2010-Florida-Energy-Code.html

Agenda Review and Approval
The Workgroup voted unanimously, 13 - 0 in favor, to approve the agenda as presented including the following objectives:

- ✓ To Approve Regular Procedural Topics (Agenda and Summary Report)
- ✓ To Review and Discuss 2010 FEC Commercial Chapter Prescriptive Packages and Other Outstanding Issues
- ✓ To Discuss Specific Building Technologies/Options to Achieve Energy Efficiency Improvements*
- ✓ To Hear Report and Discuss Pool Efficiency Subcommittee Report/Recommendations
- ✓ To Hear Report and Discuss Green and Energy Efficient Roofs Subcommittee Report/Recommendations
- ✓ To Identify Issues and Options Regarding Project Tasks and Sub-Tasks (Future Meeting)
- ✓ To Discuss and Evaluate Level of Acceptability of Proposed Options
- ✓ To Consider Public Comment
- ✓ To Identify Needed Next Steps and Agenda Items for Next Meeting

** Note: The Workgroup is not considering any specific code amendments.*

December 9, 2009 Facilitator's Summary Report Approval
Jeff Blair, Commission Facilitator, asked if any members had corrections or additions to the December 9, 2009 Report, and none were offered. The Workgroup voted unanimously, 13 - 0 in favor, to approve the December 9, 2009 Facilitator's Summary Report as presented/posted.

FEC Commercial Chapter Prescriptive Packages Presentation
Mangesh Basarkar, FSEC, provided the Workgroup with a PowerPoint presentation on small building prescriptive compliance method issues and answered member's questions.

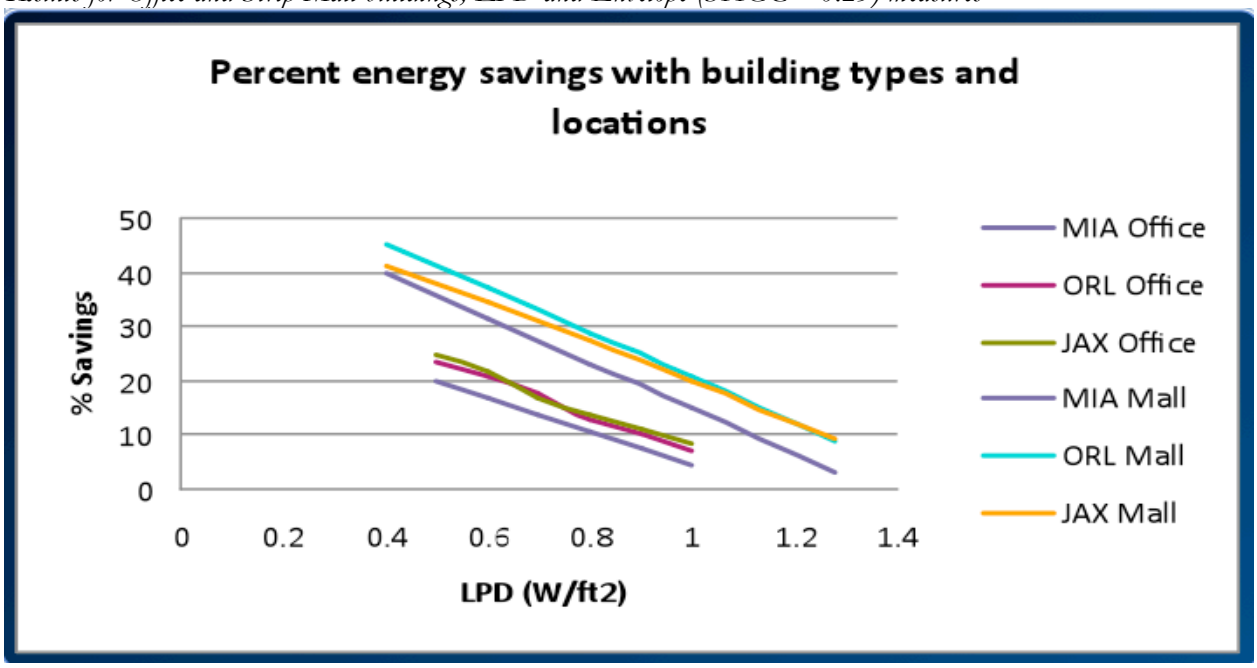
PowerPoint Presentation on Recommendations for Prescriptive Code Compliance in Commercial Buildings

Overview
- Current Florida Energy Code –performance based method is primarily used
- Prescriptive requirements only for shell building and renovations
- Task – Revise IECC 2009 prescriptive requirements to be used as part of the proposed Florida Energy Code 2010 to reach 20% goal

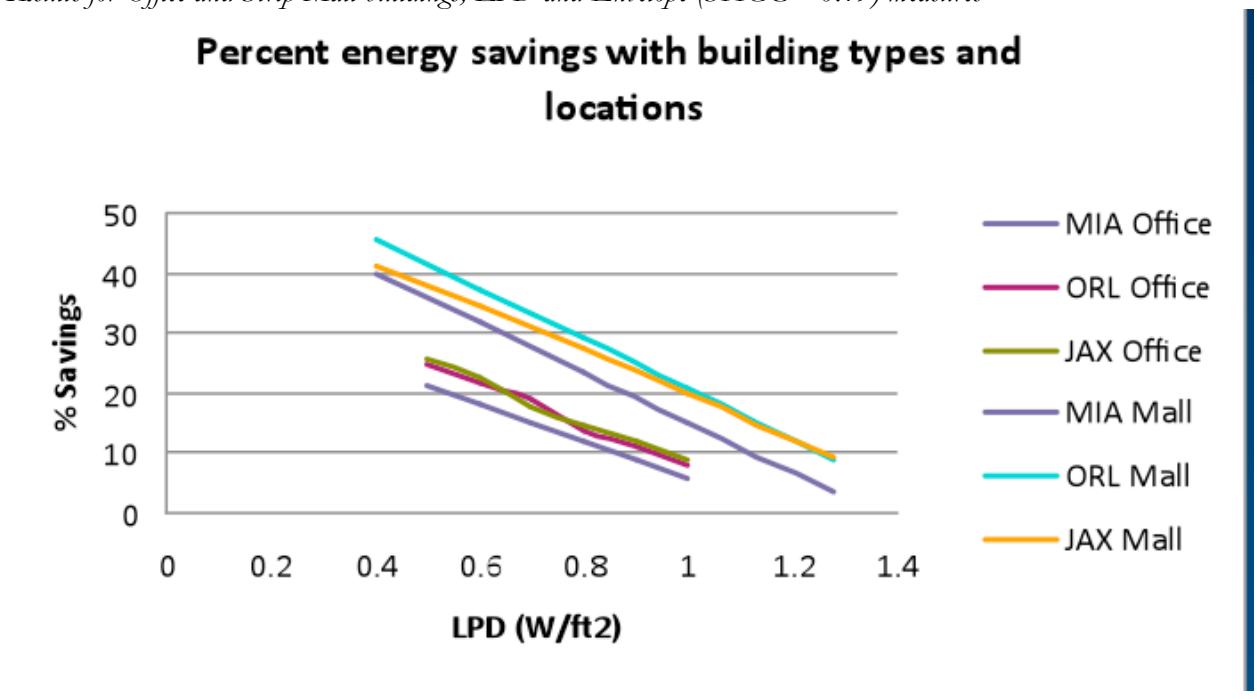
Approach – Step 1
- Estimate maximum envelope and lighting contribution to energy use
- Establish limit for possible savings using high performance envelope and lighting prescriptive measures
- Derive new prescriptive requirements based on IECC 2009 prescriptive minimums
- Used Commercial Building Benchmark models produced by the US Department of Energy – ASHRAE 90.1 2004 compliant building models
    - Two building types: Office & Strip mall
    - Three climate zones: Miami, Orlando and Jacksonville

Parametrics – Step 2
- Run 1 - Envelope limit parameters used
    - Wall and Roof R-values of 100
    - Fenestration Solar Heat Gain Coefficient (SHGC) and U-value of 0.01
- Run 2 - Lighting power density (LPD) limit of 0

