

**GREEN AND ENERGY EFFICIENT ROOFS  
SUBCOMMITTEE TO THE FLORIDA ENERGY  
CODE WORKGROUP  
REPORT TO THE FLORIDA BUILDING COMMISSION**

**FEBRUARY 2, 2010—MEETING I**

**TAMPA, FLORIDA**

**FACILITATION, MEETING AND PROCESS DESIGN BY**



**CONSENSUS CENTER**

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**FLORIDA BUILDING COMMISSION**  
**GREEN AND ENERGY EFFICIENT ROOFS SUBCOMMITTEE TO THE**  
**FLORIDA ENERGY CODE WORKGROUP REPORT**

**Evaluate Requirements For Green Roofs Recognition In the Florida Building Code**

The 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. Energy efficient roofs are one category. The Building Code act of 2008 (HB 697) directs the Commission to facilitate and promote the use of certain renewable energy technologies. This task will be evaluated by the Commission’s Green and Energy Efficient Roofs Subcommittee to the Florida Energy Code Workgroup.

**Green and Energy Efficient Roofs Subcommittee Members**

Ralph Davis, C.W. Macomber, Larry Maxwell, Craig Parrino, Lorraine Aulisio-Ross, Chris Schulte, Drew Smith, Jeff Sonne, Bob Volin, and Marty Wanielista.

**Florida Energy Code Workgroup Subtask Regarding Green and Energy Efficient Roofs**

*Issues:*

- 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).

**7h. Evaluate Requirements for Green Roofs Recognition in Florida Building Code**

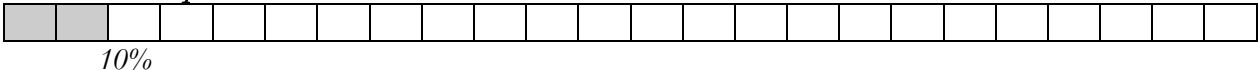
**Subtask 45**

*Schedule:*

Cool Roofs Workgroup appointed	4/8/09
Workgroup meeting	2/2/10
Proposals for 2010 FBC submitted for adoption (See 2010 FBC development schedule)	3/10

*Status:* Pending

*% Complete*



## REPORT OF THE FEBRUARY 2, 2010 MEETING

### Opening and Meeting Attendance

The meeting started at 1:00 PM, and the following Subcommittee members were present: Ralph Davis, C.W. Macomber (Bill Lippy alternate), Larry Maxwell, Craig Parrino, Lorraine Aulisio Ross, Chris Schulte, Drew Smith, and Jeff Sonne.

### Members Absent

Bob Volin, and Marty Wanielista.

### DCA Staff Present

Rick Dixon, Mo Madani, and Ann Stanton.

### 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/Green-Roofs-Subcommittee.html>

### Agenda Review and Approval

The Subcommittee voted unanimously, 8 - 0 in favor, to approve the agenda as presented including the following objectives:

- ✓ To Approve Regular Procedural Topics (Agenda)
- ✓ To Review Subcommittee Procedures, Guidelines, and Decision-Making Requirements
- ✓ To Hear an Overview of the Subcommittee's Scope, Charge, and Task Development Strategy
- ✓ To Discuss Subtasks and Identify Information Development Needs
- ✓ To Hear/Discuss Presentation Regarding Roof/Attic/Ceiling Systems and Standards Currently Recognized in the Code and Additional Technologies
- ✓ To Evaluate Options and Strategies for Including Additional Technologies in the Code
- ✓ To Consider Public Comment
- ✓ To Adopt Consensus Recommendations for Submittal to Energy Code Workgroup and FBC
- ✓ To Identify Needed Next Steps and Agenda Items for Next Meeting

### **Review of Commission’s Subcommittee Meeting Guidelines, Consensus-Building and Decision-Making Process, and Sunshine Requirements**

Jeff Blair, Commission Facilitator, reviewed the Workgroup’s process, decision-making procedures, and applicability of the Sunshine Law and answered member’s questions. The relevant documents were provided on pages 4 – 7 of the meeting agenda packet.

