



FLORIDA SOLAR ENERGY CENTER®

*Creating Energy Independence*

## CONTRACT REPORT

# **Final Technical Report (2<sup>nd</sup> Revision) ARRA: Florida Energy Code Compliance Train-the-Trainer Program**

FSEC-CR-1923-12

June 15, 2012

[Revised June 28, 2012]

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A Research Institute of the University of Central Florida

**Final Technical Report**  
**ARRA: Florida Energy Code Compliance Train-the-Trainer Program**

**Date Submitted:** June 15, 2012 [2<sup>nd</sup> Revision June 28, 2012]

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**UCF:** Florida Solar Energy Center (FSEC)

**Contract Number:** 11-BC-66-12-00-22-005  
**UCF Account No.:** Florida Solar Energy Center: 2012-7077

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## **EXECUTIVE SUMMARY**

A multi-faceted Florida Energy Code compliance methods, tools and field verification training program was established that included development of two instructor-led and two web-based courses, instructor training and course development support, and training of building officials and contractors throughout the state.

Separate instructor-led commercial and residential 2010 Florida Energy Code compliance courses were developed for train-the-trainer class use, and existing instructor-led blueprints data collection and energy code software courses were redeveloped as web-based courses.

Through partnerships with Florida colleges, building departments and industry organizations, a total of 42 instructors were trained to provide commercial energy code compliance training and 42 instructors were trained to provide residential energy code compliance training.

Approximately 950 Florida building officials, contractors and other industry personnel are estimated to in turn have now been trained with energy code compliance related material developed through the program.

While these to-date training numbers are well short of programs goals and a discussion of possible contributing factors for the discrepancy is included in the report, promotion of the training is being continued through a program web site, industry partnerships, instructor efforts and additional outreach activities. An Additional Training section outlines a two-fold plan developed by the Department of Business and Professional Regulation to train the remainder building inspectors and contractors.

## **I. BACKGROUND**

The Florida Building Commission is a twenty five member body that is responsible for the updating and maintenance of the Florida Building Code. Commissioners represent building designers, contractors and builders, owners, insurers, advocates for accessible and green buildings, and state and local government code administrators. The Florida Building Code is comprised of several sub-codes including the Florida Energy Code. The Commission updates the Code including the energy code every three years.

The standards of the Florida Energy Code were amended to require more energy efficient buildings according to the schedule of improvements established by s.553.9061(1), Florida Statutes. The 2010 Florida Building Code had to increase efficiency requirements by twenty percent relative to the 2007 Code. Additionally, the American Recovery and Reinvestment Act (ARRA) requires states to adopt building codes with requirements equivalent to national benchmark standards, to conduct training on their codes and to measure compliance in order to receive supplemental State Energy Program (SEP) funding from the US Department of Energy. Florida has certified equivalency of its code and received supplemental ARRA SEP funding. The goals established by Florida law are ambitious. To reach them and to comply with the criteria of the federal ARRA, current levels of education and training on the energy code must be enhanced. Florida has conducted training on the Florida Energy Efficiency Code for Building

Construction since its inception in 1980 and has the core of a trained industry and code enforcement workforce relative to most other states. However, enhancing code training is essential to expanding understanding of energy conservation in buildings and the options and opportunities available to industry to meet the ambitious goals established by Florida's Legislature.

## II. TASKS

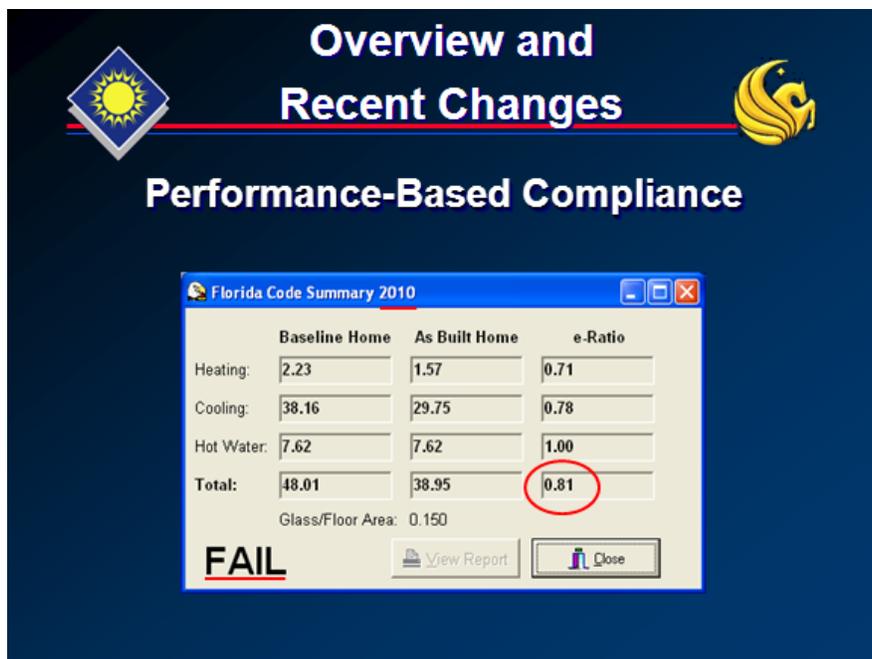
***Task 1: Develop a Training Program that informs attendees about code compliance methods, tools and field verification***

### **Residential and Commercial Code Compliance Training Courses**

Two instructor-led 2010 Florida Energy Code compliance courses were developed for this project, one for commercial buildings and the other for residential:

- *Florida Commercial Energy Code Compliance: Methods, Tools and Verification*
- *Florida Residential Energy Code Compliance: Methods, Tools and Verification*

Each course includes a PowerPoint presentation (example slide shown in Figure 1) that includes energy code and building science sections, a code software demonstration, two class exercises and exam. Course materials were sent out to several code officials for review; comments were generally very positive and several suggestions from the reviews were incorporated into the courses.