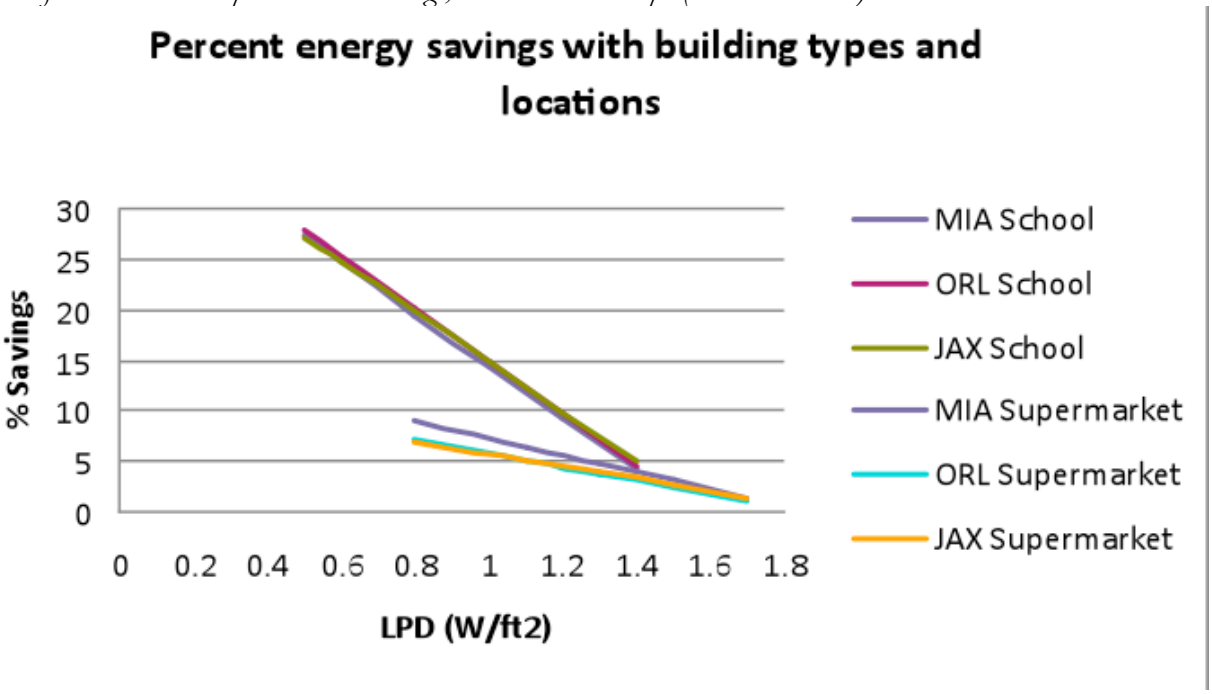
Results for Office and Strip Mall buildings, LPD and Envelope (SHGC – 0.25) measures



Results for Office and Strip Mall buildings, LPD and Envelope (SHGC – 0.19) measures



Results for School and Supermarket buildings, LPD and Envelope (SHGC – 0.19) measures



Lighting power density reductions, in addition to high thermal performance envelope criteria, required to meet 20% goal

COMPONENT	Average % LPD Reduction
Office	38% (42%*)
Strip Mall	25% (25%*)
School	43%
Supermarket	Unable to reach 20% savings even with 50% LPD reduction

** Indicates results for fenestration SHGC value of 0.25*

Conclusion

- Envelope contribution to the load is comparatively small, especially for commercial buildings in Florida
- Large LPD reductions are required to meet 20% goal for most building types. May not be possible to get average LPD reduction across building types
- LPD reductions not recommended as ASHRAE 90.1 2007 and proposed ASHRAE 90.1 2010 continue to use the same values as ASHRAE 90.1 2004. Could be a safety issue

- Considering the limited application of this method, continuation of existing Florida Building Energy Code structure recommended with envelope prescriptive values for shell buildings, small renovations and change-outs only. Performance based code compliance for all other scenarios

PROPOSED ENVELOPE PRESCRIPTIVE MINIMUMS

Proposed prescriptive envelope compliance values for new shell buildings, renovations and change-outs

COMPONENT	PROPOSED VALUE
Wall R-value	R-30 (U-0.032)
Roof R-value	R-40 (U-0.025)
Raised Floor R-value	R-30 (U-0.032)
Fenestration U-value	U-0.45
Fenestration SHGC	0.25 (0-40 % WWR) 0.19 (40-50 % WWR)
Door U-value	0.7 (swinging) / 1.45 (non-swinging)

FEC Commercial Chapter Prescriptive Packages and Other Outstanding Issues Discussion
Ann Stanton, DCA Energy Code staff, provided the Workgroup with an overview of a FEC Commercial Chapter prescriptive packages mark-up draft of the 2009 IECC based 2010 Florida Building Code, Energy Volume and answered member's questions. For each section of the Draft, the Workgroup received an overview, heard public comment and decided on the proposed text. The public was included in the discussions and provided opportunities to comment on each section.

Following discussion and public comment the Workgroup took the following actions:

Workgroup Actions:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the FEC Commercial Chapter prescriptive packages as approved by the Workgroup for inclusion in the Draft Florida Building Code, Energy Conservation, as a starting point for the Code change process.
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the residential and commercial baselines into an "Appendix XX" for inclusion in the draft of the Florida Building Code, Energy Conservation.
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt carrying forward the Florida Specific requirements for Chapter 5 as presented by DCA staff and as approved by the Workgroup for inclusion in the draft of the Florida Building Code, Energy Conservation.

Motion—The Workgroup voted unanimously, 12 – 0 in favor, to approve staff's recommendations regarding the short list of Florida Specific Requirements not reviewed previously by the Workgroup for inclusion in the posted draft of the Florida Building Code, Energy Conservation.
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the entire draft of the Florida Building Code, Energy Volume (Residential Volume, Commercial Volume, Florida Specific, modification of shell building prescriptive packages to ensure buildings will comply with the required energy efficiency increase requirements of law once they are built-out, including Chapter 2 and 6, and all other previous motions adopted by the Workgroup relevant to the Draft FEC) as approved by the Workgroup for inclusion as the Draft Florida Building Code, Energy Conservation.
(Attachment 7—Additional Florida Specific Requirements)

Workgroup Discussion on Outstanding Issues:

- Palacios: ASHRAE met in Orlando last week, and they came up with prescriptive criteria to achieve 30% savings.
- Dixon: Can end up with higher usage by adding windows for daylighting, strategies for lighting.
- Gross: Repairs would not meet 30% renovation criteria. Also, hurricanes. See possibility of exceeding 20% of federal regulations.
- Madani: If you have a damaged building, covered under "repair" in Existing Building code. Would have a list of prescriptive requirements to use, rather than having to run the whole building.
- Dixon: Can end up with 6" of foam on roof, R-40 may not be reasonable on reroof.

TABLE 502.1.1.1 ~~B5.1~~
ENVELOPE PRESCRIPTIVE MEASURES FOR SHELL… BUILDINGS[1]

Building Element	**Mandatory**
Roof: Absorptance R-value (U-value)	≤ 0.22 R-40 (≤U-0.025) ~~≤ 0.027~~
Wall: Above grade wall: Absorptance R-value (U-value) Below grade wall:	 ≤ 0.3 R-30 (≤ U-0.032) ~~≤ 0.089~~ No requirement
Raised Floor Insulation R-value (U-value)	R-30 (≤ U-0.032) ~~≤ 0.052~~
Window: **U-factor** SHGC **≤40%** 40-50% Window Area ~~SHGC 0-40% WW Ratio~~ ~~SHGC 40-50% WW Ratio~~	≤ 0.45 0.25 0.19 ≤50% window to wall area ratio[2] ~~0.61 North~~ ~~0.25 all others~~ ~~0.44 North~~ ~~0.25 all others~~
Overhang Projection Factor (PF)	0.5 (projection half the distance of window height)
Door: U-value	 Swinging U-0.7 Non-swinging U-1.45
Skylights: SHGC Skylight U-value	≤ 0.19 ≤ 1.36

[1]Equipment and lighting shall meet the efficiencies of Section 503, 504 and 505, respectively.
[2]Buildings with greater than 50% WW Ratio shall comply with Section 506.

