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[6450-01-P]

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

[EERE-2014-BT-DET-0030]

RIN 1904-AD33

Determination Regarding Energy Efficiency Improvements in the 2015 International Energy Conservation Code (IECC)

AGENCY: Energy Efficiency and Renewable Energy, Department of Energy

ACTION: Notice of Determination

SUMMARY: The U.S. Department of Energy (DOE) has determined that the 2015 edition of the International Energy Conservation Code (IECC) would improve energy efficiency in buildings subject to the code compared to the 2012 edition. DOE analysis indicates that buildings meeting the 2015 IECC (as compared with buildings meeting the 2012 IECC) would result in national source energy savings of approximately 0.87 percent, site energy savings of approximately 0.98 percent, and energy cost savings of approximately 0.73 percent of residential building energy consumption, as regulated by the IECC. Upon publication of this affirmative determination, each State is required by statute to certify that it has reviewed the provisions of its residential building code regarding energy efficiency, and made a determination as to whether to update its code to meet or exceed the 2015 IECC. Additionally, this notice provides guidance to States on these processes and associated certifications.

DATES: Certification statements provided by States must be submitted by **[INSERT DATE TWO YEARS AFTER THE DATE OF PUBLICATION IN THE FEDERAL REGISTER].**

ADDRESSES: Certification Statements must be addressed to the Building Technologies Office – Building Energy Codes Program Manager, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Avenue SW EE-5B, Washington, DC 20585.

FOR FURTHER INFORMATION CONTACT:

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For legal issues, please contact Kavita Vaidyanathan; U.S. Department of Energy, Office of the General Counsel, 1000 Independence Avenue SW GC-33, Washington, DC 20585; (202) 586-0669; Kavita.Vaidyanathan@hq.doe.gov.

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I. Introduction

A. Statutory Authority

Title III of the Energy Conservation and Production Act (ECPA), as amended, establishes requirements for building energy conservation standards, administered by the DOE Building Energy Codes Program. (42 U.S.C. 6831 *et seq*.) Section 304(a), as amended, of ECPA provides that whenever the 1992 Model Energy Code (MEC), or any successor to that code, is revised, the Secretary of Energy (Secretary) must make a determination, not later than 12 months after such revision, whether the revised code would improve energy efficiency in residential buildings, and must publish notice of such determination in the *Federal Register*. (42 U.S.C. 6833(a)(5)(A)) The Secretary may determine that the revision of the 1992 MEC, or any successor thereof, improves the level of energy efficiency in residential buildings. If so, then not later than two years after the date of the publication of such affirmative determination, each State is required to certify that it has reviewed its residential building code regarding energy efficiency, and made a determination as to whether it is appropriate to revise its code to meet or exceed the provisions of the successor code. (42 U.S.C. 6833(a)(5)(B)) State determinations are to be made: (1) after public notice and hearing; (2) in writing; (3) based upon findings included in such determination and upon evidence presented at the hearing; and (4) available to the public. (*See* 42 U.S.C. 6833(a)(2)) In addition, if a State determines that it is not appropriate to revise its residential building code, the State is required to submit to the Secretary, in writing, the reasons, which are to be made available to the public. (*See* 42 U.S.C. 6833(a)(4))

ECPA requires the Secretary to permit extensions of the deadlines for the State certification if a State can demonstrate that it has made a good faith effort to comply with the requirements of section 304(a) of ECPA, and that it has made significant progress in

doing so. (42 U.S.C. 6833(c)) DOE is also directed to provide technical assistance to States to support implementation of State residential and commercial building energy efficiency codes. (42 U.S.C. 6833(d))

B. Background

The International Energy Conservation Code (IECC) is the national model code establishing energy efficiency requirements for residential buildings. The IECC is revised every 3 years through a code development and consensus process administered by the International Code Council (ICC)[1]. Code change proposals may be submitted by any interested party, and are evaluated through a series of public hearings. As part of the ICC process, any interested party may submit proposals, as well as written comments or suggested changes to any proposal, and make arguments before a committee of experts assembled by the ICC. At the final public hearing, arguments are presented to and voted upon by the ICC Governmental Member Representatives, with the collection of accepted proposals forming the revised edition of the IECC. The ICC published the 2015 edition of the IECC (2015 IECC or 2015 edition) on June 3, 2014, which forms the basis of this determination notice.

