Fact Sheet

RE 188-13: Adding a Rating-Based Compliance Path to the IECC

Together, the Leading Builders of America, Institute for Market Transformation, Britt/Makela Group and Natural Resources Defense Council have proposed a change to the 2015 International Energy Conservation Code (IECC) that would result in significant energy savings, while providing more flexibility to builders. Leading Builders of America represents 20 of the nation's largest builders accounting for 40 percent of the new single-family homes market, NRDC is a nonprofit environmental advocacy organization representing 1.3 million members and online activists, and IMT is nonprofit advocacy organization focused on improving energy efficiency in buildings. In total, almost 90 small builders and other businesses large and small that have a stake in new home building and energy efficiency have already joined in supporting this proposal.

What are we proposing?

The proposal (RE 188-13 with modifications that were jointly sponsored) would establish a new voluntary performance compliance path for the 2015 IECC: in addition to the option of prescriptive compliance and the current performance path, builders will have the option of complying by meeting the mandatory requirements, including the water heating provisions, and then meeting the target "Energy Rating Index" (ERI) score shown below. The ERI score is defined as a numerical score where 100 is equivalent to the 2006 IECC and 0 is equivalent to a net-zero home. The current HERS (Home Energy Rating System) rating is compatible with the ERI requirements in the proposal so a builder could utilize a HERS rating to comply using the ERI path. The required scores are:

Climate Zones 1-3: 59

Climate Zones 4-5: 63

Climate Zone 6: 62

Climate Zones 7-8: 60

In addition, the builder must comply with the envelope requirements of the 2009 IECC as a mandatory minimum. These include minimum insulation and window performance.

How were the scores derived?

The scores in our proposal are intended to reflect the highest levels of efficiency that we believe are cost-effective. They were also designed to assure that the code moves forward—and prohibits backsliding—for all of the advances in energy efficiency measures required in the current 2012 IECC.

They are based on two equivalent concepts: first, that we reduce energy use by an additional 10% compared to a home with the 2012 envelope and duct systems, recognizing that minimum equipment efficiencies will be higher in 2015 than they are today, and also assuming best-case orientation and architecture of prototype homes. Alternately, the numbers are obtainable by combining the 2012

envelope with state-of-the-shelf HVAC (Heating, Ventilation and Air Conditioning systems) and water heating equipment: SEER 16 air conditioners in the South, 94% AFUE furnaces in the North, and point-of-use gas or ENERGY STAR® electric water heaters.

What are the benefits of the proposal?

From the builder's viewpoint, this method allows greater flexibility to deliver greater energy efficiency at a lower cost. Leading Builders of America estimated that a home that costs $3,000 extra to build for energy efficiency obtained through prescriptive methods only costs $1,300 for the same performance obtained by our proposed approach. Our method has the added benefit for builders of using an industry standard efficiency report to demonstrate code compliance.

From the consumer's perspective, this proposal provides substantial reductions in utility bills—about $300 a year for a typical house compared to the 2012 IECC or $850 compared to the 2006 IECC. In addition, it makes it likely that the rating will be provided to the buyer (since there is no cost to doing so), creating stronger markets for beyond-code homes, by clearly demonstrating their lower operating costs and providing guidance to the occupant on what their utility bills should be if they operate the home conservatively.

From the viewpoint of compliance, a code official will now have an additional tool to verify compliance using this path: documentation of the ERI score and of meeting the mandatory code provisions prepared by a certified third-party. The third-party verifiers will improve compliance because they are quality-checked on a random sample of their work. It can also be anticipated that they will disclose the results to the home's occupants, providing another layer of verification.

How does the proposal treat electricity compared to gas?

The proposal builds on IECC's traditional structure of not encouraging one fuel over another. The score of a home does not depend on whether the builder uses electricity, gas, or other fuels for space and water heating. Changing from a minimum efficiency gas product to a minimum-efficiency electric product does not affect the score—neither does changing from a high-efficiency gas product to a high-efficiency electric product.

Who supports the proposal?

This proposal is supported by its original sponsors, by the Leading Builders of America and its members, RESNET, along with Air Conditioning Contractors Association, the Santa Fe Home Builders Association, the Washington State University Energy Program and Insulate America. A full listing of supporters can be found here.

Recommended action

We urge the ICC voting members to approve the proposal, as amended by our jointly sponsored Public Comment for proposal RE188-13.

Appendix A: Background Information

How are savings calculated? The savings ***for an individual house*** were estimated based on the HERS score as utility bills are about proportional to the score. The IECC 2006 defines the HERS reference house whose score is set at 100. Based on the Florida Solar Energy Center study[1], the construction-weighted average HERS score for a home built to the 2012 code is about 75 and for this proposal about 61.

Thus the savings for this proposal compared to the 2006 code are approximately 39% (100-61 divided by 100) and compared to the 2012 code are about 19% (1-61 divided by 75). Two states and a few local jurisdictions have adopted the 2012 IECC. All but about 12 states have adopted the 2006 or 2009 codes.