**Figure 1. Slide from Residential Energy Code Compliance course.**

A Course Description and Outline PDF document for each course is included in the Appendix; the document includes learning objectives, a materials listing and a course timetable.

The commercial course was accredited by the Florida Building Commission (FBC) as a 6-hour advanced course, and the Florida Construction Industry Licensing Board (CILB) approved both the advanced and non-advanced versions of the course for 6 CEU hours each. The residential course was accredited by the FBC as a 4-hour advanced course, and the CILB approved both the advanced and non-advanced versions of the course for 4 CEU hours.

### Web-based Courses

FSEC worked with a vendor to develop two web-based courses based on existing residential instructor-led courses for this project:

- *From Blueprints to Residential Energy Code Compliance*
- *EnergyGauge Pro Hands On*

The *From Blueprints to Residential Energy Code Compliance* course (first frame shown in Figure 2) includes a brief Florida Energy Code overview, descriptions of building components included in residential energy code calculations and a set of electronic blueprints from which students gather data onto electronic take-off sheets. Feedback is provided to students via take-off sheet entry checks, a number of “check on learning” questions and final exam comprised of the same questions. The course was approved for 4 CILB CEU credits.

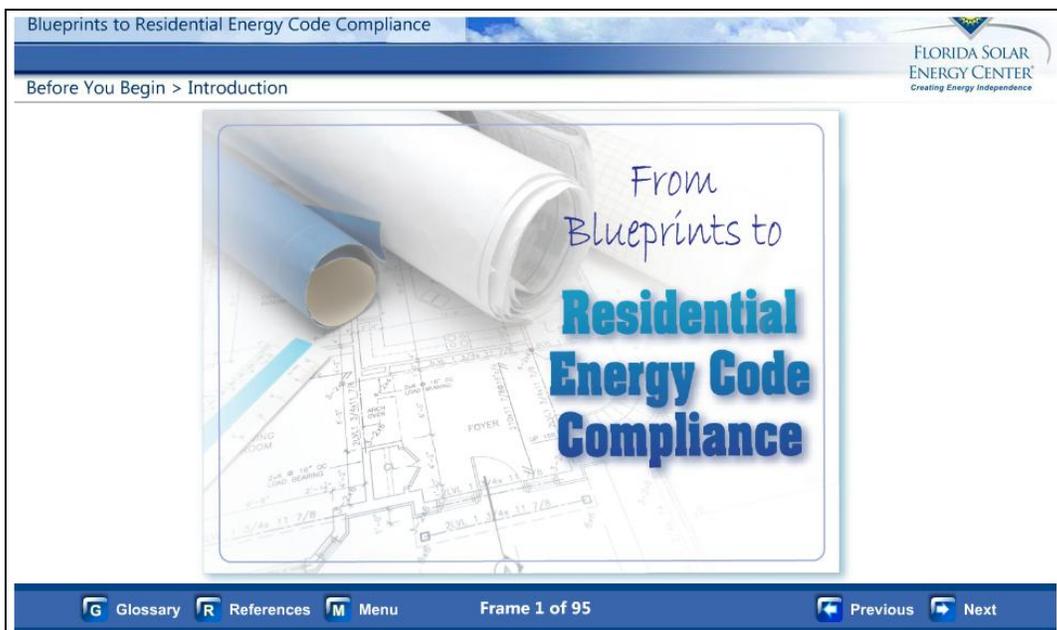


Figure 2. First frame of the web-based *Blueprints* course.

The *EnergyGauge Pro Hands On* course includes screen-by-screen descriptions of *EnergyGauge USA* software component inputs, data entry exercises and information on how to calculate Florida Energy Code compliance. Feedback is provided to students via data entry checks, a number of “check on learning” questions and final exam comprised of the same questions. The course was approved for 3 CILB CEU credits.

Both courses were launched in September 2011 through FSEC’s educational web site. An update of the web-based *From Blueprints to Residential Energy Code Compliance* course to have it reflect the new 2010 Florida Energy Code was completed and brought online in June 2012. An update to the online *EnergyGauge Pro Hands On* course to have it reflect the new 2010 Florida Energy Code version of the EnergyGauge® USA software was deemed to be too expensive through the original vendor; FSEC is currently working on an update for the course in-house.

### Training Program Web Site

A Florida Energy Code Training website (<http://floridaenergytraining.org/index.html>) was developed for this project that includes a main, introductory page and two related pages:

- An Energy Code Compliance Methods, Tools and Verification page (shown in Figure 3) that describes the instructor-led residential and commercial energy code compliance courses and provides links to currently offered courses; the page also includes a link to a password protected Instructor Resources page that provides a complete set of training materials to trained instructors
- A web based courses page that describes the online *From Blueprints to Residential Code Compliance* and *EnergyGauge Pro Hands-On* courses and provide links to register for the courses.