In arriving at its determination, DOE reviewed all changes between the 2012 and 2015 editions of the IECC with respect to residential buildings. Accordingly, DOE published a Notice of Preliminary Determination regarding the 2015 IECC in the Federal Register on September 26, 2014 (79 FR 57915).

C. Public Comments Regarding the Determination

[1]More information on the ICC code development and consensus process is described at http://www.iccsafe.org/cs/codes/Pages/procedures.aspx

DOE accepted public comments on the Notice of Preliminary Determination for the 2015 IECC until October 27, 2014. DOE received timely submissions from a total of five submitters.

Table I Inventory of Public Comments Received

Submitter	Number of Comments	Public Docket Reference
International Code Council (ICC)	3	EERE-2014-BT-DET-0030-0002
National Association of Home Builders (NAHB)	2	EERE-2014-BT-DET-0030-0003
Responsible Energy Codes Alliance (RECA)	9	EERE-2014-BT-DET-0030-0004
Natural Resources Defense Council (NRDC)	4	EERE-2014-BT-DET-0030-0005
Individual Commenter (Conner)	1	EERE-2014-BT-DET-0030-0006

ICC's first comment offers general support for DOE's preliminary determination. (ICC, No. 2 at p. 2)[2] In its second comment, ICC suggests DOE accompany its 2015 IECC determination with "previously released information regarding the increased efficiency of the 2012 IECC over the 2009 version, and the increased efficiency of the 2009 version over the 2006 version, in order to make it abundantly clear that the efficiency of the 2015 IECC is much higher than versions of the IECC in use in many states and jurisdictions around the nation." (ICC, No. 2 at p. 2-3) DOE agrees with ICC's assessment that the provisions of the 2015 edition of the IECC are much more energy efficient than several earlier editions of the model code. In performing its determination, DOE evaluates the expected national impact of the new edition of the model code, in this case the 2015 IECC, against the most recent previous edition receiving an affirmative determination of energy savings, in this case the 2012 IECC (42

[2] A notation in the form "ICC, No. 2 at p. 2" identifies a written comment that DOE received and has included in the docket of DOE's "Preliminary Determination Regarding Energy Efficiency Improvements in the 2015 International Energy Conservation Code (Docket No. EERE-2014-BT-DET-0030), which is maintained at www.regulations.gov. This particular notation refers to a comment: (1) submitted by ICC; (2) filed as document number 2 of the docket, and (3) appearing on page 2 of that document.

U.S.C. 6833(a)(5)(A)). However, DOE recognizes that the updated code represents a significant savings opportunity—in many cases up to 30 percent savings relative to codes currently adopted by U.S. states.[3] In response, DOE has added references to earlier determinations, as well as the associated energy savings estimates, in *Section V* of this notice. In its third comment, ICC suggests DOE "emphasize that states are to compare the provisions of their current codes with the provisions and requirements of the 2015 IECC, and not assume that the percentage increase in efficiency for their respective state will be the same as the 1% increase measured by DOE over the provisions in the 2012 IECC." (ICC, No. 2 at p. 3) DOE acknowledges that States and localities should indeed consider the impact of updated model codes relative to the specific requirements in effect within the state or locality. In performing its determination, DOE evaluates the updated model code relative to the previous model code, and estimates the aggregate impact on national energy consumption. As many adopting states and localities make modifications to the model code, these entities should evaluate the impacts of the updated code relative to their own provisions. ICC further offers suggested communication options for DOE to consider: "(1) DOE should transmit, with a cover letter offering assistance and cooperation, a copy of the final determination to the governor of each state, with a copy to the State Energy Office, and post a copy of the cover letter template on the DOE Building Energy Codes website. (2) DOE should provide, along with the cover letter and determination, a simple form response 'state determination form' in a format that allows the state officials charged with complying with the law the ability to check off whether the state a) has reviewed its code, b) has provided notice and an opportunity for comment