- Fairey: Perhaps put in two tables for renovations and shell building (or use footnotes). Footnote that 50% glazing applies only to shell buildings.
- Maxwell: Let's not put in roadblocks to replacing windows. Have performance option to bring into code.
- Palacios: R-30 is hard to do for walls.
- Stanton: Shell buildings have to go back in later and demonstrate compliance with Performance method. Numbers are coming from the direction that we need to meet 20%, R-30 is shown to be maximum insulation practical.
- Palacios: Building designed, added insulation to glass.
- Gross: Most buildings made of CBS, .75" furring, would have to re-stud building to get 6" of inside space. Where did 30% come from? (it's in the law). There are so many different triggers.
- Chuck Anderson, AAMA: Projection factor .5, low SHGC overkill. How often would sun actually hit the window, except the east and west. Ratcheting it down makes envelope darker, decreases window area. Harder and harder to make functional buildings with these requirements.
- Fairey: Projection factor .5 seems too high with this type of glass. Changing SHGC impact on windows to find out how much it changes visual light transmittance. Limited data, appears that VLT=.53 for SHGC .25 and VLT =.45 for SHGC.19.
- Palacios: At ASHRAE, there is expensive software that analyzes shading vs. SHGC.
- Maxwell: Importance of daylighting. Daylighting is orientation specific, some glass can get high VLTs as well. Need to get usable lighting into a building. Need to consider orientation for worst case scenario.
- Note: Correct title of table.
- Smith: Orientation, question: If we're going to segregate by orientation, why not segregate by climate zone?
- Dixon: Complexity of commercial buildings makes prescriptive option problematic, let alone climate zone. Comes down to best practices. Cannot bring existing buildings to meet current code. Have to make sure that the shell buildings meets high enough standard so that all units can meet code. Can vary by building type.
- Palacios: Peaks on east and west higher than south. On south have longer hours. Other orientations can make a mess prescriptively.
- Fairey: Would it be possible to come up with criteria for alterations that prescribed the amount of improvement. Use software to determine % savings for component.
- Madani: May be something for the future.
- Nau: Is intent to delete 502.3? Yes. Believe climate zones important. Hard to find systems that meet prescriptive. U-0.45 for all commercial is hard to find.
- Gross: Is April 2 drop dead, since Energy is a separate rule?
- Dixon: Yes, separate rule, but it does have to be adopted by the Building Code Rule. Trying to do both at the same time as well as accomplish the % savings required by statute.
- Larson: regarding Table 506.5: under building envelope, should be "maximum" .
- Fairey: tend to agree with Larson.
- Stanton: will check and correct if necessary.

Discussion of Florida Specific for Carrying Forward:

- Stewart: Does this include knee walls. Current exercise is for the purpose of putting one version online.
- Gross: What about the idea of splitting the table.
- Madani: We will either split the table or use footnotes.

- Dixon: See there is a need for a comfort factor for the table. May get group back together to review this at the next Commission meeting.
- Stanton: Would like feeling of group regarding adding baselines to appendix, including residential.
- Stewart: Think it's an excellent idea.
- Larson: Reference from text.
- Fairey: Make them Normative Appendices.
- Stewart: Regarding Normative Appendices: make sure they are defined adequately per Florida law. Need to check on this.
- Dixon: Reference from text of Code.

Review and Decide on Pool Efficiency Subcommittee Recommendations
Jeff Blair reported on the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendations and answered member's questions.

Following discussion and public comment the Workgroup took the following actions:

Workgroup Actions:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendation that APSP-15 (Standard for Energy Efficiency for Residential In-ground Swimming Pools) as revised by the Subcommittee should serve as the draft Code language for inclusion in the Florida Building Code, Energy Volume.
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendation that the Florida Building Code, Energy, shall provide energy code credits (points) for PV and alternative/renewable technologies that reduce energy consumption for pool pump motors.
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendation that APSP-14 (Portable Spa Energy Efficiency Standard) is an appliance standard and therefore not within the scope of the Florida Building Code.

Workgroup Discussion on Pool Efficiency Recommendations:
- Greiner: Don't want to get into specifics. I recommend we accept the recommendations from the experts on the topic.
- Dixon: APSP-15 not yet an adopted standard, so Commission will have to adopt the language into the Code (not as a referenced standard).
- Madani: The language should be included as a referenced appendix.
- Dixon: If something is currently Florida Specific requirement it is automatically brought forward into the updated Code.
- Carroll: When is standard likely to be finished.
- Hatfield: Probably 2011.

Review and Decide on Green & Energy Efficient Roofs Subcommittee Recommendations
Jeff Blair reported on the Green & Energy Efficient Roofs Subcommittee to the Energy Code Workgroup's recommendations and answered member's questions.

Following discussion and public comment the Workgroup took the following actions:

Workgroup Actions:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to adopt the Green and Energy Efficient Roofs Subcommittee to the Florida Energy Code Workgroup's recommendation that the Florida Building Code, Energy, shall be amended to provide minimum energy code credits (points) for the use of vegetative roofs. Additional energy credits may be achieved if documentation is provided to support the additional energy efficiency credits.

Workgroup Discussion on Green and Energy Efficient Roofs Recommendations:
- Blair: The recommendation is to provide a minimum credit for Green Roofs.
- Gross: Green roofs are a problem in South Florida. Structural committee needs to consider this.
- Dixon: There is testimony that SPRI had developed standards. Others are developing guidelines. The Code defined wind uplift and loads, so the information is there. Need to get people up to speed. How to apply. Design problem. Art is in the specification.
- Madani: It is not mandating green roofs, it's an option. Provide credit for option.
- Maxwell: If someone proposes using a green roof, has option of using performance method.
- Heard that designer can use known research to include in documentation for approving/designing.
- Ross: Anticipates putting code change in to reference standards for Green Roofs. In final draft now. Will have fire and wind issues covered. Have contacted Oak Ridge, there will be a paper delivered in Orlando in March. Fully instrumented roof system, provides significant energy savings. Cool roof credit has been in the code for some time. PV systems on a cool roof, can handle: certain % of roof has to be reflective, don't count in calculation. Other possible ways to handle it.
- Stewart: Bigger question, development of products, push new technologies. Need to keep prescriptive path. Need to be able to respond to new technologies. Why use a credit? If have data, why not enter into the software. Need criteria that manufacturers can meet to include in program.
- Dixon: Where is data that can be used? In past, Code has provided credit for new technologies until it can be adequately modelled by the compliance software. The compliance software engine is moving to, EnergyPlus, which doesn't have the capability of modelling performance either. In the interim, give a specific amount of credit. Building code is broader than just energy issues. An example is sealed attics. Have to make a judgement as to when a technology has no ill effects (or address them). Group feels that this technology has been recognized as benefit, data/tools not yet there. Can give credit based on estimates.
- Stewart: You're saying that there are other factors that need to be assessed before technology can be adequately modelled. Talking about overall treatment of new technologies.
- Dixon: Algorithms have to be developed.

Specific Building Technologies/Options to Achieve Energy Efficiency Improvements Discussion—Section 553.9061 (2)(a - h), F.S.—{Technologies/options including: solar water heating; energy-efficient appliances; energy-efficient windows, doors, and skylights; low solar-absorption roofs; enhanced ceiling and wall insulation; reduced-leak duct systems; programmable thermostats; and, energy efficient lighting systems.}

The Workgroup evaluated the following list of technologies/options to determine whether the Energy Code's energy calculation software has the capability to simulate the performance of the technology, whether it is already accounted for in the Code, and/or whether it should be included in the Code (based on capability of the software). The Workgroup agreed that the Florida Building Code, Energy Conservation, should facilitate the inclusion and use of alternative/renewable energy conserving options and technologies.

Workgroup Actions:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that the Florida Building Code, Energy Conservation, should facilitate allowing the use of new/alternative/renewable energy efficient technologies.

Following are the Workgroup's recommendations regarding including specific building technologies/options in the Florida Building Code, Energy Conservation:

Solar water heating:
The Workgroup agreed this is already provided for in the Code.

