

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

**APRIL 7, 2010—MEETING II**

**GAINESVILLE, FLORIDA**

**FACILITATION, MEETING AND PROCESS DESIGN BY**



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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**

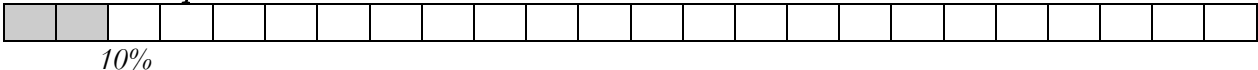
**Subtask 45**

*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 APRIL 7, 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 and Summary Report)
- ✓ To Hear Relevant Presentations on Vegetated Roofs in the Code
- ✓ To Discuss Energy Credits for Use of Vegetated Roofs in the Florida Energy Code
- ✓ To Discuss Relevant Standards for Inclusion in the Florida Energy Code
- ✓ To Decide on Proposed Credits for Vegetated Roofs in the Florida Energy Code
- ✓ To Discuss and Evaluate Level of Acceptability of Proposed Options
- ✓ 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

### **Approval of February 2, 2010 Facilitator's Summary Report**

Jeff Blair, Commission Facilitator, asked if any members had corrections or additions to the February 2, 2010 Report, and none were offered. The Workgroup voted unanimously, 8 - 0 in favor, to approve the February 2, 2010 Facilitator's Summary Report as presented/posted.

**Presentations on Vegetated Roofs Technologies and Relevant Standards Overview**

Jeff Sonne, FSEC, provided the Subcommittee with a PowerPoint presentation on vegetated roofs technologies and relevant standards and answered member’s questions. FSEC’s PowerPoint presentation is available at the project webpage.

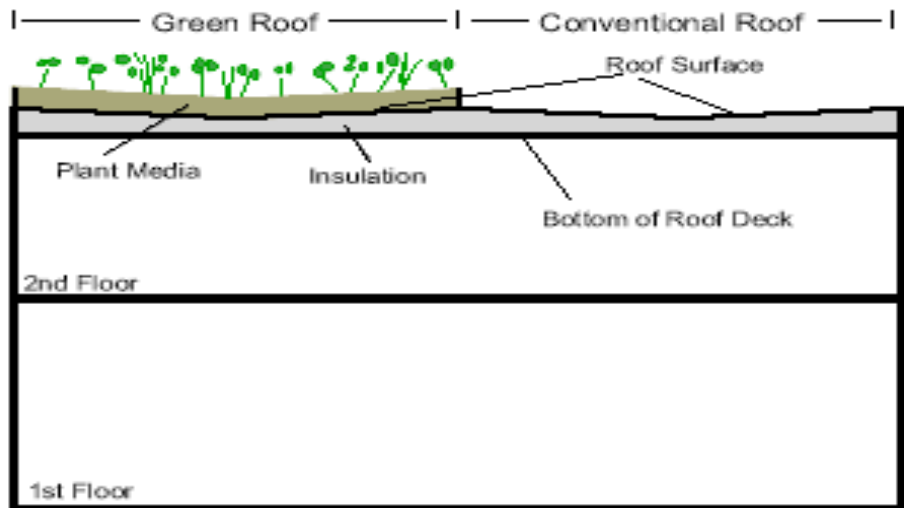
*PowerPoint Presentation on Green Roof Proposed Code Amendment:*

*Roof Technology Modeling:*

Modeling Capability	EnergyGauge USA (Current Residential)	EnergyGauge Summit (Current Commercial)	EnergyPlus (Future)
Unvented (Sealed) Attics	Yes	Yes	Yes
Radiant Barriers	Yes	No	Yes
Cool / Reflective Roofs	Yes	Yes	Yes
Green Roofs	No	No	Yes (not sure of quality)
Roof Shading by Solar Systems	No	Approximation	Yes
Photovoltaic Systems	Yes	No	Yes

