FLORIDA ENERGY CODE WORKGROUP

REPORT TO THE FLORIDA BUILDING COMMISSION

May 28, 2009

Tallahassee, Florida

Facilitation, Meeting and Process Design By

FCRC CONSENSUS SOLUTIONS

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FLORIDA BUILDING COMMISSION
FLORIDA ENERGY CODE WORKGROUP REPORT

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, has made the following appointments to the Florida Energy Code Workgroup. Members are charged with representing their stakeholder group's interests, and working with other interest groups to develop consensus package(s) 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, Tom Larson, Bill Kent, Larry Maxwell, 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.

REPORT OF THE MAY 28, 2009 MEETING

Opening and Meeting Attendance
The meeting started at 9:00 AM, and the following Workgroup members were present:
Rusty Carroll, Phillip Fairey, Dale Greiner, Jeff Gross, Jeff Householder, Tom Larson, Bill Kent, Larry Maxwell, Donny Pittman, Drew Smith, Jeff Stone, and Rob Vickers.

Members Absent:
Steve Bassett, Bob Cochell, and Paul Savage.

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

FSEC Staff Present
None.

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

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, 12 - 0 in favor, to approve the agenda as presented including the following objectives:

- ✓ To Approve Regular Procedural Topics (Agenda and Summary Report)
- ✓ To Discuss Remaining Cost Effectiveness Test Recommendations for Commercial Buildings
- ✓ To Discuss and Develop Remaining Recommendation Regarding AC Equipment Replacement
- ✓ To Discuss Energy Efficiency Standards and Planning for Compliance with Statutory Requirements for Building Efficiency Increases
- ✓ To Identify Issues and Options Regarding Project Tasks and Sub-Tasks
- ✓ 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

April 30, 2009 Facilitator's Summary Report Approval
Jeff Blair, Commission Facilitator, asked if any members had corrections or revisions to the April 30, 2009 Report, and none were offered.
The Workgroup voted unanimously, 12 - 0 in favor, to approve the April 30, 2009 Facilitator's Summary Report as presented.

Complete Cost Effectiveness Test Recommendations for Commercial Buildings
The Workgroup developed consensus recommendations for cost effectiveness test for commercial buildings with the understanding that BOMA would provide specific input on mortgage interest rate, mortgage down payment, and internal rate of return. The Commission adopted the Workgroup's package of consensus recommendations and tasked the Workgroup with completing recommendations for commercial interest rate, commercial down payment, commercial internal rate of return (IRR), and a definition of "Consumer" appropriate for residential and commercial applications.

The Workgroup evaluated and adopted the following consensus recommendations:

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

Mortgage interest rate (Commercial): 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 (Commercial): 20%.

For the internal rate of return (IRR) on investments (Commercial), a value equal to 7%. ~~8%~~

With the exception of the commercial IRR, the Workgroup adopted the above recommendations at the April 30, 2009 meeting. Regarding the IRR, the Workgroup discussed the issue and following questions and answers, public comment, and Workgroup discussion, decided as follows:

Workgroup Action:
Motion—The Workgroup voted unanimously, 12 - 0 in favor, to adjust the IRR for commercial buildings to 7%. The recommendation will be submitted to the Commission during the June 2009 Rule Adoption Hearing.

Complete Remaining Recommendation Regarding AC Equipment Replacement
Members were asked to identify and evaluate a range of options regarding recommendations for energy conservation measures for air conditioning replacement. Following discussions, questions and answers, and public comment, the Workgroup developed consensus recommendations as follows:

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.

The Results of the Options Ranking Exercise and relevant comments and discussion are included as Attachment 3 of this Report.
(Attachment 3—Options Evaluation Exercise Results)
(Attachment 4—Duct Leakage Testing Options)

Discuss Energy Efficiency Standards and Planning for Compliance with Statutory Requirements for Building Efficiency Increases
The Florida Legislature established a schedule for increases in building energy efficiency requirements. This task expands the study of energy conservation measures for residential buildings to investigation of efficiency options for commercial buildings and the development of a plan to implement the requirements of the new law. Section 553.9061 "Scheduled increases in thermal efficiency standards." was created to establish percent increases in efficiency to be implemented in the 2010, 2013, 2016 and 2019 Code. With the adoption of the Glitch Amendments to the 2007 Edition of the Florida Building Code and the revisions to Rule 9B-13 Thermal Efficiency Standards, the Commission implemented a strategy for increasing the energy efficiency provisions of the Code by 15%. The Commission's Energy Code Workgroup and Energy TAC are working with stakeholder to evaluate options for achieving an additional 5% increase for the 2010 Edition of the Code, and for achieving the progressive increases in efficiency required for subsequent editions of the code.

Energy act of 2008 (HB 7135) directs the Commission to include, as a minimum, certain technologies for achieving enhanced building efficiency targets established by the Act in the Florida Energy Code. The Building Code act of 2008 (HB 697) directs the Commission to facilitate and promote the use of certain renewable energy technologies.

Mo Madani, provided members with a PowerPoint presentation comparing the International Energy Conservation Code (IECC) and the Florida Energy Efficiency Code for Building Construction (FEECBC). The presentation reviewed the history, provided key definitions, provide details on the codes, discussed the relevant statutes and Federal stimuli, and identified the challenges with the task. Following the presentation there was an opportunity for questions and answers and a discussion. The complete presentation may be viewed at the project webpage as follows: http://consensus.fsu.edu/FBC/2010-Florida-Energy-Code.html An overview of the presentation is available as "Attachment 5" of this Report.

Rick Dixon, provided members with an overview of a plan for developing a strategy for achieving the statutory requirements and the Workgroup reviewed and discussed the matrix of characteristics regarding the IECC and the FEECBC. The overview and strategy is available as "Attachment 6" of this Report. The results of the matrix discussion are available as "Attachment 7" of this Report.
(Attachment 5—IEEC and FEECBC Issues Overview)
(Attachment 6—IEEC FEECBC Comparison Overview)
(Attachment 7—Matrix of IECC and FEECBC Characteristics)

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 during FY 2008/2009:
February 3, 2009: Melbourne; March 5, 2009: Cape Canaveral; March 27, 2009: Tampa;
April 30, 2009: Tallahassee and May 28, 2009: Tallahassee.

Following Workgroup meetings will focus on identifying and evaluating options regarding the additional project subtasks as follows: humidity and moisture control problems, specific building options to achieve energy efficiency improvements, and strategy to achieve statutory requirements for energy efficiency increases. Subsequent meetings will continue to focus on the project subtasks.