Energy-efficient appliances:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that the software is capable of simulating the performance of the technology, and energy allowances for relevant appliances should be included in the Code.
Motion—The Workgroup voted unanimously, 12 – 0 in favor, to not include portable energy-efficient appliances in the Code (not enforceable).

Energy-efficient windows, doors, and skylights:
The Workgroup agreed this is already provided for in the Code.

Low solar-absorption roofs, also known as "cool roofs":
The Workgroup agreed this is already provided for in the Code.

Enhanced ceiling and wall insulation:
The Workgroup agreed this is already provided for in the Code.

Reduced-leak duct systems:
The Workgroup agreed this is already provided for in the Code.

Programmable thermostats:
The Workgroup agreed this is already provided for in the Code.

Energy-efficient lighting systems:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that the software is capable of

simulating the performance of the technology, and energy allowances for energy-efficient lighting systems should be included in the Code (the IECC requirement for 50% energy efficient lights).
Water source, geo-thermal HVAC systems:
The Workgroup agreed this is already provided for in the Code.

Solar photovoltaic systems:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that the software is capable of simulating the performance of the technology, and energy allowances for solar photovoltaic systems should be included in the Code.

Variable refrigerant flow mechanical systems:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that this technology is not ready for inclusion in the Code.

Data center efficiencies:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that this technology is not ready for inclusion in the Code.

Under-floor duct systems:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that this technology is not ready for inclusion in the Code.

Induction lighting and new lighting technologies:
The Workgroup agreed that the software is capable of simulating the performance of the technology, but it is not needed in the Residential Code and is already accounted for in the Commercial Code.

Passive energy efficient design and day-lighting:
The Workgroup agreed that the software is capable of simulating the performance of the technology, but day-lighting is not needed in the Residential Code and is already accounted for in the Commercial Code, and both Codes account for orientation.

Building envelop efficiencies:
The Workgroup agreed this is already provided for in the Code.

HVAC System Zoning:
Motion—The Workgroup voted unanimously, 12 – 0 in favor, that this technology is not ready for inclusion in the Code.

Workgroup Discussion Regarding Additional Options/Technologies:
- Dixon: Dual track between energy and other code interests, solve problems with new technologies.
- Fairey: Other technologies already in code: solar, EE windows/skylights, low absorptance roofs, enhanced ceiling/walls, reduced leakage ducts, programmable thermostats, EE lighting, building envelope efficiencies.
- Software has the capability of including other technologies as well.
- Stewart: Question: If someone can provide a test report for a new technology can't you just include new technologies, R-value, etc. Day-lighting already embedded in program. Other programs for green

buildings can model day-lighting. If there is a different algorithm, include it. Create additional product approval.

- Fairey: Would also have to reduce power requirements for day-lighting. F/C does not have ability to model day-lighting at this point.
- Other technologies to consider (Dixon): EE appliances. May only be able to consider built in appliances.
- Greiner: If appliances are not included when CO issued, can't check. Issue is enforcement. Federal government makes you manufacture efficient appliances.
- Gross: Heat pump, water heater, etc. should be included in the Code.
- Palacios: Get real, can't track appliances. People take them away.
- Larson: May be another place in Florida regulatory regime. Certification from other program. Benefit from having energy efficient appliances. Also, technical opportunity for gains:
- Building commissioning or re-commissioning. Too many times not property operated.
- FECA study points: AV drive controls, motors. Parts of systems in buildings. Cooling for grocery stores, restaurants. Big impacts.
- Fairey: Larson's comment on appliances. Florida's Building Energy Rating System accounts for all of these issues.
- Dixon: Policy issue of finding ways to incentivize the use of new options, use of BERS.
- Savage: Issues are identified by Legislature. Can this group ignore them?
- Dixon: Issues are identified, as example; not mandatory.

EE Lighting Systems:

- In commercial program. Residential:
- Greiner: Need to make sure people are still using appliances, bulbs.
- Larson: Only if specific fixtures installed can you ensure they are used.
- Maxwell: Costs of control systems for day-lighting can prohibit people from using systems as designed.
- Dixon: There is an automatic way to design for day-lighting, design with less watts/sq ft., program would model.
- Maxwell: Schools. Lighting must be provided, assume lights on. Building could be seen as non-compliant.
- Larson: Keep it on the list, and deal with the concerns. Provide credit so it is difficult to circumvent it.
- Savage: Requiring efficient lighting should be done.
- Stanton: Prescriptive requirement already in the residential code. (Section 404.1)
- Palacios: How long are lights on? Are people home? Can't control whether spouse wants it removed or not. Federal law will prohibit incandescent lights in 2011 anyway.
- Fairey: Lighting is a major load in homes. For every watt you save on lighting, save 1/3 watt on A/C. Currently included in Code as internal gains. Could follow IECC, require that bulbs, tubes be in permanently fixtures in homes at time of CO.
- Maxwell: Can purchase fixtures that don't allow the screw in incandescent bulb.
- Smith: Increased cost. May be premature to mandate. Too many restrictions would inhibit the builder.
- Palacios: When will the Code go into effect? No incandescent bulbs available.
- Fairey: Will need to reduce internal gains, A/C sizing complicates programming issues. Have not considered 50% lighting in 20% stringency.

Solar Photovoltaic Systems:
- Fairey: Capability in program to do the work. Need approval for how it is included in the program because not in the Code.
- Maxwell: Do we want to address requirement to have to make capable for adding PV/solar hot water.
- Fairey: Building have to have a minimum efficiency, then can add PV.

Passive EE Design:
- Blair: Code provides for orientation and passive design for residential.
- Fairey: Passive design includes trombe walls, rock storage beds already covered by Code.
- Residential daylighting not much savings. Lighting load is at night, not during day.

Under Floor Duct Systems:
Fairey: Research is needed. Soil temperature lag, thermodynamic issues.
Dixon: New product AKDuct.
Maxwell: Don't see that it is advantageous in Florida.
Fairey: Motion: Not sufficiently researched to include at this time.
Palacios: Not sure how much energy savings, maybe on fan side.
Cochell: Problems with them, around a while. Where do you put the grilles? Siting of the diffusers. When you get water in duct, how get water out?

Variable Refrigerant Flow:
- Fairey: Variable refrigerant flow systems will change all that. Would eliminate ducts.
- Cochell: It solves the zoning issue problems.
- Palacios: Mini-splits do this. Has been used throughout the world for 10 years.
- Savage: How about equipment for zoning of ducts. Should we encourage.
- Cochell: Zoning is almost impossible to quantify. Hard to get in correctly. If done correctly can save energy.
- Palacios: Different story on commercial systems.

General Public Comment
Members of the public were invited to provide the Workgroup with comments. In addition, members of the public spoke on each of the substantive discussion issues before the Workgroup throughout the meeting.
None were provided.

Member's Comments and Issues
Workgroup members were invited to provide comments, or identify any issues or agenda items for the next meeting.
None were provided.

Review of Workgroup Delivery and Meeting Schedule
The Workgroup will be meeting as follows:
February 3, 2009: Melbourne, March 5, 2009: Cape Canaveral, March 27, 2009: Tampa, April 30, 2009: Tallahassee, May 28, 2009: Tallahassee, September 3, 2009: Gainesville, October 14, 2009: Tampa; November 12, 2009: Gainesville; December 9, 2009: Orlando; February 3, 2010: Tampa; April 5, 2010 Gainesville.
(Attachment 3—Workgroup's Adopted Recommendations)
(Attachment 5—Statutory Charge)

Next Steps
At the April meeting the Workgroup will focus on identifying and evaluating options regarding remaining tasks/sub-tasks, including discussion of the Commercial Prescriptive Table (e.g., shell buildings, renovations, and change-outs).
(Attachment 4—Remaining Workgroup Tasks)

Adjournment
The Workgroup voted unanimously, 12 – 0 in favor, to adjourn at 12:45 PM.

ATTACHMENT 1

MEETING EVALUATION RESULTS

February 3, 2010—Tampa, Florida

Average rank using a 0 to *10* scale, where *0* means totally disagree and *10* means totally agree.

1. Please assess the overall meeting.

9.78 The background information was very useful.
9.78 The agenda packet was very useful.
10.00 The objectives for the meeting were stated at the outset.
9.89 Overall, the objectives of the meeting were fully achieved.