### **Review of Commission’s Energy Related Workplan Tasks and Subcommittee Scope and Task Development Strategy**

The 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. Energy efficient roofs are one category. The Building Code act of 2008 (HB 697) directs the Commission to facilitate and promote the use of certain renewable energy technologies. This task will be evaluated by the Commission’s Green and Energy Efficient Roofs Subcommittee to the Florida Energy Code Workgroup. The Subcommittee is charged with evaluating the inclusion of energy efficient roofs in the Code, by evaluating what is currently in the Code, and other technologies that are developed and code ready but not yet in the Florida Building Code, Energy Conservation.

### **Review of Energy Efficient Roof/Attic/Ceiling Systems Currently Recognized in the Code**

Jeff Sonne, FSEC, provided the Subcommittee with a PowerPoint presentation o energy efficient roof/attic/ceiling systems currently recognized in the Code and answered member’s questions. FSEC’s PowerPoint presentation is available at the project webpage.

### **Identification of Additional Energy Efficient Roof/Attic/Ceiling Systems and Strategies (Including Relevant Standards/Guidelines and Initiatives)**

*{Green roof and Cool roof options and energy performance for FL; Alternative roof systems and components effect on roof/ceiling heating cooling loads for FL (solar pool heater and DHW thermal arrays, pv arrays, pv roof tiles, mass and metal roof covering, evaporatively cooled, radiant barrier systems)}*

The Subcommittee was asked to review technologies currently in the Code in order to determine any additional technologies/systems that should be added to the Florida Building Code, Energy Conservation.

### **Review of Current Capabilities to Recognize Technologies in the Code and Identification and Evaluation of Strategies and Options for Including Additional Technologies in the Code**

The Subcommittee was asked to review technologies currently in the Code in order to determine any additional technologies/systems that should be added to the Florida Building Code, Energy Conservation. Following presentations, questions and answers, public comments and discussion the Subcommittee voted to add vegetative roofs to the Code.

*Following discussion and public comment the Subcommittee took the following actions:*

#### ***Subcommittee Actions:***

**Motion**—The Green and Energy Efficient Roofs Subcommittee to the Energy Code Workgroup voted unanimously, 8 – 0 in favor, to recommend to the Florida Energy Code Workgroup and the Florida Building Commission that the Florida Building Code, Energy Conservation, shall be amended to provide

minimum energy code credits (points) for the use of vegetated roofs. Additional energy credits may be achieved if documentation is provided to support the additional energy efficiency credits.  
*(Attachment 3—Summary of Comments and Discussion)*

### **General Public Comment**

Members of the public were invited to provide the Subcommittee with general comments. In addition, members of the public spoke on each of the substantive discussion issues before the Subcommittee throughout the meeting.

#### *Public Comment:*

None was provided.

### **Adoption of Workgroup’s Consensus Recommendations for Submittal to the Energy Code Workgroup and Florida Building Commission**

After discussion and public comment the Subcommittee considered actions for submittal to the Energy Code Workgroup and Florida Building Commission.

*Following discussion and public comment the Subcommittee took the following actions:*

#### ***Subcommittee Actions:***

**Motion**—The Green and Energy Efficient Roofs Subcommittee to the Energy Code Workgroup voted unanimously, 8 – 0 in favor, to submit their consensus recommendations to the Florida Energy Code Workgroup and the Florida Building Commission.

*The Subcommittee recommends that the Florida Building Code, Energy, be amended to provide minimum energy code credits (points) for the use of vegetated roofs. Additional energy credits may be achieved if documentation is provided to support the additional energy efficiency credits.*

### **Review of Subcommittee Delivery and Meeting Schedule**

The Subcommittee's delivery and meeting schedule is as follows:

Cool Roofs Workgroup appointed	4/8/09
Workgroup meeting	2/2/10
Workgroup meeting	4/5/10
Proposals for 2010 FBC submitted for adoption (See 2010 FBC development schedule)	3/10

### **Next Steps**

Adding energy code credits for vegetative roofs will be proposed as draft code language for the Florida Building Code, Energy Conservation. FSEC will provide research and recommendations as needed to implement this recommendation.

### **Adjourn**

The Subcommittee voted unanimously, 8 - 0 in favor, to adjourn at 3:10 PM.