[3] Mendon et al., Cost-Effectiveness Analysis of the 2009 and 2012 IECC Residential provisions – Technical Support Document (PNNL, Richland, WA, April 2013), available at http://www.energycodes.gov/sites/default/files/documents/State_CostEffectiveness_TSD_Final.pdf

in the state, c) has made findings, d) has published such findings, and e) if the state has determined to revise its code a description of the new code, and if it has decided not to revise its residential building energy code, a space to provide the reasons for such decision. (3) The cover letter, as well as the proposed form for response to DOE, should prominently note the date on which the response to DOE is due. (4) DOE should publish on its Building Energy Codes website the response received from each state, as well as a list of states from which a response has not been received, updated on a regular basis. (5) Publishing the information on each state, and its response or non-response would allow citizens to become involved and ask questions of their public officials, and otherwise determine whether their state is in compliance with the law." (ICC, No. 2 at p. 3) DOE is currently evaluating the means by which it tracks the national implementation of building energy codes, and will consider the communication options proposed by ICC.

NAHB's first comment suggests that "DOE's analysis of the pipe insulation was not properly calculated" and noted that the actual net change made by this proposal was to increase the length of ¾-inch pipe requiring insulation by including runs shorter than 10 feet, while eliminating insulation requirements on smaller diameter piping. NAHB suggests "by properly applying the new hot water pipe insulation requirements, the resulting energy savings will change." (NAHB, No. 3 at p. 1) DOE agrees with NAHB's comments relative to the net energy savings surrounding this particular proposal, and has revised its analysis accordingly. The revised estimated total energy cost savings compared to the 2012 IECC are now 0.73% compared to the preliminary estimate of 0.90% (see *Section III* of this notice). NAHB's second comment notes that the "International Code Council (ICC) originally had proposal RE112-13 listed as being

approved to be included in the 2015 edition of the IECC. This proposal, however, was actually withdrawn by the proponent before it was approved on the consent agenda. As a result, the changes were not included in the 2015 IECC and thus, any reference to RE112-13 should be removed from the analysis." (NAHB, No. 3 at p. 2) DOE agrees with NAHB's comment and acknowledges that the subject proposal is not included in the 2015 IECC. DOE notes that the original documentation published by the ICC following the public hearing process inadvertently included this proposal, and it has since been confirmed that the proposal was withdrawn from consideration during the hearing process. DOE has revised this notice and supporting documentation accordingly. (Note that RECA offered a similar comment on RE112-13; *see* RECA, No. 4 at p. 3.)

RECA's first comment expresses general support for DOE's Preliminary Determination on the 2015 edition of IECC, DOE's evaluation methodology in both its quantitative and qualitative aspects, and DOE's conclusion that the 2015 IECC's weakening amendments are outweighed by its strengthening amendments. (RECA No. 4 at p. 1) In its second comment, RECA "urges the Department to move ahead to finalize its Determination endorsing the 2015 IECC for state adoption"; "to continue to provide materials to states and localities that will facilitate the adoption of, and compliance with, this latest edition of the IECC"; "to expeditiously make training and compliance software available to states that adopt the 2015 IECC"; and "to provide additional funding to those states that are early adopters of the 2015 IECC." (RECA No. 4 at p. 1, and 3) DOE acknowledges the need for materials that can assist in facilitating the adoption of the latest editions of the model code. While these activities are not directly within the scope of the DOE determination analysis, DOE is directed to provide technical assistance to

states implementing building energy codes (42 U.S.C. 6833(d)), and does so through a variety of activities, such as state-specific energy and cost analysis, code compliance software, and a collection of technical resources. DOE intends to continue to provide such resources to assist states in implementing updated model codes, including adoption of such codes by states and localities, and increasing compliance with building energy codes to ensure intended consumer energy and cost savings. In its third comment, RECA agrees with DOE that, "proposal RE68-13 slightly weakens sunroom fenestration requirements", "the impact should be very small", and it , "does not affect SHGC requirements", but notes that "the impact is on climate zones 2-3, not climate zone 1." (RECA No. 4 at p. 2) DOE agrees with RECA's comment and assessment of the subject proposal, and has revised the determination notice and supporting analysis accordingly. In its fourth comment, RECA disagrees with DOE that duct tightness levels tend to always be a "zero sum trade-off" as claimed in the Preliminary Determination, and suggests that "the Department explicitly and correctly recognize the value of mandatory measures, and that removal of this mandatory backstop is a reduction in stringency in some cases, albeit likely modest, depending on the measure that replaces duct efficiency." (RECA No. 4 at p. 2-3) DOE agrees in principle with RECA's comment that energy neutrality depends on a variety of factors, including impacts over the useful life of alternative energy measures. In the case of building energy efficiency tradeoffs, the impact on longer-term energy savings can vary significantly between the measures being traded and the chosen alternative designs. In addition, DOE understands the purpose of mandatory requirements within the code, and while the subject proposal cannot directly be captured within the DOE quantitative analysis, DOE indeed acknowledges the