2. Do you agree that each of the following meeting objectives was achieved?

9.67 Discussion and Ranking of 2010 FEC Commercial Chapter Outstanding Issues.
9.78 Discussion of Specific Building Technologies/Options to Achieve Energy Efficiency Improvements.
9.63 To Decide on Pool Efficiency Subcommittee's Report/Recommendations.
9.75 To Decide on Green and Energy Efficient Roofs Subcommittee's Report/Rec's.
10.00 Adoption of Recommendations for Submittal to the Commission.
9.86 Identification of Next Steps.

3. Please tell us how well the Facilitator helped the participants engage in the meeting.

9.89 The members followed the direction of the Facilitator.
10.00 The Facilitator made sure the concerns of all members were heard.
9.78 The Facilitator helped us arrange our time well.
9.89 Participant input was documented accurately.

4. Please tell us your level of satisfaction with the meeting?

9.89 Overall, I am very satisfied with the meeting.
10.00 I was very satisfied with the services provided by the Facilitator.
10.00 I am satisfied with the outcome of the meeting.

5. Please tell us how well the next steps were communicated?

9.78 I know what the next steps following this meeting will be.
9.78 I know who is responsible for the next steps.

6. What did you like best about the meeting?
- Staff input, especially Rick Dixon.
- Facilitator.
- The facilitator stayed focused.
- Another good finished outline with the work plan completed.

7. How could the meeting have been improved?
- Keep breaks to time specified.
- I think a copy of the pool and roof sub. Report could have been handed out.

8. Member Evaluation Comments.
None were provided.

Public Written Comments
None were provided.

ATTACHMENT 2
PUBLIC MEETING ATTENDANCE

Public Meeting Attendance	
NAME	**REPRESENTATION**
Joe Belcher	
Mike Nau	
Dean Ruark	
Michael Lafevre	
Jack Glenn	
Joe Hetzel	
Dick Wilhelm	
Steve Strawn	
Chuck Anderson	
Arlene Stewart	
Lacey Willard	
Jerry Wooldridge	
Ralph Jones	
Amanda Hickman	
Lorrane Ross	

ATTACHMENT 3

WORKGROUP'S CONSENSUS RECOMMENDATIONS

1.A. ENERGY EFFICIENCY COST-EFFECTIVENESS TESTS FOR RESIDENTIAL CODE CONSENSUS RECOMMENDATIONS

The Florida Legislature directed the Commission to develop a rule for determining cost effectiveness of energy conservation measures to be considered for inclusion in the Florida Energy Code. The rule must be completed and applied to the update of the energy provisions of the for the 2010 Florida Building Code.

"(3) The Florida Building Commission shall, prior to implementing the goals established in subsection (1), adopt by rule and implement a cost-effectiveness test for proposed increases in energy efficiency. The cost-effectiveness test shall measure cost-effectiveness and shall ensure that energy efficiency increases result in a positive net financial impact."

Energy Analysis Calculations Methodology

Energy analysis necessary to determine energy savings for Energy Conservation Measures (ECMs) be accomplished using Florida's code compliance software, EnergyGauge®.

Energy simulation analysis will be conducted for both single ECMs and packages of ECMs.

Economic Analysis Assumptions

Energy Conservation Measure (ECM) costs will be the full, installed incremental cost of improvements, where the incremental cost is equal to the difference between the baseline measure cost and the improved measure cost unencumbered by any federal tax credits, utility incentives or state rebates.

Energy Conservation Measure (ECM) costs will be the full, installed incremental cost of improvements, where the incremental cost is equal to the difference between the baseline measure cost and the improved measure cost unencumbered by any federal tax credits, utility incentives or state rebates, with option to consider encumbering utility incentives, etc. later, if possible.

Study Life Period

The analysis for residential buildings shall be conducted over a 30 year study period.

ECM Service Life

The evaluation shall be conducted using the appropriate service lives of the measures.

Home Mortgage Parameter Values

Mortgage interest rate: the greater of the most recent 5-year average and 10-year average simple interest rate for fixed-rate, 30-year mortgages computed from the Primary Mortgage Market Survey (PMMS) as reported by Freddie Mac.

Mortgage down payment: 10%.

Annual Rate Parameter Values

General inflation rate: the greater of the most recent 5-year and 10-year Annual Compound Interest Rate (ACIR) computed from the annual average Consumer Price Index (CPI) as reported by the U.S. Bureau of Labor Statistics.

Discount rate: General inflation rate plus 2%.

Fuel escalation rate: the greater of 5-year and 10-year ACIR computed from revenue-based prices as reported by Florida Public Service Commission minus the general inflation rate.

The baseline electricity and natural gas prices used in the analysis shall be the statewide, revenue-based average residential price for the most recent available 12 months as provided by the Florida Public Service Commission.

Cost Effectiveness Criteria

For present value cost-to-benefit ratio (PVCB) a value of 1.0 or greater.

For the internal rate of return (IRR) on investments, a value equal to 8%. {The recommended value is approximately 1.5% greater than the guaranteed return on State of Florida DROPS (retirement account) investments and is considered large enough that any rational investor would consider the investment wise compared with any other long-term investment.}

*For the levelized cost of conserved energy (LCCE), a value equal to the statewide residential revenue-based retail cost of electricity adjusted at the fuel escalation rate over one-half of the life of the measure (yields average over the measure life). {This is based on the fact that, over their life, accepted measures will cost consumers the same or less than purchasing electricity from the utility, where: LCCE criteria = (current price) * [(1+fuelEsc) ^ (life/2)].}*

Evaluation Methodology for Measures and Packages of Measures

Create multiple packages of ECMs that result in the target % efficiency increase for each code cycle update (20, 30, 40 and 50%), based on comparison to the 2007 FBC as adopted October 31, 2007 (without the 2009 supplement).

Evaluate each ECM using adopted cost effectiveness indicators (PVBC, IRR, LCCE), within their specific package of ECMs. PVBC will be considered the primary measure with IRR and LCEE used as measures for illustration and communication of individual ECMs and packages of ECMs comparative economic viability.

Validation of the cost effectiveness of Florida Energy Efficiency Code for Building Construction changes shall mean that a number of ECM packages evaluated to comply with the statutory percent energy efficiency increase requirements have a greater benefit than cost as measured in present value dollars.

1.B. ENERGY EFFICIENCY COST-EFFECTIVENESS TESTS FOR COMMERCIAL CODE CONSENSUS RECOMMENDATIONS

Energy Analysis Calculations Methodology

Energy analysis necessary to determine energy savings for Energy Conservation Measures (ECMs) will be accomplished using Florida's code compliance software, EnergyGauge®.

Energy simulation analysis will be conducted for both single ECMs and packages of ECMs.

Economic Analysis Assumptions

Energy Conservation Measure (ECM) costs will be the full, installed incremental cost of improvements, where the incremental cost is equal to the difference between the baseline measure cost and the improved measure cost unencumbered by any federal tax credits, utility incentives or state rebates.

Energy Conservation Measure (ECM) costs will be the full, installed incremental cost of improvements, where the incremental cost is equal to the difference between the baseline measure cost and the improved measure cost unencumbered by any federal tax credits, utility incentives or state rebates, with option to consider encumbering utility incentives, etc. later, if possible.

Study Life Period

The analysis for commercial buildings shall be conducted over a 30 year study period with appropriate service lives included in the analysis.

ECM Service Life

The evaluation shall be conducted using the appropriate service lives of the measures.

Mortgage Parameter Values

Mortgage interest rate: the greater of the most recent 5-year average and 10-year average simple interest rate for fixed-rate, 30-year mortgages computed from the Primary Mortgage Market Survey (PMMS) as reported by Freddie Mac, rate plus 2%.

Mortgage down payment: 20%.

Annual Rate Parameter Values

General inflation rate: the greater of the most recent 5-year and 10-year Annual Compound Interest Rate (ACIR) computed from the annual average Consumer Price Index (CPI) as reported by the U.S. Bureau of Labor Statistics. Discount rate: General inflation rate plus 2%.