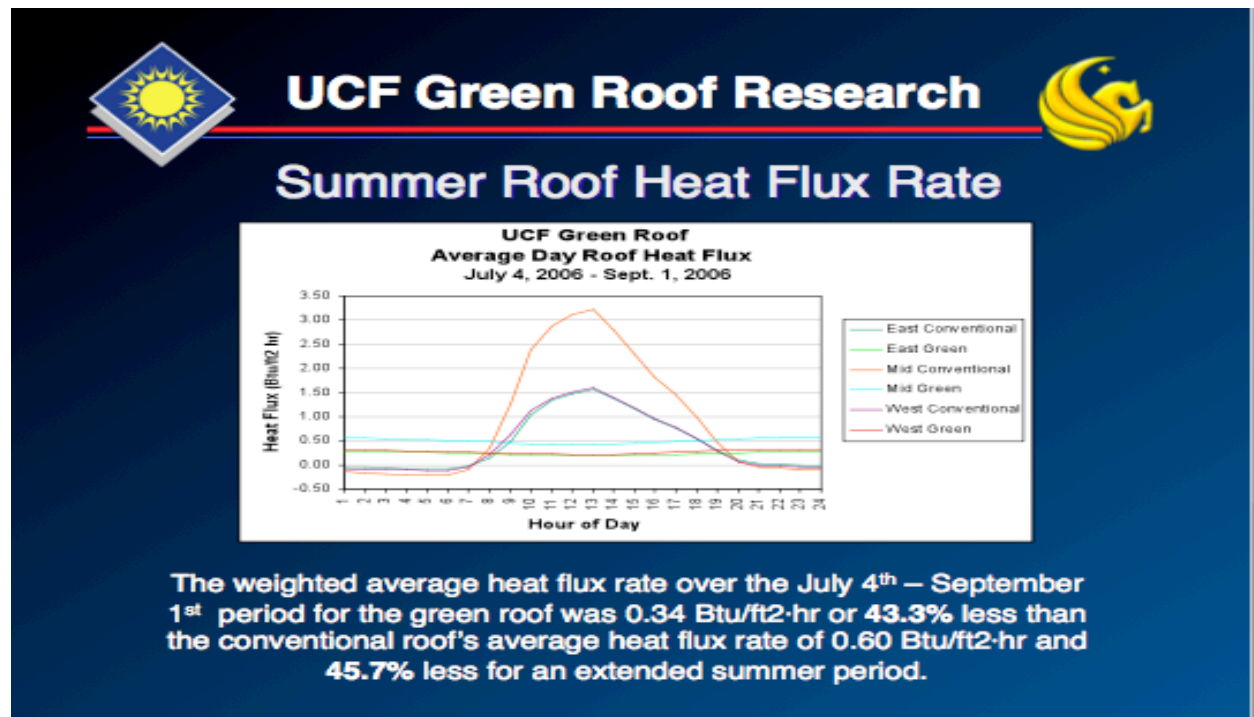
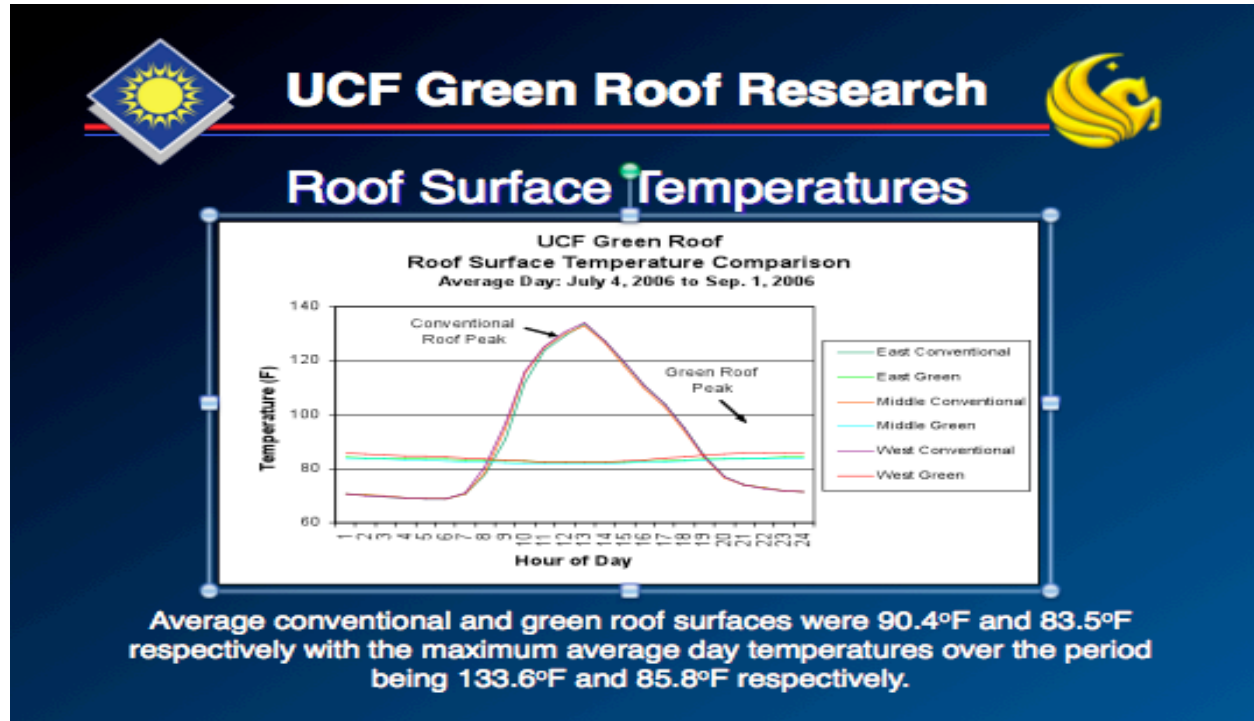
*Energy Performance Aspects of a Florida Green Roof Project Description:*