# ATTACHMENT 1

## MEETING EVALUATION RESULTS

**February 1, 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.**

- 7.8 The background information was very useful.
- 8.8 The agenda packet was very useful.
- 9.2 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?**

- 9.5 Review of Subcommittee Procedures, Guidelines, and Decision-Making Requirements.
- 9.2 Overview of the Subcommittee's Scope, Charge, and Task Development Strategy.
- 9.7 Discussion Regarding Roof/Attic/Ceiling Systems and Standards Currently Recognized in the Code and Additional Technologies.
- 8.7 Evaluation of Options and Strategies for Including Additional Technologies in the Code.
- 8.8 Adoption of Recommendations for Submittal to Energy Code Workgroup and Commission.
- 9.2 Identification of Next Steps.

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

- 10.0 The members followed the direction of the Facilitator.
- 10.0 The Facilitator made sure the concerns of all members were heard.
- 9.8 The Facilitator helped us arrange our time well.
- 9.8 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.
- 9.7 I was very satisfied with the services provided by the Facilitator.
- 9.3 I am satisfied with the outcome of the meeting.

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

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

**6. What did you like best about the meeting?**

- Input was allowed.
- Discussion re: vegetative/cool/PV roofing technologies.

**7. How could the meeting have been improved?**

- The subject is too important for only 1 meeting.

**8. Do you have any other comments?**

*None were offered.*

**ATTACHMENT 2**  
**MEETING ATTENDANCE—PUBLIC**

Public Meeting Attendance	
Name	
Bob McCormick	FRSA
Joe Hetzel	DASMA/MCA/MBMA/NSA
Donna Dore	Hanson Roof
Connie Scott	Latite Roofing
Mike Reed	FRSA
Jim Engskow	Latite Roofing
Jack Glenn	FHRA
David Lewis	Norbord
Doug Harvey	BOAF
Bill Lippy	Fifoil Co/RIMA
Jon Hamrick	DOE



## ATTACHMENT 3

### SUMMARY OF COMMENTS AND DISCUSSION

#### Identification and Evaluation of Strategies and Options for Including Additional Technologies in the Code

The Subcommittee was asked to review technologies currently in the Code in order to determine any additional technologies/systems that should be added to the Florida Building Code, Energy Conservation. Following presentations, questions and answers, public comments and discussion the Subcommittee voted to add vegetative roofs to the Code.

#### *Overview of Comments and Discussion:*

- Dixon: Commission Task is to look at green roofs and cool roofs and determine the code covers now, and what other energy efficient roof systems/technologies should be included in the Code.
- Maxwell: Savings of control (conventional) vs. dark. Night time radiation. Comparison of different technologies & how modeled/tested.
- Sonne: Need to further explore how much energy savings are possible.
- Lippy: Modeling of reflectives. Sealed attics, claims made of air infiltration, advanced techniques. Have you looked at these issues. Sonne: Have looked at air tightness, guidance in software.
- Schulte: Air tightness products, are you talking about the Icynene type of Product? Yes.
- Madani: Did you consider maintenance costs? Were there problems in applying such surfaces to existing roofs.
- Sonne: Dr. Wan, has looked at minimal maintenance. Water runoff. ASTM standards, structural issues, important details.
- Stanton: What kind of membrane.
- Sonne: Metal corrugated roof, membrane.
- Maxwell: Generally a metal deck, insulation, GTO membrane. There are corporations that have products hitting the market. Products that prevent root penetration.
- Lippy: Research over the years should be evaluated. Is there an FSEC document that ranks these technologies & cost effectiveness.
- Sonne: No. Some guidance is the extent of it. Information on how each perform. Fairey has done some analysis of cost/kWh savings for residential.
- Smith: When do you expect the software to be up to date regarding green roofs
- Sonne: May wait for EnergyPlus.
- Dixon: Don't expect to make EnergyPlus by 2010 code. Code has assigned credits that approximate potential savings for new & emerging technologies until they be modeled.
- Davis: There are studies going on nationally.
- Dixon: Studies on water management and pollution control.
- Schulte: Commission has been charged with facilitating and encouraging new technologies. I am concerned with green roofs, especially regarding uplift. How do you design for wind loading? Is product approval needed? Cool roofs can be controlled. Not sure about green roofs.
- Ross: What are the wind & fire implications of green roofs? This is addressed by the ICC code development process. Doing wind uplift calculations. ANSI documents (consensus standards RP 14...SPRI) and the membrane folks. Standards and technologies of the correct & safe installation

of vegetative roofs is available and additional research is being conducted on these as well as maintenance issues.