The delivery schedule is as follows:

Schedule for Sub-Task 27—Cost Effectiveness Test

Appoint Workgroup	12/9/08
Work Group/TAC meetings to develop recommendation	2/09, 3/09
Rule Development Workshop	4/09
Rule Adoption Hearing	6/09
Rule Effective	7/09

Schedule for Other Sub-Tasks (26, 29, 39, 42, and 45)

Workgroup/TAC considers options and develops consensus plan	3/09, 4/09, 5/09, 6/09, 8/09
Recommendations to Commission	10/09
Proposals submitted for 2010 FBC Update	12/09

Adjournment

The Workgroup voted unanimously, 12 – 0 in favor, to adjourn at 3:30 PM.

ATTACHMENT 1

MEETING EVALUATION RESULTS

May 28, 2009—Tallahassee, 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.

9.5 The background information was very useful.
9.1 The agenda packet was very useful.
9.4 The objectives for the meeting were stated at the outset.
8.8 Overall, the objectives of the meeting were fully achieved.

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

8.8 Identification of Issues and Options Regarding Project Subtasks.
9.0 Evaluation of Options Regarding Project Tasks and Sub-Tasks.
8.8 Identification of Next Steps.

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

8.9 The members followed the direction of the Facilitator.
9.4 The Facilitator made sure the concerns of all members were heard.
9.3 The Facilitator helped us arrange our time well.
9.1 Participant input was documented accurately.

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

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

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

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

6. What did you like best about the meeting?

- Broad participation.
- Discussion.

7. How could the meeting have been improved?

No comments provided.

8. Member Evaluation Comments.

None were provided.

Public Written Comments

Jon Klongerbo
Florida SEIA

Cost effectiveness test
1. Request additional information on Appendix A, Table 2 of report titles "Energy Efficiency Cost – Effectiveness Tests for Residential Code Update Processes" (2009, Fairey Viera). There are no sources for the costs, no assumptions, and no costs for baseline measures nor when the data was collected. As such, the accuracy of the baseline and the incremental costs cannot be verified.

2. Costs for solar hot water system (open loop) is not included as a separate ECM measure. The open loop system is assumed in Central and South Florida as an ECM, however cost significantly less than closed-loop systems.

ATTACHMENT 2
MEETING ATTENDANCE

Public Meeting Attendance	
NAME	**REPRESENTATION**
David Cole	Lectrus Corp
Arlene Stuart	ALS Consulting
Jon Klongerbo	FLA SEIA
Larry Nelson	FPL
Kenneth Locke	City of Tallahassee/BOAF
Dan Haywood	FPL
Chris Keena	BOMA Florida
Jack Glenn	FHBA
Bill Simpson	Progress Energy
Dick Wilhelm	FMA/WDMA
Tom Gillman	BOMA FL

ATTACHMENT 3

OPTIONS EVALUATION EXERCISE RESULTS

ACCEPTABILITY RANKING EXERCISE

This list of options is a preliminary list and is not meant to be an exhaustive list. All of the options regarding cost effectiveness test were extracted the FSEC Report: "Energy Efficiency Cost-Effectiveness Tests for Residential Code Update Process", and the balance were proposed by members during meetings. During the meeting(s) members are asked to propose any additional option(s) they would like the Workgroup to evaluate, and to develop and rank options, and following discussions and refinements, may be asked to do additional rankings of the options if requested by a Workgroup member. Members should be prepared to offer specific refinements to address their reservations. The following scale will be utilized for the ranking exercises:

Acceptability Ranking Scale	***4 = acceptable,*** *I agree*	***3 = acceptable,*** *I agree with* ***minor reservations***	***2 = not acceptable, I*** *don't agree unless* ***major reservations*** *addressed*	***1 = not acceptable***

WORKGROUP'S OPTIONS EVALUATION PROCESS OVERVIEW

For each key topical issue area the following format will be used:

- Overview of the option will be provided by proponent,
- Questions and answers on the option,
- General discussion with Workgroup members on the topic/issue,
- Refinements proposed to existing options (to enhance option's acceptability),
- Public input on option or sweet of options,
- Acceptability ranking of options (new, or any a Workgroup member proposes to be re-evaluated),
- Information needs identified.

For each of the key topical issue areas, member's will be asked to identify a range of potential options for the Workgroup to consider. Issues and Options will be organized to address the tasks assigned by the Florida Building Commission and the Florida Legislature. A preliminary list of options will be drafted and the Workgroup may discuss and add any additional relevant options they deem appropriate. When available, staff will provide information from data collections, research studies, and other pertinent sources to the Workgroup. Members and staff should request any information they feel necessary for evaluating an issue, option or range of options. Once ranked by the Workgroup, options achieving a consensus level of support will be listed within relevant key topical issue areas. Options with 75% or greater number of 4's and 3's in proportion to 2's and 1's shall be considered consensus options/recommendations.

Key to Speakers in Report (those providing comments):

Workgroup Members:
Rusty Carroll: RC
Phillip Fairey: PF
Dale Greiner: DG
Jeff Gross: JG
Jeff Householder: JH
Tom Larson: TL
Bill Kent: BK
Larry Maxwell: LM
Donny Pittman: DP
Drew Smith: DS
Jeff Stone: JS
Rob Vickers: RV

Staff:
Rick Dixon: RD
Mo Madani: MM
Ann Stanton: AnSt

Public:
Arlene Stewart: AS
Ken Locke: KL
Jack Glenn: JG
Larry Nelson: LN
Dick Wilhelm: DW
Bill Simpson: BS
Tom Gillman: TG
Jon Klongerbo: JK
Dan Haywood: DH
Chris Kenna: CK

May 28, 2009

2. OPTIONS FOR ENERGY EFFICIENCY COST-EFFECTIVENESS TESTS FOR COMMERCIAL CODE CONSENSUS RECOMMENDATIONS

Commercial: 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%.

Commercial: Mortgage down payment: 20%.

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

	4=acceptable	*3= minor reservations*	*2=major reservations*	*1= not acceptable*
Initial Ranking 5/28/09	**11**	**1**	**0**	**0**

Member's Comments and Reservations (May 28, 2009):
Chris Keena, BOMA. Represent large portion of commercial real estate. The return on investment proposed at 8%, we looked at it, and members prefer 7%. Financing: can get 5 year terms, most short term. Can amortize over 20-30 year period, but notes are for short term. Haven't seen impact on commercial industry yet. Down payment of 20% is acceptable.

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

Sizing of 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. Commercial building where the aggregate building HVAC systems have a capacity is greater than 50 Tons.