Fuel escalation rate: the greater of 5-year and 10-year ACIR computed from revenue-based prices as reported by Florida Public Service Commission minus the general inflation rate.

The baseline electricity and natural gas prices used in the analysis be the statewide, revenue-based average commercial price for the most recent available 12 months as provided by the Florida Public Service Commission.

Cost Effectiveness Criteria

For present value cost-to-benefit ratio (PVCB) a value of 1.0 or greater.

For the internal rate of return (IRR) on investments, a value equal to 7%.

*For the levelized cost of conserved energy (LCCE), a value equal to the statewide commercial revenue-based retail cost of electricity adjusted at the fuel escalation rate over one-half of the life of the measure (yields average over the measure life). {This is based on the fact that, over their life, accepted measures will cost consumers the same or less than purchasing electricity from the utility, where: LCCE criteria = (current price) * [(1+fuelEsc) ^ (life/2)].}*

Evaluation Methodology for Measures and Packages of Measures

Create multiple packages of ECMs that result in the target % efficiency increase for each code cycle update (20, 30, 40 and 50%), based on comparison to the 2007 FBC as adopted October 31, 2007 (without the 2009 supplement).

Evaluate each ECM using adopted cost effectiveness indicators (PVBC, IRR, LCCE), within their specific package of ECMs. PVBC will be considered the primary measure with IRR and LCEE used as measures for illustration and communication of individual ECMs and packages of ECMs comparative economic viability.

Validation of the cost effectiveness of Florida Energy Efficiency Code for Building Construction changes shall mean that a number of ECM packages evaluated to comply with the statutory percent energy efficiency increase requirements have a greater benefit than cost as measured in present value dollars.

1.C. DEFINITION OF "CONSUMER" (APPLIES TO BOTH RESIDENTIAL AND COMMERCIAL)

Consumer: A class of economic system participant that makes no distinction between the owner of the building and the utility rate payer.

All of the above recommendations have been adopted by the Commission.

3. ENERGY CONSERVATION MEASURES FOR REPLACEMENT OF AIR CONDITIONING EQUIPMENT RECOMMENDATIONS

Consensus Recommendations:

Sizing of Replacement Air Conditioning Systems:

The A/C contractor or licensed Florida PE shall submit a nationally recognized method based sizing calculation at time of permit application for total replacement of the condensing / evaporator components of HVAC systems 65,000 Btu/h and less.

Exception: Buildings designed in accordance with Section 105.3.1.2 of the Florida Building Code, Building.

Testing of air distribution systems when air conditioning systems are replaced:

At the time of the total replacement of HVAC evaporators & condensing units, under 65,000 Btu/h, all accessible (a minimum of 30 inches clearance) joints and seams in the air distribution system shall be sealed using reinforced mastic or code approved equivalent and shall include a signed certification by the contractor that is attached to the air handler unit stipulating that this work had been accomplished.

Exception:

1. Ducts in conditioned space.

2. Joints or seams that are already sealed with fabric and mastic.

3. If system is tested and repaired as necessary.

2. DEVELOP A STRATEGIC PLAN FOR INCREASED EFFICIENCY REQUIREMENTS REQUIRED BY LAW FOR FUTURE FBC EDITIONS

Consensus Recommendations:

Strategic Plan Criteria

1. The Strategic Plan must implement s.553.9061(1), F.S., scheduled increases in the Code's energy performance standard.
2. The Strategic plan must consider cost effectiveness of the incremental changes in efficiency required by the Code.
3. The Strategic Plan must implement s.553.73(6)(a), F.S., selection of the IECC as a foundation code and its modification to maintain the efficiencies of the Florida Energy Efficiency Code for Building Construction, s.553.901, F.S..
4. The Strategic Plan must implement s.553.9061(2), F.S., requiring the Code to recognize including energy efficiency performance options and elements including but not limited to: Solar water heating; Energy efficient appliances; Energy efficient windows, doors and skylights; Low solar absorption roofs/cool roofs; Enhanced ceiling and wall insulation; Reduced leak duct systems; Programmable thermostats; and Energy efficient lighting systems.
5. The Strategic Plan should identify compliance methods with the best potential for complying with the schedule for increasing efficiency standards.
6. The Strategic Plan should be adaptable for all potential mandated efficiency performance standard increase schedule.
7. The Strategic Plan should allow flexibility for builders to choose different ways to adapt their construction.
8. The Strategic Plan should provide flexibility appropriate to product innovation.
9. The Strategic Plan should provide for easy measurement and demonstration of compliance with the energy efficiency increases required by s.553.9061, F.S..
10. The Strategic Plan should require that compliance meets an equivalent energy standard regardless of the compliance method.

Strategic Plan Consensus Recommendation

Commission Select The IECC As Foundation Code For Florida Building Code, Energy Pursuant To S.553.73(6)(A), F.S.

Commission Adopt The Florida Energy Efficiency Code For Building Construction (FEC) Within The Florida Building Code Pursuant To S.553.901, F.S. By --

Modifying The IECC To Maintain The Efficiencies Of The FEC Adopted And Amended Pursuant To S.553.901, F.S. As Directed By S.553.73(6)(A), F.S.

Modifications To Include:

- Adding A Maximum Glass Percent Criteria To The Prescriptive Compliance Method To Maintain A Consistent Standard Of Energy Efficiency For All Compliance Methods. (Criteria 10, S.553.73(6)(A)), And S.553.901, F.S.)

- Modifying The Prescriptive Compliance Method's Component Efficiency Requirements To Meet The 20% Overall Efficiency Requirement Improvement Pursuant To S.553.9061(1), F.S., As Determined By Simulations Of Annual Energy Use By Energy Gauge USA Fla/Res. (Criteria 10 And S.553.73(6)(A))

- Modifying The UA Compliance Method's Compliance Criteria To Meet The 20% Overall Efficiency Requirement Improvement Pursuant To S.553.9061(1), F.S., As Determined By Simulations Of Annual Energy Use By Energy Gauge USA Fla/Res. (Criteria 10 And S.553.73(6)(A))

- Using The Energy Gauge USA Fla/Res Implementation Of The FEC Energy Budget Compliance Method For The Performance Compliance Method And Using 80 Points As The Compliance Criteria (S.553.73(6)(A), F.S., S.553.901, F.S., Criteria 4, 5, 6, 7, 8, 9, 10, 11 And 12)

- Modifying The IECC To Include All Other Energy Efficiency Requirements Adopted Pursuant To S.553.901, F.S. The "Thermal Efficiency Code".

The above recommendation has been adopted by the Commission.

4. SPECIFIC BUILDING OPTIONS TO ACHIEVE ENERGY EFFICIENCY IMPROVEMENTS

Section 553.9061 (2) The Florida Building Commission shall identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy-efficiency performance options and elements include, but are not limited to: (a) Solar water heating. (b) Energy-efficient appliances. (c) Energy-efficient windows, doors, and skylights. (d) Low solar-absorption roofs, also known as "cool roofs." (e) Enhanced ceiling and wall insulation. (f) Reduced-leak duct systems. (g) Programmable thermostats. (h) Energy-efficient lighting systems.

Following are the Workgroup's adopted recommendations regarding including specific building technologies/options in the Florida Building Code, Energy Conservation:

Key:
Green: the software is capable of simulating the performance of the technology, and energy allowances for the technology should be included in the Code.
Yellow: this technology is already accounted for in the Code.
Blue: the technology and/or software is not ready for use in the Code.

- Solar water heating
- Energy-efficient appliances
- Energy-efficient windows, doors, and skylights
- Low solar-absorption roofs, also known as "cool roofs"
- Enhanced ceiling and wall insulation
- Reduced-leak duct systems
- Programmable thermostats
- Energy-efficient lighting systems
- Water source, geo-thermal HVAC systems
- Solar photovoltaic systems
- Variable refrigerant flow mechanical systems
- Data center efficiencies
- Under-floor duct systems
- Induction lighting and new lighting technologies
- Passive energy efficient design and day-lighting
- Building envelop efficiencies
- HVAC System Zoning

6. OPTIONS FOR DESIGN CRITERIA FOR ENERGY EFFICIENT POOLS

The Energy Act of 2008 (HB 7135) directs adoption of pool pump efficiencies in the 2010 FBC. During discussions with the Florida Spa and Pool Association regarding energy efficiency requirements for pool pumps members suggested improved efficiency could be achieved through criteria for pool hydronic system design.