- Dixon: ASTM has 4 different standards. Lots of standards are under development. New standard E 60. Have capability to include in performance methodology ways to calculate reflectives. Judgment is required for whether/when we go for green roofs. Will need guidance.
- Ross: Standards don't give metric for energy savings for green roofs.
- Stanton: Have you looked at energy savings & water intrusion on underground houses?
- Sonne: Not really. Have modeled mass in tile energy storage.
- Maxwell: Have seen green materials placed in trays on the roof. Isolation of the trays, and this allows you to remove the green roof. Wondering how to compare systems. How to demonstrate meets wind rating? How get building departments to approve green roof systems. They are considered a ballasted roof. Membrane protected by insulation. How to keep trays from becoming projectiles in a wind storm? Chicken wire? Structure below is the same design for dead/live load in saturated state. Fully coupled vs. systems taken to ambient conditions. Daunting, not comparable because too many variations. Single largest problematic issue.
- Ross: Have been wind tunnel testing up to 140 mph. Too many assumptions may keep it from being real. Giving credit for their use is a safe bet and appropriate. Check Oak Ridge National Laboratory for research.
- Dixon: Tremendous amount of work has been done on roof uplift. Problem is in how to calculate/specify resistant forces. What size missiles may need to be answered for Florida.
- Sonne: Depends on the size of plants on roof.
- Dixon: Commission has tried to simulate risk for types of branch formations, shielding, reducing wind speed, size & mass of projectiles, protection on glass.
- Madani: Can you guess based on a correlation?
- Sonne: Hesitant because looked at one roof, could base credit on it.
- Ross: Need to consider what is compatible, and what is not. Which are the additive effects?
- Lippy: Is there a standard specification for different types of green roofs. RP-14, V1 or 2. Factory Mutual DS1-35.
- Blair: Is there support for providing credit in energy code for green technologies.
- Maxwell: Do it in such a way that it can be permitted. Can associate a minimum number of points. Put onus on proposer, to provide documentation to show savings.
- Blair: Does anyone care to propose a motion regarding providing credits for vegetative roofs in the Code?
- Maxwell: Motion to come up with minimum number of points, and allow one to demonstrate additional savings. Ross second. Approved, unanimous.
- Sonne: Does this allow for future research.
- Dixon: Start out with credit given, sequential code changes after research has been conducted.
- Maxwell: If there is research, then one can go after additional credits from the minimum.
- Dixon: Have contract with FSEC to develop numbers.
- Use term "Vegetated Roofs".
- Dixon: What considerations for radiant barriers for commercial.
- Sonne: Maybe can model it for doctor's offices, small conventional attic cases.
- Ross: How about PV. If get credit for cool roof technology & then add photo voltaics, see areas of conflict. Should look at this and add as appropriate. Also, wind and fire proposed standards for PV systems. Membranes, integrated PV shingle. Lots of code language needed to avoid conflicts. Some people viewing PV system, don't need to insulate—free energy! Need to address this.

- Maxwell: California discussion. Concerned about *applying penalties for the installation of PV systems*. People add low-hanging fruit before go to PV. Working on 2 projects now, adding PV arrays. Penalties for covering reflective roof and no credit for rack-mounted shading.
- Sonne: This can get complex. That's why moving to EnergyPlus, it can model more options together.
- Dixon: Have to calculate impact on AC load.
- Maxwell: New roof installed recently. Opportunity to put on PV, roof array vs. direct adhered. Will roof need to be reroofed?
- Davis: PV system doesn't cover the entire roof. Minimal.
- Lippy: Can we ask for more work to be done. Ranking of technologies. How they perform for savings/peak savings. Think data is there, need to research it. At some point, may need to put in a prescriptive path, need criteria in black and white.
- Sonne: Programs includes the benefit of various technologies.
- Dixon: Will take information to the Energy Code Workgroup tomorrow. Will need to add to FSEC's contract to see if we can get a code change proposal by April 2, 2010. See at least one more meeting of this group to look at what can be done.