	4=acceptable	*3= minor reservations*	*2=major reservations*	*1= not acceptable*
Initial Ranking 4/30/09	**8**	**3**	**0**	**1**
Revised (red) 5/28/09	**1**	**1**	**10**	**0**
Revised (blue) 5/28/09	**7**	**3**	**2**	**0**

Member's Comments and Reservations (May 28, 2009):
The Workgroup was asked whether they supported adding "or licensed Florida PE" to the option. Members voted by straw poll by a vote of 10 in favor.

CK, BOMA: Would prefer to exclude commercial buildings from this requirement. Building operators often renovate existing commercial buildings, including the HVAC system. Should be excluded.
PF: Commercial systems certified by a Florida-registered engineer, would override this. Don't see

necessity of explicitly exempting commercial system, most commercial systems exceed 65,000 Btu/h per system.
RD: Most commercial buildings have to have an architect/engineer involved. There are exceptions for HVAC contractors. There are many 5 ton and less systems put into commercial buildings. Perhaps give exception for engineer. Most mechanical contractors have an engineer on staff.
DG: Will see such systems in strip centers, often replaced. Size of 65,000 Btu/h keeps the impact to small systems.
JG: Commercial building's have to submit sizing calculations to Building Departments. Where do they go?
RD: Sizing calculations stays at building departments.
TL: Could we add "or engineer certify".
JS: Agree with JG about commercial systems.
LM: Don't trust contractors to size systems.

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

Member's Comments and Reservations (May 28, 2009):
JB: read the letter from Veterans Energy Solutions entered into the record (provided to members electronically in advance of the meeting).
PF: Report: System replacement: Duct leakage testing. 2 main methods of testing: 1) Duct Tester Method: both building & ducts pressurized with blower; amount of pressure needed re: leakage to the outdoors.
2) Delta Q Method. Blower door used to pressurize building enclosure, then ahu is turned on and off, repeated at different pressures, both positive & negative, in increments of 10 pascals. Leakage can be determined if on supply or return side. Has a quirk: if leakage is 0, leakage can be fairly large. Both require about 1 – 2 manhours for an experience technician to perform. Equipment to do the test initial cost $6-7K. No evidence that one test is better than the other except at 0 leakage. Another technique: pressure pan device. Pressurize bldg to 50 pascals, put on pole, cover the register with pressure pan and measure pressure difference between that one duct and the rest of the house. If there is a pressure difference, there is a leak to outdoors. If over 1 pascal, leak is close to supply register.
PF: Now in final draft form (expect completion in July), new standard for conducting home energy audits, RESNET (national home energy rating systems) and BPI (certifies home performance contractors) jointly. Standard looks at existing buildings, has specification that duct leakage testing shall be done. Exception: when duct system meets all conditions:
AHU & surface duct inside conditioned spaced
Blower door conducted, each register measured & recorded: largest is 3 pascal or less, smallest is 1 pascal or less.
JG: Is window and door leakage taken into effect during test. PF: Yes, kept constant.
MM: Can you address testing requirements in IECC? PF: Allows 12 cfm leakage, FL is 3 cfm
LM: If all ductwork is in conditioned envelope, is testing required?
PF: Nationally, only if all ducts are visible.
RC: Talked with 2 A/C guys, asked about 30" clearance issue, good gauge of getting up in an attic comfortably. Some type of FPL test for $25 to get test done, credit toward getting system fixed. Chinese drywall big issue right now, changing out units. What about units that have been tested within past 2-3 years. Not opposed to repair, but big cost needs to be offset.

DG: Seems we have to tie duct leakage to envelope leakage, if have bad envelope, tight ducts. If imposing duct testing, should also require house to be made tighter.
PF: Per RC comment on FPL: FPL used to offer programs, Gulf Power & Progress Energy also provide duct tests and incentives. Both testing & repair.
Re: DG: tie envelope to duct testing. In our climate, fairly low wind speeds, no real driving force to induce air infiltration. There is no shortage of driving force in a forced air duct system, significant leakage due to driving force from air handler unit (ahu).
RD: Order of magnitude is different. Other issues re: pressure differentials, return ducts closed, etc.
PF: When ahu is not on, air leakage doesn't matter. Problem worse at peak conditions when a/c run all time.
RC: PF: do the utilities do both methods.
PF: Can't do duct leakage test for $35. Expect they are doing a pressure pan test. Blower door is a calibrated test with blower installed in a door. Create pressure difference using 25 pascals. Then set up smaller fan on air distribution system inside house, pressurize duct system to 25 pascals (after taping off duct system openings). Put at same pressure, amount of air required to get there is leakage to outdoors.
LN, FPL: Did 28,000 duct test & repair in 2008, probably $1 mil so far; cost $30 to test, $154 to fix.
DH, FPL: Process is to identify leaks that can be cost-effectively repaired. Identify leaks, repair. Do 10,000/year/ 100K from start of program. As homeowner, need immediate replacement of A/C. Additional cost of duct testing creates issues. Utility may have already done the ductwork recently.
BS: Progress Energy: $60 contractor, pay half, repairs $130. Do 8,000 tests/year. Avg. 98% need repair. Use blower door & smoke pencil to identify leaks. Bad on cold mornings, hot afternoons.
DG: What kind of repairs are you seeing?
BS: Those that save 15-20% of cost, typically in joints, connection box.
DG: Most of turndowns are for connections.
RD: If local utility doesn't have program or incentives, what is cost? Is diagnostic test required?
PF: Purely from cost effectiveness, smoke pencil also identifies which register is closest to leak or largest leak, similar technique. If goal is to get leaks fixed & can do pressure pan test for $60 & can identify leaks, most cost effective because need to identify leaks to repair all. If have incentive structure, e.g., for leaky ducts, need number of leakage before & after to get money.
RC: What test is conducted, do you give the homeowner a paper, certification?
DH: FPL does give written notice. Actually crawl in attic, spray paint leakage points.
BS: Contractors have to agree to crawl in attics all year long.
RC: How often is incentive provided? About every 5 years.
LN: Can go to web site & view test criteria.
RC: Some areas can't get to. Any written standard of what is looked at?
DH: Program has training for how to now get in unsafe conditions.
JH: List of measures at PSC, recall duct tests proposed to continue in future.
DH: Not familiar with plan. Are looking at impacts to determine what is included in plan.
There is an economic component for considering criteria used in plan.
JG: Is retesting done after repair? DH: Yes, look at performance of contractors.
JG: Have you looked at why ducts leak. Ask PF. Can be conditions in the attic.
PF: Ducts leak immediately.
JG: Do you do commercial? Small commercial, doctor's offices, etc.
MM: After do testing, old homes, old systems, are they worth repairing? Any given age?
Do you hire qualified contractors? Have you measured savings?
DH: No given age. Contractor qualifications & training part of program. Required to get permit?
Required to do measurement & evaluation to justify demand side management efforts.

