The Florida Energy Bill and You

How Mandated Increases in Building Energy Performance will Affect the Construction Industry

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On June 25, 2008, Governor Charlie Crist of Florida signed 'The Florida Energy Bill', House Bill 7135[1]. The bill directed the Florida Building Commission (FBC) to establish a schedule to increase the energy efficiency of buildings in a cost-effective manner subject to the Florida Energy Code (Chapter 13 of the Building Code). The first goal of a 15 percent increase in efficiency over 2007 standards was put into effect with the latest release of the Building Code on March 1st. The schedule continues every three years starting in 2010 at 20%, 2013 at 30%, 2016 at 40%, and 2019 at 50%. The bill also requires the FBC to adopt a cost-effectiveness test for energy conservation measures that may be employed to meet these performance goals to ensure they result in a positive net financial impact to the consumer.

The Green Revolution is here.

That concludes your current events lesson for today. Sadly, many of the design professionals in South Florida that we have been talking to recently are oblivious to these changes. For some, the first time they prepare an energy code this month will be their rude awakening that Florida is very serious about its 'green' goals. The purpose of this article is to highlight some of the changes and show how the design of an average commercial building will be affected. Fellow professionals, the Green Revolution is here.

For many years, it has been mandatory to use a software package designed by the Florida Solar Energy Center to prepare energy code reports. This program, called 'Energy Gauge Fla-Com'[2], calculates an energy budget in dollars based on a physical model for a proposed building that includes items such as insulation values of walls and roofs, window types, lighting systems and wattages, SEER ratings of air conditioning equipment, and thermal efficiency of water heaters. The program compares the energy budget for the building with a baseline value and reports pass / fail for several categories. In order to meet the current 15% increase in energy performance, the program simply multiplies the total baseline value by 0.85. With this method, a building can in fact pass each of the required sections but fail the overall test for compliance (See Figure 1). This is the rude awakening some fellow designers will be experiencing this month.

Compliance Summary

Component	Design	Criteria	Result
Gross Energy Cost (in $)	44,550.0	41,977.0	**FAILED**
System Unmet Hours	82.0		**FAILED**
LIGHTING CONTROLS			**PASSES**
EXTERNAL LIGHTING			**PASSES**
HVAC SYSTEM			**PASSES**
PLANT			**None Entered**
WATER HEATING SYSTEMS			**PASSES**
PIPING SYSTEMS			**PASSES**
Met all required compliance from Check List?			**Yes/No/NA**

IMPORTANT MESSAGE
Info 5009 -- -- -- An input report of this design building must be submitted along with this Compliance Report

FIGURE 1

So what is the bottom line for architects, engineers, contractors and the clients we serve? Below is an example that hopefully will illustrate some of the trade-off decisions the design team will need to make now and on into the future.

Our office provided MEP design services for a 45,000 square foot multi-use commercial structure in South Florida. The original design was completed in early 2008 and the building is currently under construction. The building is of typical construction for the South Florida environment: 8" CMU wall with 1" of rigid insulation, wood truss roof system with R-30 spray foam insulation, and typical single-pane storefront windows. The HVAC system is comprised of DX split systems and rooftop units. Both the HVAC system and lighting system are controlled by central digital control system. Utilizing the previous version of the energy code software, FLA/COM 2004, the building 'passed' with a design gross energy cost of 91.4% of the criteria. Under the new version of the energy code software, FLA/COM 2008, the building would need to be 6.4% more efficient in order to receive a passing grade. Obviously, the rules for 'typical construction' in South Florida have changed.

Running simulations using the new software, a variety of options for increasing energy performance were explored. We attempted to discover what would be required to get the building to pass with available technology, keeping both the basic building architecture and system design intact. Below is a chart (Figure 2) showing the measure taken and the resulting increase in performance:

FIGURE 2

Performance Measure	**% Increase**
Increasing the wall insulation from R-6.5 to R-13	1.2
Convert all the glass to low-e	6.0
Reduce glass area by 20%	5.9
Add two points to EER / SEER rating for all equipment	6.3
Reduce lighting levels by 20%	4.2

In this case, increasing the wall insulation and converting the glass to low-e would allow the building to pass. In order to meet the 2010 code requirement of a 20% increase in performance, the reduced glass area option would need to be implemented. Finally, to meet the 2013 code requirement of a 30% increase in performance, the lighting level reduction and increase in EER / SEER rating would need to be implemented. Take note…*at this point it is not clear within the existing software how to approach a 40% or 50% increase in energy performance*.