This task will be evaluated by: Pool Efficiency Subcommittee to the Energy Code Workgroup.

Issues for Evaluation:

Pool pump standards; Pool plumbing system design; Performance and prescriptive compliance paths for pools; Credits for alternative energy sources for pool heating, lighting and pumping.

The Florida Energy Code Workgroup voted to adopt the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendation that APSP-15 (Standard for Energy Efficiency for Residential In-ground Swimming Pools) as revised by the Subcommittee should serve as the draft Code language for inclusion in the Florida Building Code, Energy Volume.

The Florida Energy Code Workgroup voted to adopt the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendation that the Florida Building Code, Energy, shall provide energy code credits (points) for PV and alternative/renewable technologies that reduce energy consumption for pool pump motors.

The Florida Energy Code Workgroup voted to adopt the Pool Efficiency Subcommittee to the Energy Code Workgroup's recommendation that APSP-14 (Portable Spa Energy Efficiency Standard) is an appliance standard and therefore not within the scope of the Florida Building Code.

7. EVALUATE REQUIREMENTS FOR GREEN ROOFS RECOGNITION IN FLORIDA BUILDING CODE

This task will be evaluated by: Green and Energy Efficient Roofs Subcommittee to the Florida Energy Code Workgroup.

Issues for Evaluation:

Green roof energy performance, structural and water protection characteristics in Florida environment; Cool roof options and energy performance in Florida environment; Alternative roof systems and components effect on roof/ceiling heating cooling loads and calculations for Florida environment (solar pool heater and DHW thermal arrays, pv arrays, pv roof tiles, mass and metal roof covering, evaporatively cooled, radiant barrier systems).

The Florida Energy Code Workgroup voted to adopt the Green and Energy Efficient Roofs Subcommittee to the Florida Energy Code Workgroup's recommendation that the Florida Building Code, Energy, shall be amended to provide minimum energy code credits (points) for the use of vegetative roofs. Additional energy credits may be achieved if documentation is provided to support the additional energy efficiency credits.

ATTACHMENT 4

REMAINING WORKGROUP TASKS

5. OPTIONS FOR ADDRESSING HUMIDITY AND MOISTURE CONTROL PROBLEMS FOR HOT AND HUMID CLIMATES

Issues for Evaluation:

- *Minimum efficiency equipment can result in problems with indoor humidity control for situations where AC equipment is oversized and sensible heat loads are diminished by advanced ECMs relative to latent loads contributed by outdoor moisture infiltration/diffusion and indoor moisture generation.*
- *Energy conservation achieved by sensible load reduction measures must be balanced with equipment requirements for improved moisture removal and latent loading control measures.*
- *High efficiency variable speed and variable capacity AC systems provide load matching capability and increase moisture removal effectiveness.*
- *Building envelope tightening to limit outdoor moisture infiltration/diffusion typically reduce air exchange resulting in building performance characteristics that may lead to required forced air ventilation of homes.*
- *Forced ventilation of homes will require preconditioning of ventilation air to remove moisture to achieve indoor humidity control.*

ATTACHMENT 5

STATUTORY CHARGE

553.9061 Scheduled Increases In Thermal Efficiency Standards.--

(1) The purpose of this section is to establish a schedule of increases in the energy performance of buildings subject to the Florida Energy Efficiency Code for Building Construction. The Florida Building Commission shall:

(a) Include the necessary provisions by the 2010 edition of the Florida Energy Efficiency Code for Building Construction to increase the energy performance of new buildings by at least 20 percent as compared to the energy efficiency provisions of the 2007 Florida Building Code adopted October 31, 2007.
(b) Increase energy efficiency requirements by the 2013 edition of the Florida Energy Efficiency Code for Building Construction by at least 30 percent as compared to the energy efficiency provisions of the 2007 Florida Building Code adopted October 31, 2007.
(c) Increase energy efficiency requirements by the 2016 edition of the Florida Energy Efficiency Code for Building Construction by at least 40 percent as compared to the energy efficiency provisions of the 2007 Florida Building Code adopted October 31, 2007.
(d) Increase energy efficiency requirements by the 2019 edition of the Florida Energy Efficiency Code for Building Construction by at least 50 percent as compared to the energy efficiency provisions of the 2007 Florida Building Code adopted October 31, 2007.

(2) The Florida Building Commission shall identify within code support and compliance documentation the specific building options and elements available to meet the energy performance goals established in subsection (1). Energy efficiency performance options and elements include, but are not limited to:
(a) Solar water heating.

(b) Energy-efficient appliances.

(c) Energy-efficient windows, doors, and skylights.

(d) Low solar-absorption roofs, also known as "cool roofs."

(e) Enhanced ceiling and wall insulation.

(f) Reduced-leak duct systems.

(g) Programmable thermostats.

(h) Energy-efficient lighting systems.

(3) The Florida Building Commission shall, prior to implementing the goals established in subsection (1), adopt by rule and implement a cost-effectiveness test for proposed increases in energy efficiency. The cost-effectiveness test shall measure cost-effectiveness and shall ensure that energy efficiency increases result in a positive net financial impact.

ATTACHMENT 6

PRESCRIPTIVE IMPROVEMENTS TO ACHIEVE 20% SAVINGS COMPARED TO FLORIDA BUILDING ENERGY CODE 2007

INTRODUCTION:

This report documents the analysis carried out to investigate prescriptive measures that can be implemented to improve the building energy use of commercial buildings, built to the Florida Energy Code 2007[1] baseline standards, by a value of 20%. The prescriptive measures evaluated were limited to lighting and envelope improvements only.

Four general building types, an office, strip mall, school and a supermarket, were chosen for this study and each of these buildings were simulated in three representative climate locations viz. Miami, Orlando and Jacksonville.

SIMULATION METHODOLOGY:

The four building types referred to above, an office, strip mall, school and supermarket, were chosen based on an analysis of the Commercial Building Energy Consumption Survey (CBECS)[2] 2003 reports available from the US Energy Information Administration.

The 4 building models were picked from the US DOE Commercial Building Benchmark[3] models available as part of DOE's commercial building initiative. The DOE Benchmark Buildings are compliant with ASHRAE 90.1 2004, which is the baseline for the existing Florida Energy Code 2007 for commercial buildings.

The study consisted of two parts. In the first round of simulation, the aim was to evaluate the contribution of the envelope to the overall energy use of the building. It was determined that the savings potential from extreme increases to insulation levels for envelope components like walls and roofs and highly decreasing the thermal conductivity and solar heat gains through fenestration, was an average of about 10% across locations and building types. Table 1 gives the original values as against the extreme values that were used to evaluate this potential.

Table 1 Envelope improvements to evaluate maximum savings potential

COMPONENT	OLD VALUE	NEW VALUE
Wall R-value	R-13	R-100
Roof R-value	R-15	R-100
Window U-value	U-1.22	U-0.01
Window SHGC	0.25	0.01

[1] Florida Building Energy Code, www.floridabuilding.org
[2] CBECS, US Energy Information Administration (EIA), http://www.eia.doe.gov/emeu/cbecs/
[3] US DOE Commercial Building Benchmark models, http://www1.eere.energy.gov/buildings/commercial_initiative/new_construction.html

As mentioned above, it was found that, even with extreme levels of insulation and fenestration performance improvements, savings on the level of 10% on average were possible. For the second phase of this study, it was then decided that envelope improvements would be restricted to realistic values as specified in Table 2, and lighting power density would be reduced in steps to achieve an overall savings of 20% compared to the Florida Energy Code 2007 baseline.

Table 2 Envelope improvements restricted to realistic values

COMPONENT	OLD VALUE	NEW VALUE
Wall R-value	R-13	R-30
Roof R-value	R-15	R-40
Window U-value	U-1.22	U-0.45
Fenestration SHGC	0.25	0.19

Using envelope prescriptive values from Table 2 above, the lighting power density in the building was reduced in steps of 0.1 W/m^2 or 0.2 W/m^2, as applicable, and the exercise was carried out till an overall energy saving of 20% resulted. Table 3 summarizes the improvements to lighting power density (LPD) that are required in addition to the envelope savings from Table 2.