The U.S. Energy Information Administration's residential energy consumption survey estimates that the average annual energy costs for a home built between 2000 and 2009 are $2,174. We assume that this is the average utility bill for a home built to the 2006 IECC. These assumptions yield conservatively low estimates of the benefits: the average efficiency of a home built during this time may be somewhat lower than the 2006 IECC, due to inadequate enforcement of the IECC, and single family house size has been increasing over this period.

Multiplying these average energy costs by the 39% energy savings yields annual energy bill savings of approximately $850 compared to the 2006 code.[2] By the same estimates, a home built to the 2012 code would cost approximately $1,630 to operate on average and the proposal would save $300 per year compared to a home built to the 2012 code.

For the savings ***for the nation as a whole*** we estimate annual and cumulative savings in 2030.

We start with the savings for an individual house, assume full adoption in 2016 and accumulate the savings between 2016 and 2030. How many new houses should we assume? This is problematic because the industry constructed about 1.5 million homes a year during the past decade but the number was down below 400,000 in 2011. For the purposes of this study, we assume a constant build rate of 1 million per year.

Using these assumptions we find that annual savings will be over $12.7 billion in 2030 and cumulative savings will be $102 billion compared to the 2006 IECC. Annual greenhouse gas emissions reductions will be 70 million metric tons (MMT) carbon dioxide pollution (CO2) equivalent and cumulative emissions

[1] http://www.resnet.us/uploads/documents/FSEC-CR-1941-13_R01.pdf

[2] Our estimates of savings are rounded to avoid the impression of more precision than the data really allow. There are not reliable data available on the average bills of homes across the U.S. that meet any given level of code stringency, so the uncertainties in the base case make rounding the best way to convey useful information.

reductions will be 560 MMT CO2 equivalent, approximately equal to the emissions produced by 20 and 158 coal fired power plants, respectively.

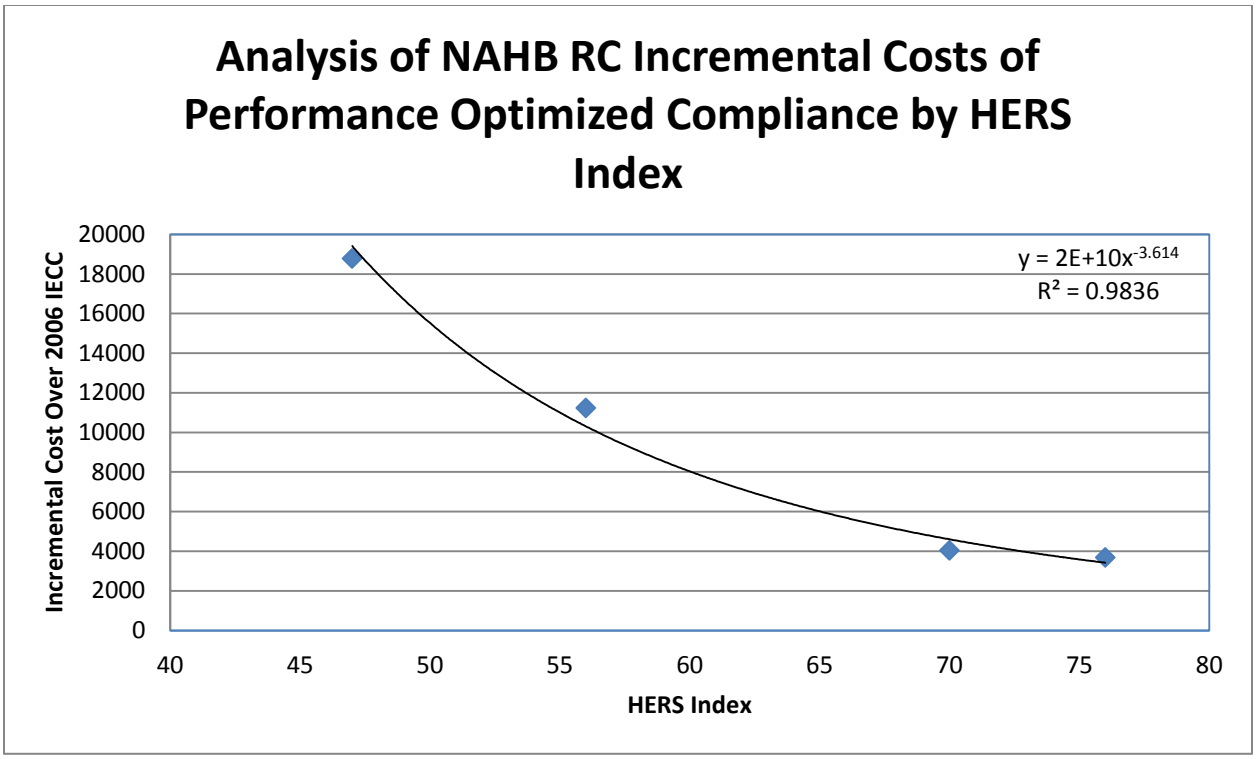
Is the proposal cost-effective?

The proposal is extremely cost-effective, in large part because of the flexibility it offers. Our estimates compare the cost and savings to the 2012 code, since this is the most conservative case: the costs of efficiency generally grow faster than the savings, so the last increment is the most expensive.