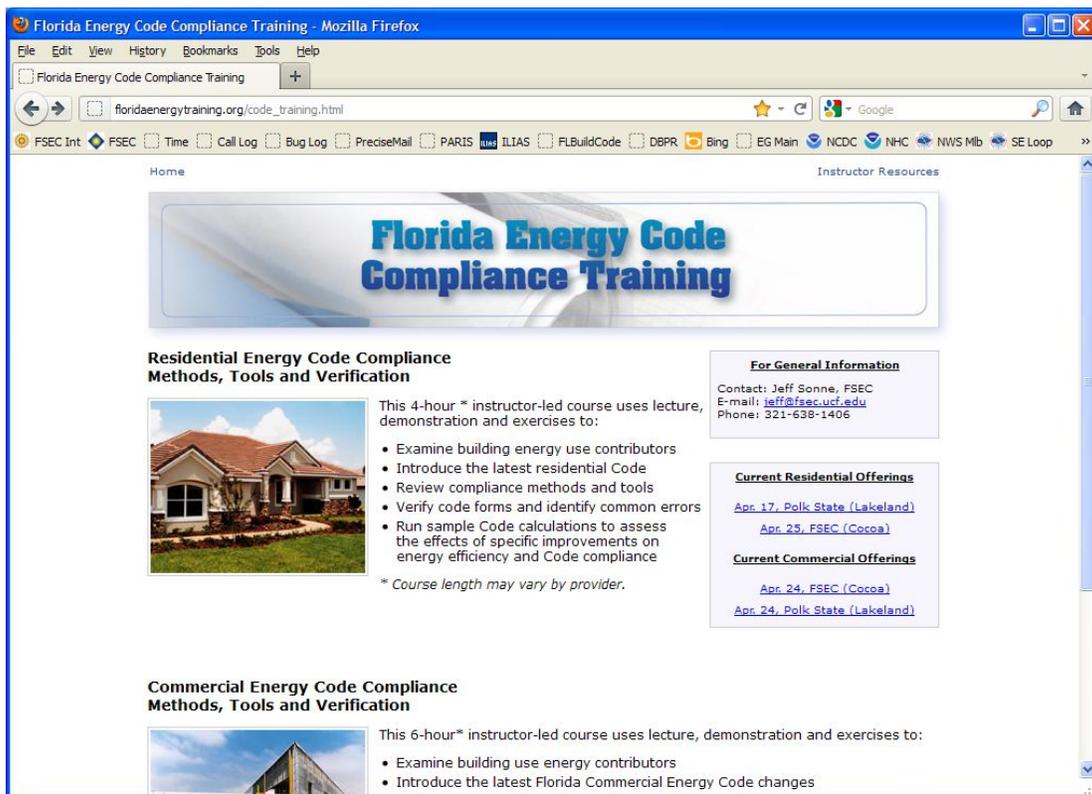


Figure 3. Energy Code Compliance Training Web Page

***Task 2: Develop a plan to track the number of trainers trained***

Tracking for the instructors was provided via collection of the applications that each instructor was required to provide and a spreadsheet that includes each instructor's name, affiliation, anticipated following year training estimates and support record.

Tracking for the train-the-trainer code training courses had originally been planned to be coordinated through the Workforce Florida Banner Center system (described in the Task 3 summary below) that is being used for building inspector and contractor tracking, however since effective trainer tracking was accomplished without the system, this has not been done.

***Task 3: Develop a plan to track the number of building inspectors and contractors who complete the course work***

FSEC leads an existing Employ Florida Banner Center for Clean Energy through Workforce Florida (<http://www.floridaenergyworkforce.org/>) that includes student tracking. The goal of the Banner Center's partnership of Florida universities, community colleges, technical institutes, workforce agencies and industry is to supply education, training and workforce placement in alternative energy technologies for students located throughout the state. As such, the Banner Center is ideally suited to provide tracking of energy code compliance course participants.

Tracking for the code training courses was coordinated with the Banner Center system. Specific activities have included coordination with Brevard Workforce and creation of a revised Employ Florida Marketplace Tracking (EFM) form for tracking students who participate in the Code training courses.

Each trained instructor was provided with a blank electronic EFM form and asked to have students fill out forms, and then return the forms to FSEC. General instructor training reporting issues are discussed separately below, but EFM forms from only one utility training event have been received to date from non-FSEC instructors. Forms collected from FSEC-led classes have been submitted for entry into the Banner Center database.

Building inspector and contractor tracking was also provided by collection of sign-in sheets for FSEC courses and when provided by other trainers, and via completed tests collected for FSEC CEU courses. FSEC web course student tracking is provided by a learning management system log.

***Task 4: Develop advertising plan to help trainers increase inspector and contractor participation***

The advertising plan developed for the project includes four components: 1) continuing education credits, 2) strategic partnerships, 3) publicity and 4) coordination with the project web site.

### **Continuing Education Credits (CEUs)**

Florida Construction Industry Licensing Board (CILB) CEUs were obtained for the web based *From Blueprints to Residential Code Compliance* and *EnergyGauge Pro Hands-On* courses and the commercial and residential *Energy Code Compliance: Methods, Tools and Verification* courses. Advanced Florida Building Commission accreditation and advanced CILB CEUs were also obtained for the *Energy Code Compliance: Methods, Tools and Verification* courses. Since these courses have been approved for CILB CEUs, information about them is also available to perspective students on the DBPR Continuing Education Course website. FSEC offered to assist instructors submit their courses for CEUs as well.

### **Partnerships**

Through its role leading the Banner Center for Clean Energy, FSEC has established working relationships with community colleges throughout the state. To facilitate train-the-trainer and general industry (non train-the-trainer) building inspector and contractor training efforts, FSEC partnered with a number of these colleges as well as building departments, industry organizations and private companies.

To identify potential instructors for the program, FSEC contacted a total of 23 Florida colleges and also requested assistance from the Florida Department of Education in distributing the Train-the-Trainer Opportunity Flier shown in Figure 4. The Florida Department of Community Affairs also assisted in identifying a number of instructors by forwarding training opportunity information to building departments, industry organizations and private companies.

General industry (non-train-the-trainer) training efforts for building inspectors and contractors have been coordinated with a number of the same Florida colleges, building departments, industry organizations and private companies who participated at the train-the-trainer level.

**Train the Trainer Opportunity**

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**Florida Energy Code Compliance Courses  
Available for Training Institutions**

**Limited time and number of training institutions**

**Courses:**

The courses provide a clear overview of building energy use contributors, code compliance methods and forms and field verification issues, and prepare students to address common questions:

- **Residential Energy Code Compliance Methods, Tools and Verification**
- **Commercial Energy Code Compliance Methods, Tools and Verification**

These courses have been approved for 4 and 6 CILB CEUs respectively. Both courses include code compliance software demonstrations and exercises. Student comprehension assessment is achieved via a written exam at the end of each course.

