RE186 – "Builder Flex Beyond the 2012," As Modified

No other proposal in this year's code cycle will produce an additional 5% savings from all residential buildings subject to the code. By giving builders broad flexibility after they've complied with the other provisions of the code, the concept of RE186 could become the template for future code cycle gains that build on the gains incorporated in the 2012 IECC.

In the 2012 IECC, the ICC accomplished the monumental task of improving the 2006 IECC by more than 30%. **But the effort must not stop there. In addition, to preventing any backsliding on 2012 requirements, we believe that a reasonable improvement in efficiency is necessary for 2015 and a framework should be established for future improvements. RE186 accomplishes these objectives.**

RE186 would improve the overall energy efficiency required by the IECC and IRC by 5% over the 2012 IECC, guaranteeing a reduction in a new home's energy consumption and homeowner operating costs. Builders complying with the IECC prescriptive or performance paths will be required to achieve a mandatory minimum of 5% more energy savings under this proposal by choosing additional efficiency measures from a menu of options. RE186's new mandatory set of points-based options – where 1 point equals a 1% efficiency gain over the current code in each respective climate zone – is predicated on the notion that:

- The current code requirements (reflecting the improvements made in the 2012 IECC) represent a solid foundation of long-lasting "whole house" efficiency improvements, and that
- Builders should have the flexibility to determine the additional improvements that build on that foundation.

The proposal lays the groundwork for future efficiency improvements by establishing a framework with both prescriptive- and performance-based compliance options. In addition to achieving a reasonable, but modest, 5% boost in energy efficiency in the 2015 *IECC* (assuming no other backsliding), RE186's "Flex Point" concept can easily be modified to meet specific future IECC improvement goals (i.e., a 10-point, or 10%, option set for the 2018 IECC). Somewhat similar "options-based" approaches are currently in force in both the 2012 IECC's commercial chapter (section C406) and in individually-developed codes adopted in two states.

An additional 5% improvement in efficiency in the 2015 IECC is not only feasible, but is crucial to sound national energy policy and our nation's energy future. From a national energy policy standpoint, the need to continue to improve building efficiency has not changed with the development of the 2012 IECC (America's homes and commercial buildings use 42% of total energy, 54% of its natural gas, and 71% of its electricity).

Efficient homes built to the 2012 IECC generate significant homeowner energy savings that quickly recoup the added cost of these improvements. The U.S. Department of Energy determined that average homes built to the 2012 IECC generate life-cycle (30-year) homeowner cost savings ranging from $4,763 in Climate Zone 2 to $33,105 in Climate Zone 8 over average homes built to the 2006 IECC. Even after accounting for the incremental up-front costs of mortgage fees and down payment, *a homeowner's cumulative cash flows become positive within a year or two in all eight regions*.

RE186 creates incentives for code users to implement high-efficiency heating, cooling, and water heating systems, or other alternatives, without degrading the thermal building envelope or violating federal law. Code-writing organizations have long wrestled with the dilemma of how to

incorporate high-efficiency equipment requirements into the code without violating federal law or sacrificing thermal envelope improvements. Code officials removed equipment trade-offs from the 2009 IECC to resolve both issues and 2/3 of the states have adopted either the 2009 or 2012 IECC and have followed suit. That said, RE186 takes the next step by offering builders the choice of equipment upgrades among several other potential improvements beyond the current IECC baseline requirements (reflecting the 2012 IECC), which we are working hard to keep intact.

RE186 creates a highly flexible method to achieve additional energy savings that would be impractical or difficult to require in the current IECC and IRC structure. The result is a broader array of possible efficiency improvements beyond the 2012 IECC:

- Some emerging technologies save energy, but due to limited availability, high cost, or federal laws, it may not be reasonable – or even legal – to require them in every building. For example, RE186 includes high-efficiency heating, cooling, and water heating options that can be provided as a builder-selected option, but cannot be required outright because of preemption by federal law.
- While jurisdictions often balk at requiring innovative building practices or emerging technologies for all new homes, offering them as builder options gives them a foothold in state and local building codes and allows consumers and the market to determine the most feasible options for any given project. For example, ground-source heat pumps can offer significant energy savings, but because of geological features or regulatory issues, they may not be appropriate in all circumstances. RE186 incents the installation of ground source heat pumps and other emerging technologies and practices, but also offers many other comparable options that achieve the same level of savings.

In short, RE186 recognizes the energy savings potential of a range of systems and building components that currently aren't feasible for I-Code baseline requirements and it also includes envelope-only measures that reward builders for going well beyond the current code requirements. The result is a flexible system of builder options that that goes beyond the current IECC and IRC, incents good building practice and technologies, and gives jurisdictions an easily-adaptable and easy to administer method to set ever-improving efficiency requirements.

How "Builder Flex Beyond the 2012" Works

RE186 maximizes flexibility by establishing multiple methods of compliance for new buildings and additions of more than 1,000 square feet (smaller additions, alterations, renovations, and repairs are currently proposed to be exempt to keep the proposal simpler):

Code users who prefer a straightforward points-based approach can choose from a number of options for each climate zone that can be combined for a total of at least 5 points. Each point represents roughly a one percent decrease in the present value of energy costs over the life of the building (so 5 points equal roughly a 5% improvement in efficiency over the 2012 IECC).

Code users preferring the simulated performance alternative will achieve compliance if the proposed design demonstrates an energy cost less than or equal to 95% of the standard reference design (they can also use the points system so long as they don't "double count" any improvements used in points compliance in their performance analysis).

Finally, RE186 allows users to comply via renewable energy systems, which is not an option under current codes.

