

GREEN edge

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Like the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system, the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) Energy Standard 90.1 has fundamentally transformed building design in this country. And like LEED, Standard 90.1 has some fundamental flaws that need to be addressed to keep up with the rapidly evolving green building market. Many highly cost effective energy strategies are not recognized or encouraged in Standard 90.1. This has resulted in a huge missed opportunity in new buildings, especially green buildings. Luckily some simple solutions are available.

The LEED rating system and ASHRAE Standard 90.1 are intertwined. Ten of the possible 69 points in the LEED system are based on an analysis of a building's energy performance using Standard 90.1. This analysis requires the comparison of a "proposed" building's energy performance as compared to a "budget building design." Standard 90.1 sets requirements for the budget building as well as the proposed building. USGBC requires the use of the 1999 version of Standard 90.1. ASHRAE released a 2001 version of the standard and has recently released addendum e. This addendum addresses energy modeling of base case and proposed buildings. The 2001 version will be combined with addendum e and other addendums in a 2004 version later this year or early next year.

Standard 90.1-1999 allows designers to get credit for such energy saving strategies as better glazing, more insulation, window overhangs, improved lighting and more efficient cooling compressors. However, some of the best and most cost effective strategies listed below are not given credit.

EFFICIENT BUILDING STRATEGIES THAT ARE NOT GIVEN CREDIT IN ASHRAE 90.1-1999

- Building orientation and shape
- Efficient and low pressure drop fan systems
- Low energy pumping systems
- Low energy office equipment
- Efficient exterior lighting
- Switching from air cooled chillers or package units to water cooled chillers
- Daylight lighting controls
- Demand controlled ventilation (using CO2 sensors)
- High thermal mass buildings

Fortunately the 2001 version of Standard 90.1 with addendum e does include these and other strategies. For example, it encourages efficient fan systems or better building orientation that often can be implemented in a way that lowers construction costs. The energy impacts of better fan systems in climates where economizers are used can result in 20 to 50 percent lower HVAC energy use! We have often found that designers are overlooking these options because they are not rewarded with additional LEED points. Once a building is built these things are often impossible to retrofit. This represents a huge lost opportunity.

There remain important strategies that even Standard 90.1-2001 with addendum e does not recognize. These include non-compressor-based cooling, operable windows, and adaptive comfort based on air movement and radiative surface temperatures.

In a recent building design, we modeled the allowed energy savings using both the 1999 and 2001 with addendum e versions of Standard 90.1. The results were stunning. The building showed a small 9 percent sav-



IT'S TIME TO GIVE CREDIT
WHERE (ENERGY)
CREDIT IS DUE

ings as compared to 90.1-1999 using that older version's more restricted approach. Yet the Standard 90.1-2001 with addendum e method indicated a 42 percent savings.

We also modeled the building compared to a standard new construction practices for that area and found almost 50 percent savings. While this is a somewhat unusual example since the building is a laboratory building with high fan loads and very good low fan power design, the point remains the same; the Standard 90.1-2001 with addendum e more closely reflects actual savings.

So what is the solution? We advocate the immediate adoption of Standard 90.1-2001 with addendum e as the LEED standard, with pending adoption of Standard 90.1-2004 when ASHRAE approves it later this year. The USGBC can move decisively and quickly to utilize this new energy standard and help architects and designers get credit where credit is due. +

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