**Anticipated Audiences:**

1. Code officials need to be trained to understand energy use in buildings and all aspects of building inspection for verifying energy code compliance. As energy codes evolve they will typically be more inclusive and thus code officials will have to learn to inspect items not currently required.
2. Architects, builders and subcontractors need to learn how to achieve more energy-efficient buildings in order to meet the energy codes. Both the process of completing energy codes as well as the efficient off-the-shelf technologies that can help builders comply must be learned.

**Preparation:**

Potential trainers must submit an application and attend a no-cost training session for each course they plan to offer. The Florida Solar Energy Center (FSEC) provides presentation materials and related documents for the courses, and FSEC staff is also available to provide follow-up support and assist trainers as they develop and teach their course(s).

The code training courses have been developed by buildings research and training specialists at the Florida Solar Energy Center under DOE ARRA funding. FSEC has been involved in Florida Energy Code development work for over 25 years and provides residential and commercial performance compliance method software products for the state. FSEC training experience also includes more than 30 years of energy efficiency and building durability courses, several ongoing Florida Energy Code compliance calculation courses and 100% of the Florida energy rater training.

**Figure 4. Train the Trainer Opportunity Flier**

Training partner collaboration was invaluable to the project. Total outreach and collaboration includes:

- 23 Florida colleges
- Florida Department of Education
- Florida Refrigeration and Air Conditioning Contractors Association (FRACCA)
- Six municipalities and building departments
- Eight private companies
- Banner Center for Construction
- Air Conditioning Contractors Association of Central Florida (ACCA-CF)
- Florida Green Building Coalition
- Building Officials Association of Florida (BOAF)

- Building Owners and Managers Association (BOMA) Florida
- Florida Association of Building Inspectors (FABI)
- Florida Home Builders Association (FHBA)
- Utilities (Progress Energy, Florida Power and Light and Jacksonville Electric Authority)

## Web Site

The program’s energy code training web site (<http://floridaenergytraining.org>) was discussed in the Task 1 section of this report. The web site provides a central location that prospective students can use to learn about the course offerings and sign up for the courses, and is the first site listed (after any ads) for Google or Bing searches on the terms “Florida energy code training” or “Florida energy code classes.” The first page of a June 2012 Bing search is shown in Figure 5.

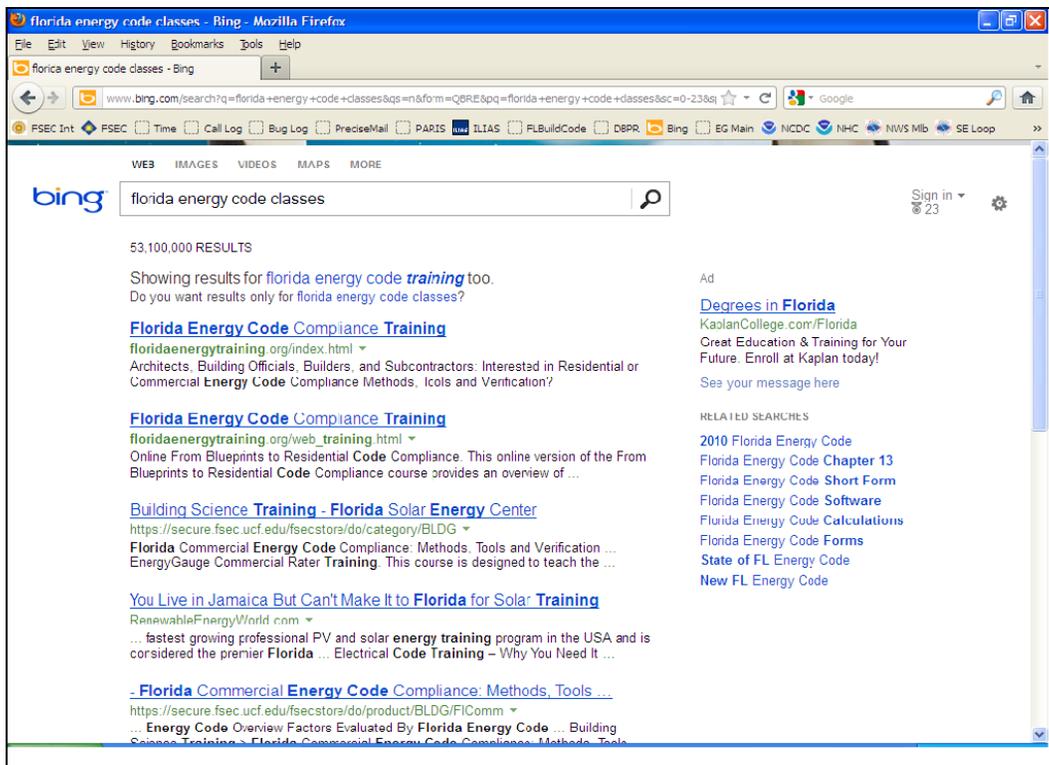
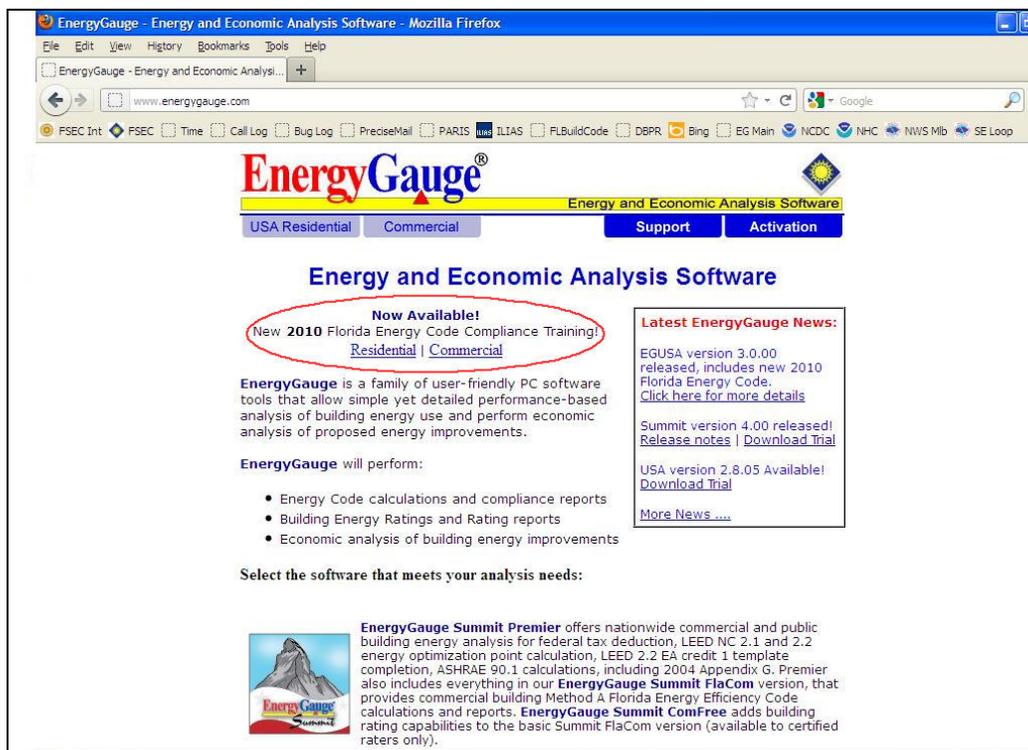