The "Flex Points" Calculation Methodology is Sound: Each Flex Point equals a one percent boost in the present value of energy cost savings over the current, 2012 IECC for a 20-year period. The calculations by ICF, International limit the life of all measures to a maximum 30-year life (consistent with a typical mortgage term), and incorporate both relevant federal equipment standards and the estimated useful life of each efficiency measure. This approach conservatively recognizes the additional

benefits from measures that achieve longer-term savings. **While no building energy simulation on this scale will be perfect, the analysis behind the Flex Points tables is among the most sophisticated and detailed of its type.** And, because the analysis uses the U.S. Department of Energy's building analysis and present value calculation methodology, future table updates will be easy to make.

Specifically, the analysis includes 105 TMY3 weather locations and 12 building types to account for varying stories, foundations, and fuel types for each of the baseline and upgrade measures. Present value calculations aligned with the U.S. Department of Energy's "Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes" were used to determine the present value of energy savings in determining point values.

Flex Point compliance options can be easily updated in the future. For example, as they become available, new and improved technologies and building practices can be added to the table – along with a corresponding point value – without a total rewrite of the code.

FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Under RE186, builders are required to achieve a 5% boost in efficiency over the 2012 IECC. If they opt to use the proposal's "Flex Points" table below, they can select specific efficiency measures from eight categories that total *at least* 5 points (each point has been calculated to equal a 1% increase in building energy efficiency over the 2012 IECC in the respective climate zone where the home is being constructed). *Note that several of the measures allow the builder to go beyond the mandatory 5% efficiency gain.*

Measure Number	Measure Description	Flex Point Value								
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 4C [a]	CZ 5	CZ 6	CZ 7	CZ 8
1a	≥ 2.5% reduction in total UA [b]	1	1	2	2	2	2	3	4	4
1b	≥ 5% reduction in total UA [b]	3	3	3	3	3	4	5	5	5
1c	≥ 7.5% reduction in total UA [b]	5	5	5	5	5	6	7	8	8
1d	≥ 10% reduction in total UA [b]	6	7	7	7	8	8	9	10	10
2a	≥ 10% reduction in glazed fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-
2b	≥ 20% reduction in glazed fenestration area-weighted average SHGC	4	1	-	-	-	-	-	-	-
3a	≤ 4 ACH50 air leakage rate with ERV or HRV installed [c]	1	2	-	-	-	-	-	-	-
3b	≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]	2	4	5	7	7	7	7	8	8
3c	≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]	2	5	7	9	9	9	10	11	11
4a	≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2	1	1	1	1	-	1	1	1	1
4b	100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*	1	1	1	1	1	1	2	2	2
4c	100% of duct thermal distribution system located in *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
4d	100% of ductless thermal distribution system located in *building thermal envelope* ~~*passively conditioned space* and/or *actively conditioned space*~~ [d]	8	8	9	11	8	12	15	17	17
4e	100% of hydronic thermal distribution system located in *building thermal envelope* ~~*actively conditioned space*~~ [d]	8	8	9	11	8	12	15	17	17
5a	≥ 15 SEER and ≥ 12.5 EER cooling system efficiency [e]	2	2	1	-	-	-	-	-	-
5b	≥ 16 SEER and ≥ 13 EER cooling system efficiency [e]	5	4	1	1	-	-	-	-	-

5c	≥ 18 SEER and ≥ 14 EER cooling system efficiency [e]	9	7	3	2	-	-	-	-	-
5d	≥ 16 EER cooling system efficiency [e]	10	7	3	2	-	-	-	-	-
5e	≥ 18 EER cooling system efficiency [e]	13	10	4	2	-	1	-	-	-
5f	≥ 20 EER cooling system efficiency [e]	16	12	5	3	-	1	-	-	-
6a	≥ 90 AFUE heating system efficiency [f]	-	2	4	6	6	7	8	8	9
6b	≥ 92 AFUE heating system efficiency [f]	-	2	5	7	7	8	9	10	11
6c	≥ 95 AFUE heating system efficiency [f]	-	2	6	8	9	10	11	12	13
6d	≥ 96 AFUE heating system efficiency [f]	-	2	6	9	10	10	11	12	14
6e	≥ 98 AFUE heating system efficiency [f]	-	3	7	10	11	12	13	14	15
7a	≥ 8.8 HSPF heating system efficiency [f]	-	-	-	-	-	-	-	-	-
7b	≥ 9.5 HSPF heating system efficiency [f]	-	-	1	2	2	2	2	2	1
7c	≥ 10.5 HSPF heating system efficiency [f]	-	1	2	4	4	5	4	3	3
7d	≥ 3 COP heating system efficiency [f]	-	1	2	3	3	4	3	3	2
7e	≥ 3.5 COP heating system efficiency [f]	-	2	4	6	6	8	7	6	5
7f	≥ 4 COP heating system efficiency [f]	-	2	5	8	9	10	10	9	7
8a	≥ 0.7 EF for fossil fuel service water heating system	2	2	-	-	-	-	-	-	-
8b	≥ 0.8 EF for fossil fuel service water heating system	7	5	4	3	2	2	2	1	1
8c	≥ 0.95 EF for electric service water heating system	-	-	-	-	-	-	-	-	-
8d	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2	2
8e	≥ 0.4 Solar Fraction for service water heating system	8	9	9	7	9	6	5	4	3

a. Climate Zone 4C is Climate Zone Marine 4.

b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.

c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).

d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts ~~or pipes~~ used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.

e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.~~2~~1 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.

f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.~~2~~1 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.