It should be clear that these new requirements pose cascading challenges to the design team. Decisions about trade-offs with insulation values, shading coefficients, and lighting design will have to be made early in the project life cycle. Gone are the days when the engineer quickly assembles the energy code during the last week of the project. The energy code must be run

with multiple scenarios during the beginning of the construction document phase and the architect, MEP engineer, and interior designer must tightly coordinate these decisions.

You might be wondering why we have not discussed design options that engineers have utilized for years to save energy. For example, variable frequency drives for pumps and fan motors, energy recovery ventilation, or the use of a digital control system to schedule operation and monitor performance of building systems. Well, that is because the software in its current form does not provide a direct means of accounting for those measures. If you choose to utilize VFD's or energy recovery, that is wonderful and you will save energy, but it will not help you pass the Florida Energy Code.

The Florida Energy Bill includes some suggestions for the FBC to explore to help meet the established energy performance goals. These include:

- Solar water heating.
- Energy-efficient appliances.
- Energy-efficient windows, doors, and skylights.
- Low solar-absorption roofs, also known as "cool roofs".
- Reduced-leak duct systems.
- Programmable thermostats.
- Energy-efficient lighting systems.

In the short term, the opportunities for increasing energy performance in the software are limited for commercial buildings. There is no direct method for modeling a solar water heater or to account for the solar-absorption of a roof in the commercial software as there is in the residential version of the software. Architects and engineers must be asking the kinds of questions we asked in our example above. Can we increase wall insulation or use high performance glass? Should we consider modifying the east or west elevation of the building to include less windows? Can we utilize HVAC systems with higher SEER ratings or use fans with smaller motors? Those are really the only options available.

If you are not sufficiently concerned about the energy performance of buildings you are designing <u>right</u> <u>now</u>, it might be too late.

If you are not sufficiently concerned about the energy performance of buildings you are designing *right now*, it might be too late. Imagine this nightmare scenario. You are the architect for a new medical clinic in South Florida. You have designed a dramatic lobby that will be flooded with natural light. But you have also designed a spacious flat roof so your engineer can specify inexpensive rooftop A/C units and keep the cost down for your client. Imagine your horror when three days before your permit submission the engineer tells you that the energy code is failing. He cannot change the EER ratings on his equipment since they are standard rooftop units and their ratings are dictated by the Department of Energy. The lighting designer has trimmed the wattages on her

selections to the bare minimums required by code. The engineer says the only way he can get the energy code to pass is if you convert all of the windows to low-e impact glass. Understandably this will have a profound effect on the construction cost.

The Green Revolution is here and that is good news. However, in the short term there will be growing pains and conflicts to resolve when designing new buildings. How will the FBC adapt to these new requirements and provide for alternative energy conservation measures, some which have been in practice for many years by engineers? The FBC has commissioned a workgroup to address that question looking towards the code revision in 2010[3]. Will the state allow the use of other energy modeling software packages such as Trane's Trace 700 that already make provisions for these measures? That remains to be seen, but serious questions need to be asked about the long term viability of the Energy Gauge software in the face of these proposed performance increases. Finally, how do these changes to the energy code affect buildings that are applying for LEED certification? These are the types of questions design professionals and their clients need to be asking as the Green Revolution moves forward in Florida.

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[1] The bill in its entirety can be downloaded at: http://www.myfloridahouse.gov/Sections/Documents/loaddoc.aspx?FileName=_h7135er.xml&DocumentType=Bill&BillNumber=7135&Session=2008

[2] More about Energy Gauge can be found at http://www.energygauge.com/

[3] More about the FBC workgroup on the energy code can be found at http://consensus.fsu.edu/FBC/2010-Florida-Energy-Code.html

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RGD & Associates Inc. *is one of South Florida's premier consulting engineering firms and has been providing innovative engineering solutions for commercial and residential projects since 1988. More about RGD and their corporate resume can be found at* ***http://www.rgdengineers.com*** *along with this article in .pdf format.*

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