EE 1: IMPROVE ENERGY MODELING FOR BUILDING DESIGN

ANSI/ASHRAE/IESNA Standard 90.1 (2007), as incorporated in Chapter 13 of the New York City Building Code
Proposal developed by the Energy & Ventilation Committee

Summary

Issue:
ASHRAE 90.1 allows designers to follow a prescriptive path or to use energy modeling to demonstrate compliance. Energy modeling, however, is prone to manipulation because it lets enhanced efficiency in one energy system be traded off against poor efficiency in another system.

Recommendation
Require projects using energy modeling to demonstrate design energy use that is 14% lower than the prescriptive path.

Proposed Legislation, Rule or Study

Amendments to ANSI/ASHRAE/IESNA 90.1 (2007), as incorporated in Chapter 13 of the New York City Building Code:

1. Amend Section 4.2.1.3 as follows:

4.2.1.3 Alterations of Existing Buildings. Alterations of existing buildings shall comply with the provisions of Sections 5, 6, 7, 8, 9, and 10 or Section 11 provided, however, that nothing in this standard shall require compliance with any provision of this standard if such compliance will result in the increase of energy consumption of the building.

2. Amend Section 11.1.4 as follows:

11.1.4 Compliance. Compliance with Section 11 will be achieved if

a. all requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 are met;

b. the design energy cost, as calculated in Section 11.3, does not exceed 90% of the energy cost budget, as calculated by the simulation program described in Section 11.2, for New Buildings, or does not exceed 95% of the energy cost budget, as calculated by the simulation program described in Section 11.2, for alterations of existing buildings or additions to existing buildings; and

c. the energy efficiency level of components specified in the building design meet or exceed the efficiency levels used to calculate the design energy cost.

Supporting Information

Issue- Expanded
The currently allowable tradeoffs permit, for instance, that the energy efficiency gained by lower lighting density in MEP rooms can be traded off against a lower efficiency for the façade, even though the life expectancy of the two systems is greatly different. This type of allowable tradeoff creates a problem, since the short-life energy efficiency measures may not be continued after their useful life ends, while the inefficiency of long-lived systems will remain in place for a very long time. Also, while very hard to quantify, there is no doubt that a certain amount of gaming is possible under the performance path, leading to buildings whose actual performance falls short of the estimates generated during design. The purpose of this proposal is to level the playing field on both counts, and to ensure that buildings permitted using the performance path perform during their lives as well as buildings permitted under the prescriptive path.

Environmental & Health Benefits
Environmental and health benefits, in terms of calculated savings, at level of building/installation (and sometimes at citywide level) will accrue due to lower energy use.

This proposal was found to have a high, positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 2.

This proposal was found to have a positive, indirect health impact.

Cost & Savings
As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.

This proposal was estimated to increase first capital costs by 0.3% to 2.9%, depending on building type. It was thus categorized as incurring a medium to higher capital cost increment. This proposal was also estimated to generate financial savings that will pay for the capital costs in three to ten years depending on the building type.

Precedents
There are no known precedents for this proposal.

LEED
LEED prerequisites for Minimum Energy Performance under the Energy & Atmosphere sections of LEED NC, LEED CS, LEED CI and LEED for Schools require that the scope of work complies with ANSI/ASHRAE/IESNA standard 90.1-2007. In addition, a greater number of LEED points or “Optimize Energy Performance” accrue as the project’s energy cost budget decreases below that of the base case building. This proposed code requires compliance with measures exceeding ASHRAE 90.1-2007, and will require performance consistent with two points in this category.

Implementation and Market Availability
There are no known implementation difficulties for this proposal.

Notes
The committee notes that if the percentage savings were calculated under Appendix G instead of Chapter 11, the buildings would have a more uniform baseline. The difference in baselines is most important for residential-type buildings (housing, hotels, and dormitories). Under Appendix G all residential-type buildings would have as a baseline PTACs. Under Chapter 11, a residential building using PTACs would have PTACs as a baseline, if using water loop heat pumps would have water loop heat pumps as a baseline, and if using an absorption chiller would have an absorption chiller as a baseline. If each of these buildings demonstrated 14% reduction in energy cost against its own baseline, the building with PTACs would probably have a significantly higher energy cost than the one with the absorption chiller. Such difficulties stem from the fact that Chapter 11 was not devised to be used as a baseline in order to demonstrate percentage energy savings; it is Appendix G that was created for this purpose. Yet Chapter 11, rather than Appendix G, forms the basis for the Energy Code.

However, Appendix G requires that the entire energy use of the building be included in the calculation, while Chapter 11 refers only to regulated loads (i.e., excluding computers, printers, copiers, elevators, escalators, kitchen, dishwashing, drying, process and others). Also, for Core & Shell, Chapter 11 refers only to the uses under the control of the developer (i.e., excluding the tenant loads such as lighting and computers). Thus, a 10% reduction under Chapter 11 is easier to attain than a 10% reduction under Appendix G, if the baseline is the same – as is usually the case for office buildings.

The committee will consider the ramifications of substituting the requirements for Appendix G to the ones for Chapter 11. One possibility may be to address the most significant problem in Chapter 11 by requiring, for residential-type buildings, that the baseline be made PTACs regardless of the system type used in the design.