BS: For new filing, numbers more precisely defined.
PF: If there is a program within the code system to require that ducts be tested in some way, how will that impact your programs? If code requires testing, utility may be prohibited from providing testing.
DH: Will have to be analyzed, programs created around statutory guidelines that say what utilities can & cannot do.
BS: Huge # of a/c contractors, small number in utility program. Can't really answer question without legal counsel. Has to be within rules.
PF: Would it impact the repair? DH: If have no program, can't do it.
LN: Example, don't pay on SEER 13 because it's code minimum.
DS: What is the average age of homes that have been tested? What is the most common leak? Is it material failure?
DH: All over the place, don't know.
BS: Average home, 5-8 years old regardless. Criteria has to be at least 2 years.
DH: Can be disconnection.
BS: Tape breaks down in hot attics.
PF: Tape breakdown is most common problem.
TL: Should be data within few weeks. Duct repair is one of 250 measures being evaluated. Avg. savings potential is about 5%.
BK: Next month meeting on swimming pools. Any data available on pools? (Don't know)
Where are the utilities on pump use?
DH: Pool pumps are included in program. Heat pumps not in program.
JH: You mentioned that 90% of ducts had leakage significant enough to repair. Have you tracked what the problems are? Can you predict where the leaks will be and just repair them without the test?
DH: Need the test to verify leaks, test points out where leaks are, holds contractors responsible.
KL: Based on current testimony, looks like test is a waste of time. If issue is where are leaks, ok. Seems that a prescriptive system may be better. Can still offer incentives. Ridiculous that old ducts need to be tested & not new ducts. Roofs & mitigation similar story. What do you do on ducts between floors, "When existing system is replaced, repair all ducts that are accessible."
Caution not to make a determination based on incentives from utility providers. No guarantee that program will remain. May change. Once in code homeowner required to do it. Who is certified to perform test? Only 3 in Leon County, only 1 has equipment to do the test. Utility company in Arizona, pulled out ducts, repaired them, saw major reduction in energy use.
JG: Disagree with concept that when numbers go up, cost would go down. Cost of testing is still important. Cost of repair when coupled with testing may be too high. See as code plus. Over a million units replaced every year in Florida. What are the costs associated with testing, may go up.
AS: Support PS assumption that costs go down, because it justifies purchase of equipment.
CK, BOMA: request commercial buildings not be required to do testing. Owners responsibly repair equipment when new tenant moves in. BOMA has 7 point challenge on USGBC on operating costs to save energy, 95% …

Workgroup Discussion:
DP: Have concerns about testing. Part of problem is enforcement across FL. Most ducts in existing homes not accessible. Not practical. Testing should be allowed by a/c contractors with 2 hr class. Will run into work with no permit pulled. If a unit goes out, get permit. No-one calls for inspection. Don't think duct testing will solve problem.

PF: Proposal. Add to code:

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.

	4=acceptable	*3= minor reservations*	*2=major reservations*	*1= not acceptable*
Initial Ranking 5/28/09	**5**	**5**	**2**	**0**
Revised (red)	**6**	**6**	**0**	**0**
Revised (blue)	**12**	**0**	**0**	**0**
Revised (brown)	**12**	**0**	**0**	**0**

Member's Comments and Reservations (May 28, 2009):

RC: Totally support proposal. Better off doing it all. Only reservation, why not exception if have had utility test/repair in last 5 years.

DS: Does this mean you have to replace both units? Why not just one or the other.

PF: That's how is was previously considered. If only one unit replaced, would not have to do this.

RD: Need to consider mismatched equipment criteria, practically speaking replace both.

DP: Could use HVAC sticker as criteria.

JG: Speak against motion. Unintended consequences enormous. Commercial building systems more complicated. Shouldn't we be looking at new construction, rather than looking at old systems.

MM: Doesn't differentiate as to whether the system needs it or not? Need an evaluation to define the problem. Just adding cost. Replacement of equipment, many bldg depts. Are not enforcing the mismatched criteria because it is hard to enforce.

LM: Should require at least a visual inspection, not necessarily a certified tester. There is no longer room in the attic to get to the duct work. All duct work in house is within the conditioned envelope. No need to have someone test my ducts. Visual inspection is reasonable. Problems often visually obvious. Any a/c guy can do visual inspection and repair. Should prohibit ducts in attics.

DG: Proposal does not require testing. Should put exception for exposed ducts in conditioned space.

Major Reservations:

JS: More stringent that code for new buildings. Think that tape people would argue. No idea of costs of this proposal, or savings.

LM: 2 issues: Requires replacement of both condenser and evaporator, should do on "either or" replacement. Would require a visual inspection and repair of problems found.

RC: Why not exception if test and repair as needed.

JS: Enforcement. How are they going to validate? Notice from utility? Inspector has been in attic. Will ask for an affidavit that job was done.

DG: Jurisdictions do different things.

DP: Maybe allow a sticker to determine if

PF: Inspections. Most common duct system is a flexible duct attached to junction boxes and supply grille boots. Put mastic on inner liner, fab/glass inner liner to metal boot or junction box connection, not on outer jacket. Serious problems if inner liner is not sealed.
BK: Add on should be a separate sentence.
DH: May be safety issue of sealing combustion equipment.
JS: Allow alternate methods approved by the code.
TL: These requirements should also be in the code for new buildings.

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

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.

2. OPTIONS FOR 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.

3. 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.

4. OVERVIEW OF REVISED RECOMMENDATIONS

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

Mortgage interest rate (Commercial): 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 (Commercial): 20%.

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

ATTACHMENT 4

DUCT LEAKAGE TESTING

There are two generally accepted methods of testing residential forced-air distribution systems to determine the amount of air leakage to outdoors that is associated with the operation of the air distribution system:

- The duct tester method where the air distribution system is pressurization (or depressurization) using a calibrated blower (the duct tester) combined with building enclosure pressurization (or depressurization) to the same level using a separate calibrated blower device (a blower door) such that the results from the duct tester apparatus represent air distribution system leakage to the outdoors.

- The delta Q method where a the building enclosure is pressurized (or depressurized) using a calibrated blower and the air handler unit is alternatively turned on and off and the calibrated blower air flows resulting from the tests are subjected to a computer analysis designed to determine the air distribution system leakage based on paired results (AHU on/off pairs) collected at a series of house pressurization and depressurization levels.

Both of these methods are reasonably effort consuming, taking approximately 1-2 man hours for an experienced technician to complete. Additionally, the equipment necessary to conduct these tests costs about $6,000 - $7,500. There remains contention within the scientific community as to whether one or the other of these test methods is better than the other.