Figure 5. Bing "Florida energy code classes" search results.

## Publicity

The project’s code compliance training web site described above includes a general information contact for questions or to inquire about additional training. In addition to the web site exposure, FSEC code compliance course notices are also provided on the *EnergyGauge* software ordering web pages (see Figure 6), and the training was also highlighted twice in the *Buildings Research Post*, FSEC’s buildings research quarterly publication that has a circulation of 2,400. Project partners also provided a significant amount of publicity through emails and course offering announcements to their memberships.



**Figure 6. EnergyGauge software web page with code compliance training announcement (highlighted with red oval for reporting).**

In an initial training resources email that each instructor received and again in the follow-up training reporting emails send in April and May 2012, instructors were informed that the floridaenergytraining.org website was available for them to list their course offerings as they become available.

FSEC also recently sent out a press release on the training courses along with emails to several additional industry organizations regarding the training, and will work to either provide training to parties who respond or facilitate lining up training through other instructors.

***Task 5: Offer classes with the capacity to teach 70 trainers to deliver the developed curriculum***

A total of eight Energy Code Compliance train-the-trainer events, each including separate 4 hour residential and 6-hour commercial training classes, have been held. Feedback from instructors attending the training was very positive.

As Table 1 below indicates, a total of 42 instructors were trained to provide the residential course and 42 instructors were also trained to provide the commercial course. At an estimated average class seating capacity of 20, the instructor training capacity for all eight train-the-trainer events is estimated at 160 for residential and 160 for commercial, or a combined total of 320. Instructor anticipated following year training estimates totaled 2,670 students.

**Table 1: Instructor Training Activities Summary**

Instructor Training Event	Dates	Instructors Trained		Anticipated Following Year Training Estimates Provided by Instructors
		Residential	Commercial	
Lakeland	May 31 – June 1, 2011	3	3	48
Pembroke Park	August 25 - 26, 2011	5	5	258
Tallahassee	September 8 - 9, 2011	3	3	384
Gainesville	September 14 - 15, 2011	9	6	380
Fort Myers	October 6 - 7, 2011	6	9	240
Tampa	October 11 - 12, 2011	3	3	480
Sarasota	November 29 - 30, 2011	9	9	840
Progress Energy	January 9 - 10, 2012	4	4	40
<b>Totals:</b>		<b>42</b>	<b>42</b>	<b>2670</b>

Several efforts were made via an industry partnership and through direct contact with a utility to provide additional train-the-trainer classes in the Jacksonville and Orlando areas, but there was not enough interest to finally schedule the events. An additional utility training event (either train-the-trainer or general employee) is still pending.

***Task 6: Require trainers to schedule classes that cumulatively can enroll at least 700 building inspectors statewide using the developed curriculum***

**Trainer Support**

FSEC supported instructors throughout the project through the energy code training web site’s Instructor Resources page (that includes all course materials), with email and phone support, and by providing no-cost EnergyGauge software for class use as requested. All instructors trained were also emailed blank Banner Center Employ Florida Marketplace Tracking (EFM) Student Sign-up sheets.

As also reported above, in an initial training resources email that each instructor received and again in the follow-up training reporting emails send in April and May 2012, instructors were informed that the floridaenergytraining.org website was available for them to list their course offerings as they become available. Only one college took advantage of this resource to date, listing two separate sets of code compliance training offerings.

FSEC will continue to provide instructors with course development and promotion assistance as it’s requested.

**Training Activities**

A number of general industry (non-train-the-trainer) energy code training classes have been held to date, starting with a corporate college offering in Lakeland of both the commercial and

residential compliance courses in November 2011. Outside of an additional FSEC commercial training event held June 4, 2012 that had 9 contractor and engineer participants, all known training that has been provided through the program has been previously documented in monthly and quarterly reports.

An initial training reporting request for event sign-in sheets and Banner Center EFM student tracking forms was sent to each instructor upon completion of the initial training, and a follow-up reporting request email was also sent in either April or May 2012. However, with a few exceptions, class offering feedback and reporting from instructors was generally difficult to obtain.

Largely due to the fact that instructor feedback was already limited during the first quarter of 2012 and initial feedback that was received indicated relatively low attendance at courses that were being held, FSEC began offering code compliance courses at its Cocoa facility and as they were requested by building departments and industry organizations. FSEC has held 11 non-train-the-trainer commercial and residential compliance training classes to-date with estimated totals of 38 building officials and 243 contractors attending the classes.