Table 3 Average LPD reduction to get to 20% savings

COMPONENT	Average % LPD Reduction
Office	38%
Strip Mall	25%
School	43%
Supermarket	Unable to reach 20% savings even with 50% LPD reduction

As can be seen from the results in Table 3, it was found that, due to higher internal loads due to refrigeration and other equipment in a typical supermarket, even a 50% reduction in lighting power density was unable to provide an overall savings of 20% in terms of total energy use for the building. The maximum value obtained for the supermarket building was around 9% savings from a 50% reduction in LPD.

Based on the findings above, and taking into consideration the prescriptive minimums for shell buildings and renovations set for the 2009 Supplement to the Florida Energy Code 2007, Table 4 below gives a set of possible prescriptive minimums for envelope measures that could be adopted for the next code cycle.

Table 4 Recommended envelope prescriptive measures

COMPONENT	NEW VALUE
Wall R-value	R-30 (U-0.032)
Roof R-value	R-40 (U-0.025)
Raised Floor R-value	R-30 (U-0.032)
Window U-value	U-0.45
Fenestration SHGC	0.19
Door U-value	0.7 (swinging) / 1.45 (non-swinging)

CONCLUSION:

To achieve an overall savings of 20% compared to the Florida Energy Code 2007 using only envelope and lighting prescriptive improvements, values specified in Tables 2 and 3 will have to be prescribed. If the values of LPD reductions are high, as in case of schools (43%), credit for daylight optimization using daylighting sensors to reduce lighting power use, could be included. In some buildings, like supermarkets, it will not be possible to implement any strategies that will achieve the target of 20% savings. In the case of such buildings, additional measures like reduction of overall equipment power density should be investigated.

However, as is apparent from the results, and the high values of LPD reductions required, in addition to the strict envelope measures employed, it may not be possible to create a uniform prescriptive code that allows for a 20% reduction in energy use as compared to the Florida Building Energy Code 2007 for all commercial buildings in Florida. It should also be noted that the ASHRAE 90.1 code for 2007, and currently available drafts for 2010, require no change to the LPD levels specified by ASHRAE 90.1 2004 on which the current Florida Energy Code performance method is based.

Given these results and considerations, it is recommended that all new construction and new shell buildings, as well as renovations, use the performance method of the current Florida Energy Code to demonstrate 20% improvement for the next code cycle. However, a small number of new shell buildings, change-outs and simple alterations/renovations could use the values from Table 4 as prescriptive minimums for the 2010 code cycle for the Florida Energy Code. Any mechanical equipment change-outs and lighting alterations for buildings using the prescriptive values from Table 4 would be subject to the same baseline standards as specified in the Florida Building Energy Code 2007.

ATTACHMENT 7

ADDITIONAL FLORIDA SPECIFICS

LIST OF ADDITIONAL FLORIDA-SPECIFICS FOUND or PROPOSED AFTER COMMITTEE REVIEW

Chapter 1

101.4.9 Shell buildings. Nonresidential buildings that are permitted prior to design completion or which will be finished in sections at a time after construction of the shall comply with either Sections 502, 503, 504 and 505 or with Section 506 prior to granting of a permit to build. If Sections 502, 503, 504 and 505 are used, a code submittal(s) using Section 506 shall be submitted when completion of the building (or part of the building) is permitted. If Section 506 is used, all assumptions made about features not installed until later that are not on the building plans shall be listed and appended to the compliance form submitted to the building department. Unless the building is completed as per all assumptions made in the original code compliance submittal, a revised code submittal(s) using Section 506 shall be submitted when completion of the building (or part of the building) is permitted.

Chapter 4

403.2.2 Sealing (Mandatory). All ducts, air handlers, filter boxes and building cavities which form the primary air containment passageways for air distribution systems shall be considered ducts or plenum chambers, shall be constructed and sealed in accordance with ~~used as ducts shall be sealed. Joints and seams shall comply with~~ Section 503.2.7 of this code ~~M1601.4.1 of the *Florida Building Code, International Residential Code.* or Section 603 of the *Florida Building Code, Mechanical*, as applicable, and shall be shown to meet duct tightness criteria in Section 403.2.2.1.~~

405.2 Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

405.2.1 Ceiling insulation. Ceilings shall have an insulation level of at least R-19, space permitting. For the purposes of this code, types of ceiling construction that are considered to have inadequate space to install R-19 include single assembly ceilings of the exposed deck and beam type and concrete deck roofs. Such ceiling assemblies shall be insulated to at least a level of R-10.

405.5.6 Installation criteria for homes claiming the heat recovery unit (HRU) option. The heat recovery unit option may be used for installation of a waste heat recovery unit (HRU) on either an air conditioner or a heat pump where the heat recovery unit has a minimum net useful heat exchange effect of 30 percent and meets the following criteria:

1. The net useful heat exchange effect shall be demonstrated by either a Form prominently displayed on the unit with test results clearly visible for inspection or by an ARDM certified refrigerant desuperheater seal affixed to the unit.
2. The net useful heat exchange effect shall have been determined by an independent laboratory testing to the standard rating conditions specified in Florida Standard FL-1 (see Appendix X).
3. If more than one air conditioning system is installed in a residence and only one HRU is installed, energy load shall be based on the gallon capacity of the water heater to which it is coupled and the total capacity of the water heaters in the residence. In such case, the HRU shall be attached to the system serving the daytime primary living areas (family room, living room, kitchen, dining room and adjacent bedrooms and bathrooms).

405.5.7 Installation criteria for homes claiming the dedicated heat pump option. The dedicated heat pump option may be used for a dedicated heat pump (also known as a heat pump water heater) installed either with a tank (an integral unit) or without tank (add on to another water heater) based on the COP of the system on which it is installed. No minimum rating is required for this equipment.

Chapter 5

502.2.2.2 Shell buildings, renovations and alterations.

502.2.2,1.3 Above-grade walls. The minimum thermal resistance (*R*-value) of the insulating material(s) installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table 502.1.1.1 502.2(1), based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table 502.1.1.1 502.2(1). "Mass walls" shall include walls weighing at least (1) 35 pounds per square foot (170 kg/m2) of wall surface area or (2) 25 pounds per square foot (120 kg/m2) of wall surface area if the material weight is not more than 120 pounds per cubic foot (1900 kg/m3).

502.2.3 Floors.

502.2.3.1 Shell buildings, renovations and alterations.

502.2.3.1.1.5 Floors over outdoor air or unconditioned space. The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table 502.1.1.1 502.2(1), based on construction materials used in the floor assembly.

"Mass floors" shall include floors weighing at least (1) 35 pounds per square foot (170 kg/m2) of floor surface area or (2) 25 pounds per square foot (120 kg/m2) of floor surface area if the material weight is not more than 12 pounds per cubic foot (1,900 kg/m3).

[NOTE: Criteria in Section 502.2.2.2 and Section 502.2.3.1.1 that define what constitutes "mass" walls and floors should be moved to Chapter 2, Definitions.**]**

503.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) shall meet the provisions of Sections 503.2.10.1 through 503.2.10.2 Criteria in sections 503.2.10.3 through 503.10.6 shall also be met.

503.2.10.5 Ventilation systems. Ventilation systems shall be designed to be capable of reducing the supply of outdoor air to the minimum ventilation rates required by section 6.1.3 of ASHRAE 62.1. Systems may be designed to supply outside air quantities exceeding minimum levels, but they shall be capable of operating at no more than minimum levels through the use of return ducts, manually or automatically operated control dampers, fan volume controls, or other devices.

Exception: Minimum outdoor air quantities may be greater if required to make up air exhausted for source control of contaminants or if required by process systems.

503.2.10.5.1 Air quality. Sources of pollutants within the conditioned space shall be minimized or eliminated, if possible, in order to minimize the outside air intake required for dilution. Concentrated sources shall be controlled at the source by containment, local exhaust systems, or both.

503.2.10.6 Building pressures. Mechanical systems shall be designed to assure that buildings are pressurized with respect to outdoors.