Additionally, there is a commonly used diagnostic technique for determining the location of severe air distribution system leaks. This technique is called pressure pan diagnosis. This diagnostic technique is accomplished by pressurizing (or depressurizing) the entire building enclosure using a blower door devise and then alternatively covering each supply and return register with the pressure pan devise (with the air handler unit not operating). The pressure pan device then measures the pressure difference between the main body of the house and the portion of the duct immediately behind the supply register or return grill that has been covered by the pressure pan. If the pressure difference reading is very small, it means that there is not likely to be a significant leak to outdoors near that register or grill. On the other hand, if the pressure difference is large, then there is likely a significant leak to outdoors fairly near that register or grill. The pressure pan diagnostic technique can not measure the amount of duct leakage in a home – it can only tell you if there is a leak near to the register or grill that is covered by the pressure pan device.

However, the pressure pan technique has been employed by some as a means of determining the need to perform a duct leakage test that will determine the amount of duct leakage using the duct tester method or the delta Q method. For example, the final draft RESNET/BPI *Standard for Conducting a Comprehensive Home Energy Audit* stipulates as follows:

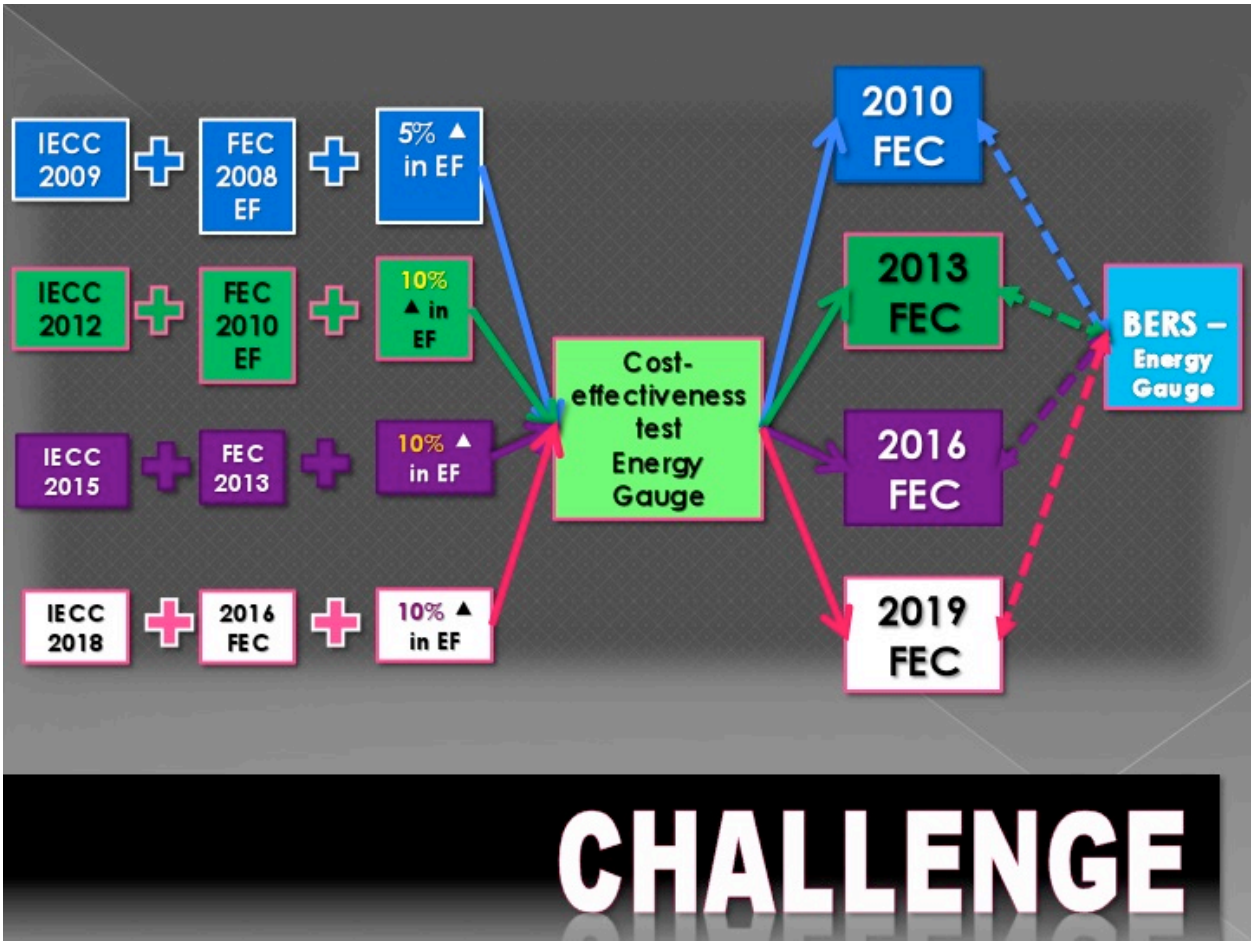
"5.4.3.1 Duct leakage test. Conduct a duct leakage test. Duct system leakage shall be measured in accordance with the RESNET Residential Mortgage Industry National Home Energy Rating System Standards.