A summary of known general industry (non-train-the-trainer) classes held to-date that were based on or at least included some of the training provided through this program is provided in Table 2 below. The table shows the number of building inspectors and contractors (also including some other industry personnel) trained at each event or group of events. Estimated totals of 258 building inspectors and 722 contractors (including other industry personnel and 40 web-based training participants) have been trained to-date through known events. As noted in the Task 5 summary above, instructor anticipated following year training estimates had totaled 2,670 students. Additional training discussions are provided in the Objective 3 and Objective 4 sections of this report below.

**Table 2: Known General Industry (non-train-the-trainer) Energy Code Compliance Classes Summary as of June 15, 2012**

<b>Training Event</b>	<b>Class Capacity (est.)</b>	<b>Energy Code</b>	<b>Building Officials / Plan Reviewers</b>	<b>Contractors (incl. some other industry personnel)</b>	<b>Both Build. Official and Contractor</b>
Corp. College Nov. '11	20	Commercial	4	2	2
Corp. College Nov. '11	20	Residential	2	2	0
FSEC WPB Mar. '12	50	Residential	26	1	0
FSEC/FRACCA Mar '12	100	Residential	8 (est.)	80 (est.)	1
FSEC Cocoa March '12	209	Commercial	0	9	0
FSEC Cocoa March '12	209	Residential	2	11	0
Utility March '12	50	Both	0	33 Employees	0
FSEC Cocoa April '12	209	Commercial	0	6	0
FSEC Daytona April '12	8	Residential	0	7	0
Corp. College April '12	20	Residential	3	3	0
Corp. College April '12	20	Commercial	3	3	0
FSEC/FRACCA Apr. '12 (2)	80	Commercial	2	49	0
FSEC/FRACCA May '12	50	Commercial	0	22	0
FSEC/ACCA CF May '12	45	Residential	0	42	0

Private Co. #1 (5 classes)	275	Both	50 (est.)	102 (est.)	0
Private Co. #2 (6 classes)	250	Both	30 (est.)	220 (est.)	0
FSEC Cocoa May '12	209	Residential	0	7	0
FSEC Cocoa June '12	209	Commercial	0	9	0
Building Department	5	Both	3	0	0
BOAF	200	Both	93	42	29
<b>Totals</b>	<b>2238</b>		<b>226</b>	<b>650</b>	<b>32</b>

Efforts to add to the number of Florida building inspectors and contractors trained are being continued. These efforts will include following up on individual industry organization responses to outreach activities, continuation of classes offered by FSEC and new training that is outlined in the next section.

### **Additional Training**

Tasks 6 and 7 of Contract #17588 require trainers to schedule classes that cumulatively can enroll 700 building inspectors and 7,000 contractors using the FSEC developed "train-the-trainer courses". Due to the economy and overall lack of interest in the Florida Energy Code, the Department of Business and Professional Regulation has trained approximately 950 inspectors, contractors and related industry personnel as of June 15, 2012.

The Department has developed a two-fold plan to train the remainder 700 building inspectors and 7,000 contractors during Fiscal Years 2012-13 and 2013-2014.

The Department will develop two one-hour courses on the Florida Energy Code. One course will include information from the train-the-trainer courses and changes to the 2010 Florida Energy Code. The second course will provide simple energy code compliance information regarding what should be collected at the time of the building permit and what should be checked in the field, i.e., using computer-generated forms.

The Department will conduct 5-10 webinars on each of the two courses, with a capacity of 150 individuals per course. Participants will receive free continuing education credit. Participants will be required to submit their name and license number(s) during the webinar registration, which will allow the Department to collect the appropriate information for the FSEC tracking system and the Department continuing education system. The Department has scheduled the course on the changes to the 2010 Florida Energy Code for August 30, September 6, September 13, September 20, September 27, October 4, October 18 and October 25. The Department will report the number of participants at the end of September, December, March and June of each Fiscal Year. Any additional training from other events will also be included in these reports.

The Department will also contract with Building A Safer Florida (BASf) to conduct free onsite training where participants will receive one hour of continuing education for each course. Providers will be paid a per-participant fee to conduct the course and submit the participant name and license number through the Department continuing education system and the FSEC tracking system.

***Task 7: Require trainers to schedule classes that cumulatively can enroll at least 7000 contractors using the developed curriculum***

Since there is significant overlap in the building official and contractor training activities, both are reported together in the Task 6 summary above, and an additional contractor training discussion is included in the Objective 4 section below.

***Tasks 8 – 10: Reporting***

Monthly and quarterly reporting were provided to the Florida DBPR to provide updates on project activities per the delivery schedule.

**III. ACCOMPLISHMENT OF OBJECTIVES**

The 4-part objective of the work was to:

1. Develop a building energy code compliance methods, tools and field verification training program
2. Train 70 trainers on how to deliver the building energy code training program to building inspectors and contractors
3. Train 700 building inspectors statewide
4. Train 7,000 contractors statewide in 2 years.

**Objective 1: Develop a building energy code compliance methods, tools and field verification training program**

A multi-faceted energy code compliance methods, tools and field verification training program was established through this project that included development of two instructor-led and two web-based training courses. These materials are now being made available to building inspectors, contractors and other industry personnel via classes being offered by instructors trained through the program, FSEC and via online learning. Promotion of the training has continued through a program web site, established industry partnerships and additional outreach efforts.

**Objective 2: Train 70 trainers on how to deliver the building energy code training program to building inspectors and contractors**

Through partnerships with Florida colleges, building departments and industry organizations, a total of eight energy code compliance train-the-trainer events were held, each including separate residential and commercial training classes. Through these events, a total of 42 instructors were trained to provide the commercial instructor-led course and 42 instructors were trained to provide the residential instructor-led course; estimated class capacities for these events would have allowed up to 320 instructors to be trained.

**Objective 3: Train 700 building inspectors statewide**

Table 2 of this report indicates an estimated know total of 258 building inspectors have been trained to date with the code compliance courses or in classes that included material from the courses. Based on estimated class capacities for the known training events held so far and

capacities of known events offered that were canceled due to lack of participation, 700 inspectors could have already been trained statewide through the program. Training participation is further addressed in the Objective 4 discussion below.