- Roof drainage location/insulation taper facilitates comparison.
- Extensive green roof using shallow (6” – 8”) plant media with grasses and small plants.



Results: rainwater and pollution:

- Water retention on the roof was 80% of the rainfall on an average yearly basis.
- Mass of pollution removal was over 80%.
- Proved the design could be used in the new state wide stormwater rule to meet post equal pre conditions.

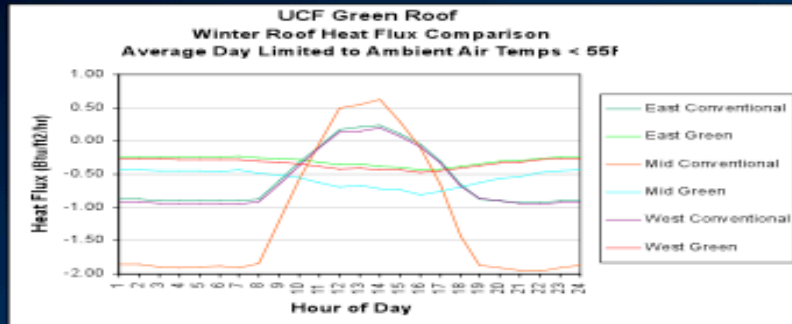




## UCF Green Roof Research



### Winter Roof Heat Flux Rate



The weighted average heat flux rate over the period for the green roof is  $-0.40$  Btu/ft<sup>2</sup>·hr or 49.4% less than the conventional roof's average heat flux rate of  $-0.79$  Btu/ft<sup>2</sup>·hr.

#### Energy Savings:

- Estimating building energy use impacts from green roofs is somewhat involved, being dependant on characteristics such as:
  - Building size and number of stories
  - Roof/attic design and details
  - Use type
  - Sub-metering issues
- Rough energy savings calculations were performed using the original winter and second summer roof heat flux results and several equipment efficiency assumptions
- Total estimated cooling and heating season savings for the green roof compared with the conventional roof, if the entire 3,300 square foot project roof were green, would be approximately 489 kW/hr/yr.

#### Overview of Discussion:

- Maxwell: does the even temperature distribution offset the peaks during the day?
- Sonne: this is accounted for in the analysis and results.
- How does watering effect the temperature of the roof?
- Sonne: moisture on the roof will actually help roof temperatures.
- Maxwell: the recommendation is for a credit of a 45% reduction in the heating and cooling roof heat flux rates for the roof area covered with the vegetative roof, why is the winter roof rate so high (almost 50%)?
- Sonne: because the heat in the building is kept in the building by the green roof.
- Lippy: need a prescriptive insulation requirement in the Code.
- Sonne: if it gets down to very low roof R-values it could make a difference.
- Madani: who would certify that the credits are based on reality and what is installed?
- Schulte: I understand the energy conservation aspects of vegetated roofs, but has anyone done an economic cost/benefit analysis on vegetated roofs?
- Sonne: not that I know of. 489 kw savings per year is expected from a vegetated roof.