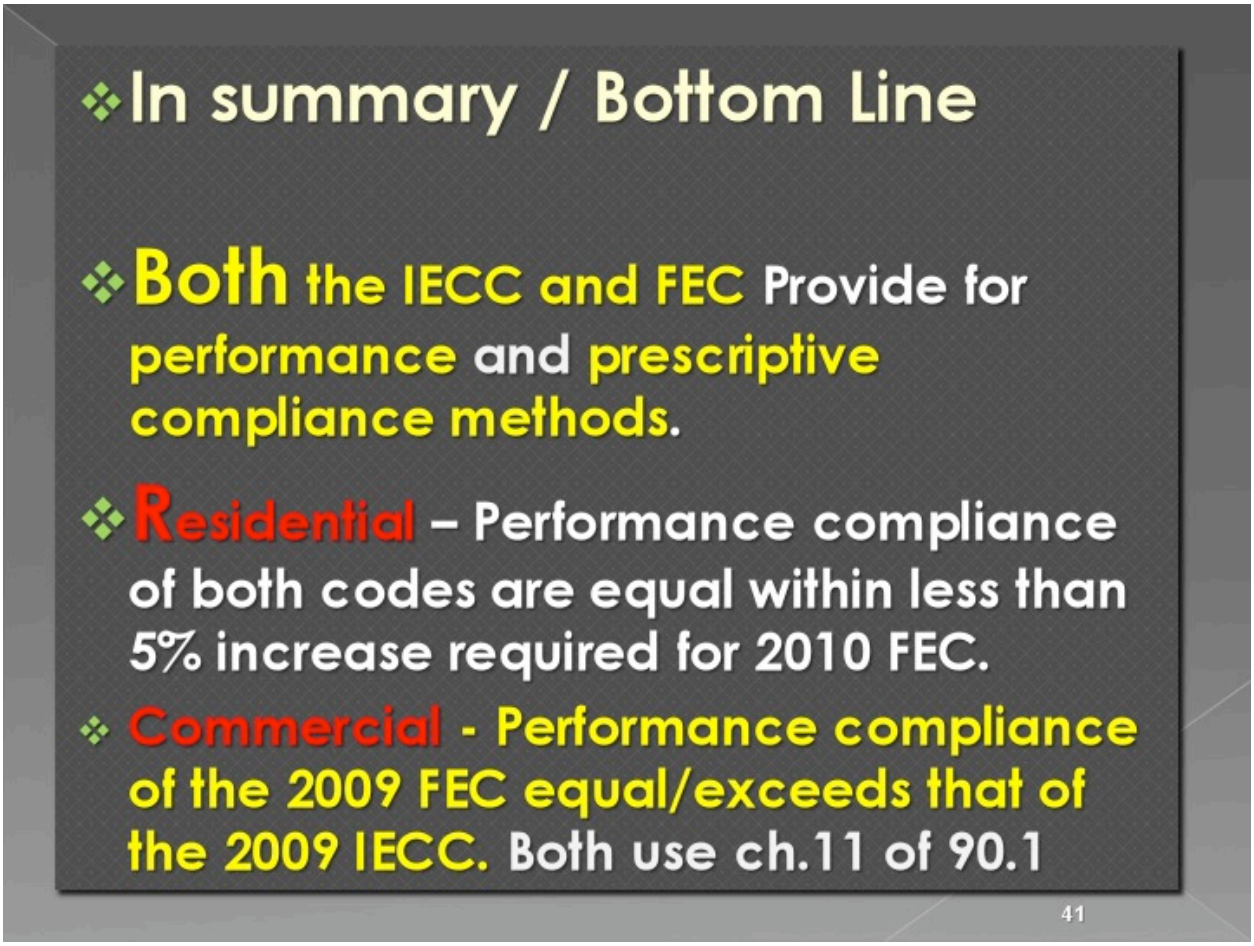
Exception 1: in an existing home, a duct test need not be conducted when a duct system meets all of the following conditions:

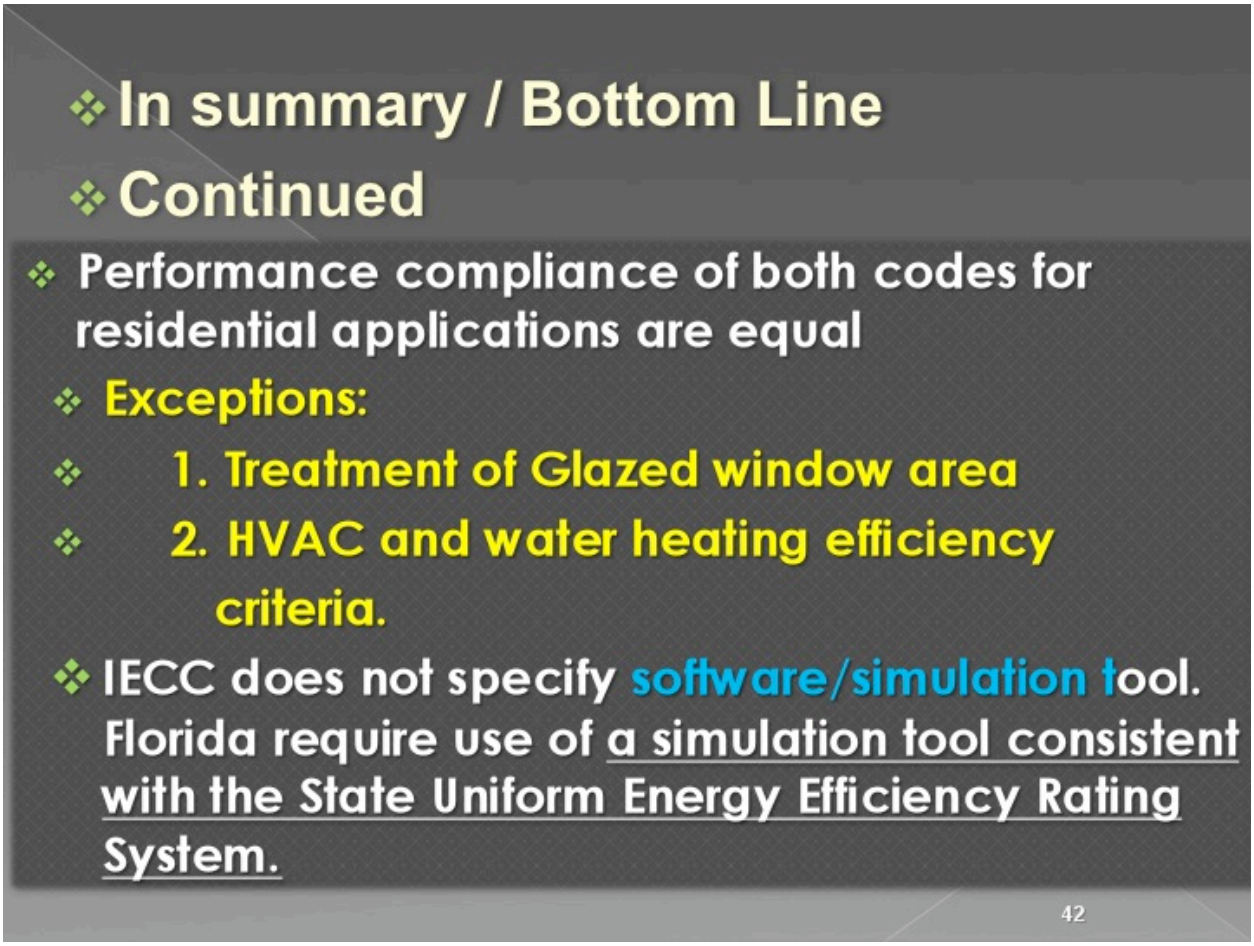
i. The system air handler and a minimum of 75% of the surface area of connecting ductwork are located inside conditioned space.
ii. A "pressure pan" test is conducted as follows: During a blower door pressurization or depressurization test, the blower door is set to maintain a pressure difference of 50 Pa between inside and outside. One at a time, each supply or return register in the system is covered with a "pressure pan" device or airtight membrane, that is sealed or gasketed to the surrounding surface. For each register, the pressure difference between the inside of the building and the space containing the register is measured and recorded.
iii. When measured in this manner, the largest recorded pressure difference at any one register is 3 Pa or less, and the average of the recorded pressure differences at all supply and return registers in the system is 1 Pa or less."