#### **Objective 4: Train 7,000 contractors statewide in 2 years**

Table 2 of this report indicates an estimated known total of 682 contractors (with some additional industry personnel included in this number) trained to date with the code compliance courses or in classes that included material from the courses. The two web-based courses add 40 students (including contractors, utility personnel and code specialists) to this total. Including estimated class capacities shown in Table 2 for the known events held so far and capacities of known events offered that were canceled due to lack of participation would increase the opportunity of educating contractors to over 2,500, but would still fall well short of the 7,000 contractor objective.

Following year training estimates provided by instructors totaled 2,670 students, or 5,340 students if extended to two years of training per the Objective 4 timeframe, and surpassing the Objective 4 total of 7,000 students if extended out to 3 years.

As reported above, with a few exceptions, class offering feedback and reporting from instructors was generally difficult to obtain, and as illustrated by Table 2, there was a mixed bag of interest in the instructor-led training classes in the reporting that was received. FSEC, for example, was able to hold several training events at its Cocoa location, but to relatively small audiences, and also had to cancel several other events due to low registration. One college and an established private instructor who responded to the training activities survey sent out in April and May 2012 indicated they didn't see enough interest to hold any of the code courses they had offered to that point. On the other hand, one building department was able to bring 26 local building officials to a single class and an industry organization was able to provide several events with good attendance (one event attended by an estimated 80 contractors).

It is noteworthy that there is currently other energy code training occurring around the state that to the authors' knowledge is not based on the training provided through this project; this other training will of course reduce the demand for training through this project. Notwithstanding, based on the above feedback and the fact there are over 40 instructors trained to teach each of the energy code compliance courses through this project, it is very likely that if there was more interest in the energy code, these instructors would be providing a significantly greater amount of training.

Efforts to add to the number of Florida contractors trained are being continued. These efforts include maintaining availability of the two web-based courses, outreach efforts and following up on individual and industry organization responses to outreach, promotion of non-FSEC classes as requested and continuation of classes offered through FSEC. The Additional Training section above outlines a two-fold plan developed by the Department of Business and Professional Regulation to train the remainder building inspectors and contractors.

## **IV. DISCUSSION**

From several comments and discussions during the code training and from concurrent, related code compliance project research, it appears that one contributing reason for the mixed interest

from both building inspectors and contractors may be inconsistent levels of attention given to energy code forms by different building departments across the state. One code training participant, for example, indicated that it's not clear whether the mechanical or plumbing inspector is responsible for the energy code inspections.

In the concurrent code compliance project related to this training project, there has been significant evidence that commercial energy code forms are not submitted or collected by building departments correctly:

“In light of this study it is recommended that effort be placed by the Florida Building Commission, the DBPR, the Building Officials Association of Florida (BOAF), and training organizations to provide simple information of what should be collected at the time of building permit for energy code compliance and what should be checked in the field. Perhaps an informative poster that could hang in building departments/permit application areas for applicants and officials to see would be beneficial.” (Withers, et.al, 2012)

Based on the results of these projects, a Residential Energy Conservation Code Documentation Checklist is being added to the reports that the EnergyGauge<sup>®</sup> residential Florida Energy Code software provides. The checklist indicates which forms should be provided to the building department based on the compliance path chosen (performance or prescriptive).

## **V. CONCLUSIONS AND RECOMMENDATIONS**

Code training project conclusions and recommendations include:

- While pockets of higher interest in energy code compliance training were seen, there appears to be relatively little interest in the training in a number of areas in the state
- Anecdotal evidence from the code training class participants suggests that energy code forms are not consistently inspected and that it's at least sometimes not clear who in the building department office is responsible for them
- Increasing interest and participation in energy code training will require additional efforts:
  - Short webinars and on-site live courses based on the energy code train-the-trainer materials could be developed to increase access to the training
  - Consumer, appraiser, Realtor, lender and building owner education will be required according to recent testimony to Congress (Richardson, 2012).

## **REFERENCES**

Withers, C., R. Vieira, and J. Montemurno, “Final Report of Task 8 ARRA: Energy Code Compliance and Effectiveness Measurement,” Florida Solar Energy Center, FSEC-CR-1922-12, June 15, 2012.

Richardson, L. (2012). *New Hampshire's Energy Code Compliance Program* [PDF document]. Retrieved from Environmental and Energy Study Institute website: [http://files.eesi.org/Richardson\\_032012.pdf](http://files.eesi.org/Richardson_032012.pdf)

**APPENDIX A**

**CODE COMPLIANCE COURSE DESCRIPTION AND OUTLINE PDFs**

## **COURSE TITLE**

### **Florida Commercial Energy Code Compliance: Methods, Tools and Verification**

## **WHY THIS COURSE IS NEEDED**

Under state of Florida law (HB 7135), the Florida energy code will continue to tighten through 2019 at which time it will represent a 50% reduction in energy use relative to the 2007 energy code. Meeting this goal will be a big challenge and will require well-trained building professionals that understand what changes they can expect in commercial buildings in the next several years.

## **COURSE DESCRIPTION**

This course will introduce current code changes and discuss implications of what building qualities will be like to meet planned energy reductions in the near future. Students will learn how a building is evaluated to pass the energy code using building example case studies with the code approved software EnergyGauge® Summit Fla Com. Individual changes will be made to illustrate how much impact specific improvements will have on energy efficiency and code compliance.

## **COURSE LEARNING OBJECTIVES**

The primary objective is for students to be able to use Summit software with existing building files to determine Florida commercial building energy code compliance, simulate energy use, and generate output reports.

Each student will be able to:

1. State two methods of code compliance and describe the differences between each
2. Name three primary types of commercial energy use that affects code compliance
3. Generate and review code compliance reports from an existing building file using EnergyGauge Summit Fla Com software program
4. Generate and review energy use reports to determine potential energy savings from specific energy conservation measures using EnergyGauge Summit Fla Com software program
5. Find all code deficiencies in a code report.