- Palacios: has the negative impacts (conservation) of irrigating the roofs been considered in the estimated savings? What about the effects of hurricanes?
- Dixon: there are ASTM standards for wind and fire. There are also structural design standards available, and vegetated roofs can be engineered as well. UF has done studies on wind resistance for vegetated roofs.
- Davis: has there been discussion on how long the roof stays in place?
- Dixon: aging is not part of the Building Code.
- Stanton: the prescriptives need comments during the Code amendment comment window.
- Ross: relevant ASTM standards are being proposed for the Code.
- Lippy: has the subcommittee looked at radiant barriers for commercial buildings.
- Sonne: FSEC has not proposed this for the 2010 Code update, but it could be developed.
- Madani: its too late to propose a new code amendment for the 2010 code update, but a comment could be made to an existing proposed code amendment if it was relevant to the issue.
- Dixon: DOE 2 does not have the capability to model radiant barrier criteria.
- Sonne: it may not be technically feasible to model.
- Maxwell: I have concern for re-roofing; leaks could be repaired without retaining the vegetated roof cover and they still used the energy credit.
- Schulte: where can we find relevant code amendment proposals?
- Madani: I will assist you with this.
- Ross: proposed code amendment #4734 has landscape requirements.
- Stanton: Section 602.1 Conformance.
- Palacios: why not have a green roof inspection to make sure its done correctly?

### 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.

### Review of Subcommittee Delivery and Meeting Schedule

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

Green and Energy Efficient Roofs Subcommittee appointed	4/8/09
Workgroup meeting	2/2/10
Workgroup meeting	4/7/10
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.

At the February 2010 meeting the Subcommittee voted unanimously to recommend 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.

Following is the proposed code amendment to implement the Subcommittee's recommendations:

**506.3.3 Requirements specific to credit options.** Credit may be claimed in the compliance calculation for technologies that meet the criteria for various options specified below.

**506.3.3.1 Vegetative roofs.** Credit may be claimed in whole building performance method calculations for the area of a proposed building's roof that is covered with a vegetative roof with a minimum growth media depth of 4 inches. The credit shall provide a 45% reduction in the heating and cooling roof heat flux rates for the roof area covered with the vegetative roof.

## Adjourn

The Subcommittee voted unanimously, 8 - 0 in favor, to adjourn at 2:00 PM.



# ATTACHMENT 1

## MEETING EVALUATION RESULTS

**April 7, 2010—Gainesville, 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.**

- 8.9 The background information was very useful.
- 8.8 The agenda packet was very useful.
- 9.3 The objectives for the meeting were stated at the outset.
- 9.3 Overall, the objectives of the meeting were fully achieved.

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

- 9.3 Relevant Presentations on Vegetated Roofs in the Code.
- 9.0 Discussion/Ranking of Energy Credits for Use of Vegetated Roofs in the Florida Energy Code.
- 8.0 Discussion/Ranking of Relevant Standards for Inclusion in the Florida Energy Code.
- 9.1 Decision on Credits for Vegetated Roofs in the Florida Energy Code.
- 8.8 Adoption of Recommendations for Submittal to Energy Code Workgroup and FBC.
- 8.6 Identification of Next Steps.

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

- 9.9 The members followed the direction of the Facilitator.
- 9.8 The Facilitator made sure the concerns of all members were heard.
- 10 The Facilitator helped us arrange our time well.
- 9.6 Participant input was documented accurately.

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

- 8.3 Overall, I am very satisfied with the meeting.
- 9.1 I was very satisfied with the services provided by the Facilitator.
- 8.8 I am satisfied with the outcome of the meeting.

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

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

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

- Good technical presentation by FSEC.
- The facilitator kept the meeting on topic.

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

- Include an update on the agenda on actions requested from the last meeting.
- May need a little more time.
- Better sound.

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

- I love Jeff Blair ...nice tie.
- I assumed (my mistake) that the request to include radiant barriers in some commercial buildings would be completed and that a code proposal would have been done.

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

Public Meeting Attendance	
Name	
Bob McCormick	FRSA
Bill Lippy	Fifoil Co/RIMA
Jack Glenn	FHBA
Mike Reed	FRSA
Manny Oyola	Eagle Roofing
Jim Engskow	Latite Roofing
Jack Glenn	FHRA
David Lewis	Norbord
Doug Harvey	BOAF
Jon Hamrick	DOE