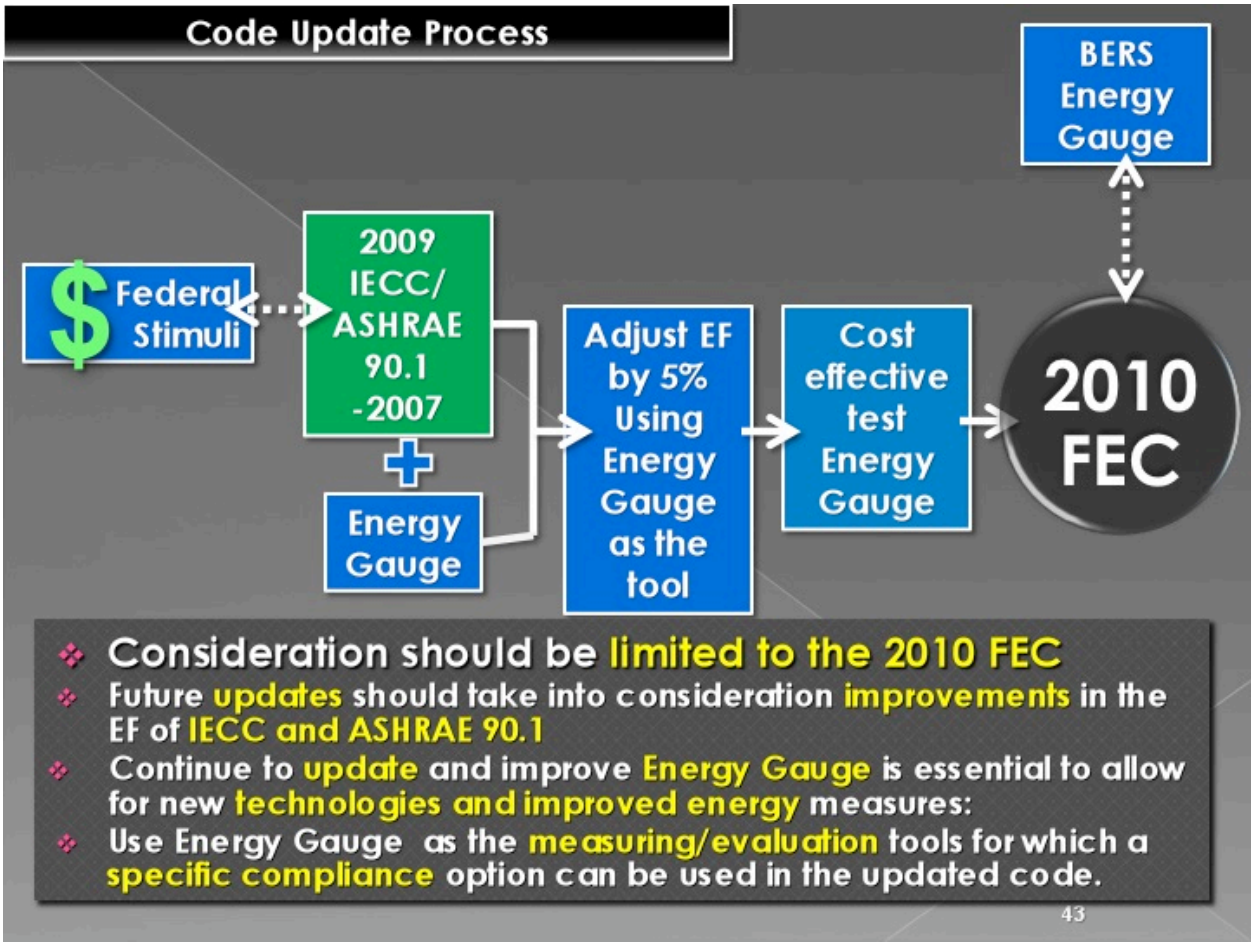
ATTACHMENT 5

OVERVIEW OF IECC AND FEECBC ISSUES




In summary / Bottom Line
Both the IECC and FEC Provide for performance and prescriptive compliance methods.
Residential – Performance compliance of both codes are equal within less than 5% increase required for 2010 FEC.
Commercial - Performance compliance of the 2009 FEC equal/exceeds that of the 2009 IECC. Both use ch.11 of 90.1
41


In summary / Bottom Line
Continued
Performance compliance of both codes for residential applications are equal
Exceptions:
1. Treatment of Glazed window area
2. HVAC and water heating efficiency criteria.
IECC does not specify software/simulation tool. Florida require use of a simulation tool consistent with the State Uniform Energy Efficiency Rating System.
42


Code Update Process
BERS Energy Gauge
Federal Stimuli
2009 IECC/ ASHRAE 90.1 -2007
Energy Gauge
Adjust EF by 5% Using Energy Gauge as the tool
Cost effective test Energy Gauge
2010 FEC
Consideration should be limited to the 2010 FEC
Future updates should take into consideration improvements in the EF of IECC and ASHRAE 90.1
Continue to update and improve Energy Gauge is essential to allow for new technologies and improved energy measures:
Use Energy Gauge as the measuring/evaluation tools for which a specific compliance option can be used in the updated code.
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ATTACHMENT 6

IECC TO FEECBC COMPARISON OVERVIEW

GOAL

Implement the energy efficiency standards increases established by s. 553.9061, F.S. 20% 2010; 30% 2013; 40% 2016; 50% 2019.

OBJECTIVE

Develop long range strategic plan for how to comply with statutory schedule of efficiency increases

TASKS

1. Evaluate how to provide for future flexibility to implement efficiency increases for the broadest range of housing prices
2. Compare characteristics of FEECBC to IECC for flexibility to achieve higher efficiency standards
3. Develop strategic plan for FBC energy standards compliance methods
4. Integrate FEECBC and IECC to implement the strategic plan for the 2010 FBC

Task/Analysis:

Task 1:

- Identify compliance methods used in current national model and Florida energy code
- Describe how the compliance methods work

Task 2:

- Create a matrix of IECC and FEECBC characteristics for each method
- Evaluate for flexibility to implement future efficiency increases

Task 3:

- Select compliance method characteristics that provide the maximum potential to implement the 553.9061 mandated efficiency increases to form the strategic plan

Task 4:

- Develop a draft of the energy standards chapters for the 2010 FBC

Task Schedule:

Step 1:	April 30 and May 29, 2009
Step 2:	April 30 – May 29, 2009
Step 3:	May - August, 2009
Step 4:	August - October (proposals for 2010 FBC mods)

Task 1:

(a) Compliance Method Types –

IECC	ASHRAE 90.1	FEECBC
Prescriptive	**Prescriptive**	**Prescriptive**
Component Performance	**Component Performance**	
Performance	**Performance**	**Performance**

Major Compliance Method Types from All Codes

Prescriptive
Component Performance
Performance

(b) How the Compliance Methods Work –

Note: Each Code/Standard has a little different way of implementing the major compliance methods, which will be identified in the matrices.