For costs, we use the LBA-commissioned NAHB Research Center study and compare the costs of flexible compliance with our proposal to the costs of meeting the 2012 IECC prescriptively. We do this because there is not a tradeoff approach going beyond the envelope in the 2012 code. The study estimated that national average costs of 2012 compliance are $6,368. The report does not estimate the costs for the proposed ERI 61 level, but it does project costs of meeting:

- the 2012 IECC,
- Energy STAR,
- a level of 50% beyond 2006, and
- a level 60% beyond 2006,

The study found that the HERS index corresponding to each of these levels were 76, 70, 56, and 47, respectively, and that the cost of compliance compared to the 2006 IECC using the performance method was $3,687, $4,043, $11,237, and $18,783, respectively. We charted these HERS indices and average incremental costs and derived an equation with an R-squared valued of .98 to estimate the incremental costs of meeting a HERS index of 61. Using this equation we found an average incremental cost of $7,060 compared to the 2006 IECC and $693 compared to prescriptive compliance with the 2012 IECC ($7060-$6368).



These costs typically will be financed by a 30-year mortgage with 20% down. We assume the interest rate is 4.5%. The incremental down payment is then $139. The monthly payments increase $2.81 but utility bills go down $25.36. So the down payment is paid back in just over months.

We must re-emphasize how cautious these assumptions are. Costs of efficiency tend to decline with experience and with market share. As this proposal becomes more widely used, the costs of most efficiency components will decrease, and new techniques for design will further accelerate the decrease.

And if the SAVE Act, a proposal that the sponsors all endorse, is passed, the entire cost of efficiency can be financed. In this case there is no initial cost impact but mortgage payments go up $3.51; so the consumer saves $21.85 a month on net from the very first month, with savings increasing as utility rates go up. For additional information on the SAVE Act, click here.

What are the main objections to the proposal?

The proponents do not anticipate many objections. We are not aware of any interest that would be opposed to a new technique for code compliance that saves energy, reduces costs for builders, and makes code simpler to enforce.

There are three technical issues that some may raise, however, and we respond to them next:

Q: Does inclusion of mechanical systems as a tradeoff violate federal pre-emption of state standards on equipment efficiency?

A: No. A code cannot be based on equipment efficiency higher than the National Appliance Energy Conservation Act (NAECA) minimum, either as a requirement or in the reference house for a tradeoff procedure. But the ERI scores in this proposal do not even mention an equipment level. They are *a percentage reduction from* a reference home. Restrictions on the characteristics of the equipment in a reference home apply only if the energy use of the proposed home is evaluated against the energy use of a reference home, not if it is compared to a fraction of such energy use. The concept of a standard that is a percentage below a prescriptive level was tested in a lawsuit in the State of Washington and found to pass muster.

Q: How would ERI be policed?

A: A state or jurisdiction adopting the International Energy Conservation Code can specify any method it chooses, but the existing compliant Energy Rating Index (ERI) method—RESNET's "HERS Score"—includes elaborate quality control and quality assurance. RESNET certifies raters who have the training and have passed field and on-line tests; RESNET also requires continuing professional education and periodic recertification, as well as compliance with ethical standards. At least 1% of every rater's output each year must be rechecked by an independent rater, and the two ratings must agree within 3 ERI/HERS points. In addition, the proposal requires that verification of compliance be done by an approved third party.

Q: How does ERI treat different heating fuels?

A: Interests associated with suppliers of both gas and electricity have been fighting battles over this issue for at least 40 years. Each of these interests supports a method that would in their judgment offer an incentive for using their fuel rather than the other. Choosing either one of these methods would be considered to be unfair and unjustified by proponents of the other.

ERI solves this by following the example that the ICC has used for 20 years or more: it sets up equations to **assure that the ERI score remains unchanged when the builder switches fuels** for either heating or hot water or both.

The language we propose in Section 406.6.1 item 5 is: "Calculations that account for the differences in the heating, cooling and hot water equipment efficiencies of the *reference design* and the *proposed design, and* normalize for the differences in fuel types."

Systems that comply with this language assure that not only does the score remain unchanged when the builder swaps electricity for gas or vice versa at minimum efficiency levels, it also remains unchanged for the highest efficiencies. The latter criterion is important because the range of efficiency between high and low is currently greater for electricity than for gas. If we did not include this condition, changing fuels to electricity would help the builder comply with an ERI score because he could gain more credit for a high efficiency heat pump than for a high efficiency gas furnace. Such a concern caused Congress to limit the amount of credit that builders could take for equipment efficiency improvements used to comply with the Section 45L builders tax credit.

If you want to follow the code philosophy that builders cannot improve their ERI score merely by switching fuels, whether with high efficiency or minimum efficiency, then you have no choice but to employ principles of item 5 for the ERI system. If you change the principle, you change the policy outcome and the IECC would begin to encourage the builder to choose one fuel rather than the other.

In sum, any other method that has been proposed in the code world for comparing heating fuels would inevitably encourage fuel switching as a means of code compliance.