What Does a Performance-Based Energy Code Look Like?

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Who Knows?

- There are no real, honest-to-gosh, performance-based commercial building energy codes in existence

- There are many codes with performance-based trade-off approaches, including all recent versions of Standard 90.1 and the IECC

What's the Big Deal With Performance Codes?

- Performance-based codes force the designer to "make up" for energy inefficient design choices and poor site selection

- Right now, prescriptive model codes allow you to design a building with the worst envelope, the worst lighting, the worst HVAC, and the worst SWH, and orient it all in the worst direction possible

The End of the Worst Possible Building

- Performance-based codes can put an end to this
- Designers can still use an inefficient envelope, but they have to make up for it elsewhere
- Designers can still over-light spaces in a building, but they have to make up for it elsewhere
- Designers can still make poor equipment selection, but they have to make up for it elsewhere

- Eventually, there is no place to “make up for it elsewhere” and designers are forced to design energy-efficient buildings

General Idea

- A performance-based code requires/allows you to design a building that has equal energy performance to a specified target

- A performance-based code has three parts
  - A baseline or target
  - A comparison metric
  - A comparison method

Baselines or Targets

- ASHRAE Standard 90.1-2004 Prescriptive requirements
  - LEED, Federal Standards, ASHRAE Energy Cost Budget method, ASHRAE Linked Criteria
- 2006 IECC Prescriptive requirements
  - IECC Total Building Performance Method
- DOE Commercial Building Energy Consumption Survey Data (real utility billing data)
  - EnergyStar Target Finder

Comparison Metrics

- Site energy
- Source (or primary) energy
- Energy cost
- Tons of carbon or carbon or CO_2 equivalents

- **Saving all of these is good, but some are better than others (depending on your point of view)**
- **Most common right now is energy cost**

Comparison Methods

- ASHRAE Standard 90.1-2004 Energy Cost Budget Method
- ASHRAE Standard 90.1-2004 Performance Rating Method
- ICC 2006 IECC Total Building Performance Method
- Simulation of Whole Building with any approved simulation tool

General Rule

Performance-Based = Simulation Required

- If using a prescriptive baseline, two simulations may be required – baseline plus proposed design
- If using a performance baseline, only one simulation is required – proposed design only

- Exception – ASHRAE linked criteria approach can also generate prescriptive package options

Corollary

Simulation Required = Checking Required

- Checking a whole building simulation (or two) requires not only knowledge of the baseline requirements of the code, but also of the use of the simulation tool
- The details of what is simulated and how it is simulated can be very important

Questions for States

- Are you ready to adopt a new commercial building energy standard that is performance-based?
- Are you ready to enforce a new commercial building energy standard that is performance-based?
- What do you need from DOE to make your answers to the first two questions “yes”?

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