Prescriptive:

- Provides minimum efficiency criteria for building components that contribute to energy use
- Does not allow trade off of increased efficiency of one component for lower efficiency of another
- Simple with uniform requirements for efficiency of components for all similar buildings
- May or may not require equal overall efficiency for buildings of different construction types
- May or may not provide the most cost-effective energy reductions
- May or may not address Florida-specific climate problems such as moisture control and building durability
- May not control for Florida-specific needs for minimum/maximum component areas such as window area
- May or may not account for dynamic building performance and advanced design techniques involving building orientation and thermal mass

Performance:

- Establishes overall energy efficiency target (budget) for the building instead of for each component
- Allows trade off of efficiencies between components to achieve the overall efficiency target
- Requires calculation for appropriate trade off between component efficiencies
- May or may not require equal overall efficiency for buildings with different building features and construction types (not clear?)
- Allows market place to determine most cost-effective alternatives on a building-by-building, contractor-by-contractor, client-by-client, and supply chain-by-supply chain basis
- May or may not control for all, or even the majority, of building energy uses
- Can account for most, if not all, dynamic building performance characteristics like orientation and thermal mass impacts

Component Performance:

- Provides minimum efficiency criteria for HVAC equipment, water heating equipment and lighting components (commercial)
- Allows trade off of efficiencies between building envelope components based on R/U values
- Does not allow trade off for window solar control properties
- Hybrid prescriptive/performance method traditionally appropriate to heating dominated climates
- Does not account for dynamic building performance and advanced design techniques involving building orientation and thermal mass
- Allows ill-advised trade-off of non-opaque, window U-factor properties against opaque envelope component properties
- Allows trade-offs of component thermal properties of that have significantly different impacts on building energy use (i.e. U-factor change of walls considered equivalent to U-factor change of roof/ceilings)

Task 2:

(a) IECC and FEECBC Characteristics Matrix
(b) Evaluate for flexibility to implement future efficiency increases

ATTACHMENT 7

MATRIX OF CHARACTERISTICS—IECC/FEECBC

(a) MATRIX OF CONCEPTUAL CHARACTERISTICS OF THE IECC AND THE FLORIDA ENERGY CODE

RESIDENTIAL ≤ 3 STORIES

	IECC 09				FEECBC '09 Supplement		
Characteristic	Prescriptive	Component Performance	Performance	'09	Prescriptive	'09*	Performance
Building Envelope							
Credit for reduced glass area?	**no**	**no**		**no**		**no**	**yes**
Penalty for increasing glass area?	**no**	**partial**		**yes**		**yes**	**yes**
Restricts glass area?	**no**	**partial**		**no**		**yes**	**no**
Credit for potential wall insulation levels?	**no**	**partial**		**yes**		**no**	**yes**
Credit for potential ceiling insulation levels?	**no**	**partial**		**yes**		**no**	**yes**
Credit for potential floor insulation level?	**no**	**partial**		**yes**		**no**	**yes**
Credit for air infiltration testing	**'06 = no '09 = yes**	**partial**		**yes**		**no**	**yes**
Mechanical Systems							
Credit for air conditioner efficiency?	**no**	**no**		**no**		**no**	**yes**
Credit for heating system efficiency?	**no**	**no**		**no**		**no**	**yes**
Credit for alternative water heating?	**no**	**no**		**no**		**no**	**yes**
Credit for tested ducts?	**'06 = no**	**no**		**yes**		**yes**	**yes**

	IECC 09				FEECBC '09 Supplement		
Characteristic	Prescriptive	Component Performance	Performance		Prescriptive		Performance
				'09		'09*	
	'09 = yes						
Penalty for untested ducts?	**yes**	**yes**		**yes**		**no**	**possible**
Lighting Systems							
Considers alternative lighting?	**'06 = no '09 = yes**	**yes**		**no**		**no**	**no**
General							
Credit for solar, passive systems?	**no**	**no**		**yes**		**no**	**yes**
Equivalent stringency prescriptive vs. performance?	**no**	**no**		**no**		**yes**	**yes**
Equivalent stringency for different fuel types?	**yes**	**yes**		**no**		**yes**	**yes**

***Criteria are somewhat different for renovations, equipment changeouts and small additions.**

COMMERCIAL and RESIDENTIAL > 3 STORIES

	IECC '09			FEECBC '09 Supplement	
CHARACTERISTIC	Prescriptive IECC 502, 503, 504, 505/ ASHRAE 90.1 5.5	Bldg Envelope Tradeoff ASHRAE 90.1 5.6	Performance IECC 506 / ASHRAE 90.1 Chapter 11	Prescriptive**	Performance ASHRAE 90.1 Chapter 11
Building Envelope					
Credit for reduced glass area?	**No**	**No**	**No**	---	**No**
Penalty for increase glass area?	**No**	**Yes**	**Yes**	---	**Yes**
Restricts glass area?	**Yes**	**No**	**No**	---	**No**
Credit for potential wall insulation levels?	**No**	**Yes**	**Yes**	---	**Yes**
Credit for potential ceiling insulation levels?	**No**	**Yes**	**Yes**	---	**Yes**
Credit for potential floor insulation level?	**No**	**Yes**	**Yes**	---	**Yes**
Credit for air infiltration testing?	**No**	**No**	**No**		**No**
Mechanical Systems					
Credit for air conditioner efficiency?	**No**	**No**	**Yes**	---	**Yes**
Credit for heating system efficiency?	**No**	**No**	**Yes**	---	**Yes**
Credit for alternative water heating?	**No**	**No**	**No**	---	**No**
Credit for tested ducts?	**No**	**No**	**No**	---	**No**
Penalty for untested ducts?	**No**	**No**	**No**	---	**No**

Lighting Systems					
Credit for alternative lighting?	**No**	**No**	**Yes**	**---**	**Yes**
General					
Credit for solar, passive systems?	**No**	**No**	**No**	**---**	**No**
Equivalent stringency prescriptive vs. performance?	**No**	**Yes**	**No**	**---**	**No**
Equivalent stringency for different fuel types?	**Yes**	**No**	**Yes**	**---**	**Yes**

****There are prescriptive criteria for shell buildings at first permit, renovations, equipment and lighting change-outs, and changes of occupancy type**