## **MATERIALS NEEDED FOR COURSE**

1. Presentation slides with speaker notes
2. EnergyGauge Summit Fla Com software
3. Code compliance and energy savings student exercise handout
4. Example code form handouts
5. Code terms defined document

## **COURSE OUTLINE**

### **Florida Commercial Energy Code Compliance: Methods, Tools and Verification 325 min**

#### **Course Introduction 10 min**

#### **Commercial Energy Code Overview 50 min**

Factors Evaluated by Florida Energy Code	20 min
Basic Methodologies for Compliance (Method A and B)	10 min
Recent Changes	20 min

#### **Florida Code Compliance Software 50 min**

Navigating Code Software Menus	20 min
Generating Florida Code Compliance Reports	10 min
Reviewing Florida Code Compliance Reports	20 min

(Break 10 min)

#### **Building Science Energy Fundamentals 45 min**

Internal and External Heat Sources	10 min
Three Types of Heat Transfer in Buildings	10 min
Controlling Moisture Transfer	10 min
Good Airflow Management in Commercial Buildings	15 min

#### **Energy Use Modeling to Assess Code Compliance and Energy Savings 60 min**

Evaluate Different Orientations and Window Shading	10 min
Windows	10 min

(Break 10 min)

Insulation	10 min
Reflective Roofs	10 min
Interior Electric Lighting	10 min
Cooling Efficiency	10 min

(Lunch Break 60 min)

#### **Code Compliance Tips 30 min**

(Break 10 min)

#### **Energy Code Forms 60 min**

Using Forms in the Field for Compliance Verification	20 min
Form 400A	15 min
Form 400B	15 min
Discussion	10 min

#### **Review 20 min**

**Testing** *thirty minute will be allotted for the exam*

## **COURSE TITLE**

### **Residential Energy Code Compliance: Methods, Tools and Verification**

#### **WHY THIS COURSE IS NEEDED**

Under state of Florida law (HB 7135), the Florida energy code will continue to tighten through 2019 at which time it will represent a 50% reduction in energy use relative to the 2007 energy code. Federal legislation currently being considered calls for similar reductions and then tightening beyond that. The U.S. Department of Energy has a goal of achieving zero energy buildings. These are highly energy-efficient buildings that use renewable energy systems (typically solar photovoltaics but sometimes small-scale wind) to provide a net zero energy use. Two training issues related to achieving these goals are identified:

1. Code officials need to be trained to understand energy use in buildings and all aspects of building inspection for verifying energy code compliance. As energy codes evolve they will typically be more inclusive and thus code officials will have to learn to inspect items not currently required.
2. Architects and contractors will need to learn how to achieve more energy-efficient buildings in order to meet the energy codes. Both the process of completing energy codes as well as the efficient off-the-shelf technologies that can help builders comply must be learned.

To address these identified training needs, a two-pronged approach of developing and providing train-the-trainer Energy Code compliance courses and leveraging of existing Energy Code related courses for web-based use is developed. Separate train-the-trainer courses for residential and commercial energy code compliance are being provided. This curriculum encompasses the residential train-the-trainer course.

#### **COURSE DESCRIPTION**

This course will provide students with an overview of building energy use contributors, compliance methods, tools and field verification issues, and prepare them to address common questions. The course is comprised of three main sections-- Building Science, The Residential Florida Energy Code (including a discussion of compliance and energy saving improvement options), and Residential Energy Code Forms. Student comprehension assessment is achieved via a written exam at the end of the course. FSEC staff is available to provide follow-up support throughout the project to assist trainers as they develop their course(s).

## LEARNING OBJECTIVES

The primary objective is for students to obtain a working knowledge of the Florida residential energy code compliance methods, the tools that are used for determining compliance, and how to verify compliance at permitting and in the field.

Each student will be able to:

1. Identify sources of building heating and cooling loads
2. Describe the residential compliance methods
3. Identify the residential compliance method forms
4. Generate performance code compliance forms from an existing building file
5. Review performance code compliance forms
6. Identify common code form deficiencies
7. Determine potential energy savings from specific energy conservation measures using modeling tools.

## STUDENT MATERIALS

Course materials include:

1. Presentation Notes
2. EnergyGauge<sup>®</sup> USA FlaRes (Demo version)
3. Sample Section 402 Prescriptive Method Form
4. Sample Section 405 Performance Method Form
5. Code Compliance and Energy Savings Improvement Options Exercise Form
6. Verification Exercise Form
7. Residential Definitions

## COURSE OUTLINE

**Residential Code Training Course** **260 min (total)**

Course Introduction.....	10 min
Building Science.....	45 min
Heat Transfer Mechanisms	5 min
Moisture Movement	10 min
Uncontrolled Air Flow	10 min
Building Loads	10 min
The Building as a System	10 min
The Residential Florida Energy Code .....	40 min
Overview and Recent Changes	5 min

Chapter 4 and Appendix B Overview	10 min
Section 402 (Prescriptive) Compliance	5 min
U-factor Alternative and Total UA Alternative	5 min
Section 405 (Performance) Compliance	10 min
Appendix B: Computer Modeling Criteria	5 min

Break (15 minutes) - or lunch- (60 minutes)

Code Compliance and Energy Savings Improvement Options.....	70 min
Improvement Options Overview	10 min
Performance Compliance Software Introduction	15 min
Improvement Options Exercise	40 min
Discussion	5 min

Break (15 minutes)

Residential Energy Code Forms.....	70 min
Section 402 Forms	5 min
Section 405 Forms	5 min
Using Forms for Permitting Verification	10 min
Using Forms for Field Verification	10 min
Verification Exercise	30 min
Discussion	10 min

Additional Resources.....5 min

Review.....20 min

Break and Testing (30 minutes will be allotted for the exam.)