potential effect on building energy efficiency in application. In its fifth comment, RECA notes that proposal RE112-13 "was withdrawn prior to final consideration, and is thus not part of the 2015 IECC." (RECA No. 4 at p. 3) DOE agrees with this comment, as detailed above in response to NAHB's similar comment. In its sixth comment, RECA suggests that DOE should "continue to assess the potential impact of changes to the IECC for compliance paths outside the prescriptive path" averring that expanding the Department's ability to further assess such changes is in the public interest. (RECA No. 4 at p. 3) With specific reference to DOE's evaluation of the new ERI compliance path, RECA agrees with DOE's use of the prescriptive compliance path as the generally predominant path, but recommends "this emphasis on the prescriptive path for the numerical analysis should not be read as limiting the overall assessment of all changes in the code, nor should it suggest that an edition of the code will receive a positive or negative determination solely on the basis of this quantitative analysis." RECA notes that in previous determinations, DOE has not historically limited itself to analyzing only changes to the prescriptive path, and encourages DOE not to limit itself to only considering changes to the prescriptive path in the future. RECA "urges the Department to clarify in its Determination that it will continue to assess any changes made to the performance path, and any new compliance options (like ERI) that are added to the IECC going forward in future Determinations." DOE agrees with RECA's comment in principle, and acknowledges that changes in the 2015 IECC, as well as potential future changes to the IECC, are likely to require increasingly nuanced analyses of the changes' impacts. As stated in the preliminary notice, DOE plans to collect data specifically on the ERI path, and will consider means to broaden the scope of that commitment, as

necessary, in the future. In addition, while the DOE Determination has typically focused on the mandatory and prescriptive requirements of the IECC, the Department reserves the right to evaluate other means of compliance when adequate information is available. In its seventh comment, RECA agrees with DOE that "it is difficult to assess the impact of the new Energy Rating Index in the context of a Determination," but argues that "DOE could reasonably conclude, based on the results of a Pacific Northwest National Laboratory study, that the new compliance path is reasonably likely to save energy as compared to compliance with the 2012 IECC prescriptive requirements on average, even if some individual homes could be weaker than those built to the 2012 IECC."[4] (RECA No. 4 at p. 5) DOE appreciates the comment and agrees, based on the referenced PNNL analysis, that most homes built using the ERI path, as specified in the 2015 IECC, are likely to be at least as efficient as the homes built to meet the prescriptive requirements of the IECC or the traditional performance path. In its eighth comment, RECA urges DOE to "promote the proper adoption and implementation of the ERI as contained in the 2015 IECC, without any weakening amendments, including monitoring its deployment in states and cities going forward." RECA also recommends "DOE develop and/or fund comprehensive support materials and training to help to ensure that the ERI is properly implemented," and that "DOE should also consider how it can help to ensure that the ERI process produces consistent, repeatable, and credible results for code compliance." (RECA No. 4 at p. 5-7) DOE acknowledges the importance of the new ERI path in the 2015 IECC and its potential impact on energy as the code is implemented. While code implementation activities are outside the direct scope of the DOE determination, DOE

[4] Taylor et al., Identification of RESNET HERS Index Values Corresponding to Minimal Compliance with the IECC (PNNL, Richland, WA, May 2014), available at http://www.energycodes.gov/hers-and-iecc-performance-path

does provide technical assistance to states implementing building energy codes (42 U.S.C. 6833(d)). DOE recognizes the need for continued analysis and support for states adopting the 2015 IECC, and will consider the requested activities, as able and appropriate, through the Building Energy Codes Program. In its ninth comment, RECA supports the "Department's stated plan to collect data relevant to the ERI, as well as all compliance options allowed in the IECC." RECA further encourages the Department to "reach out to industry and nonprofit partners to aggregate the data already available, and to explore new methods for collecting and analyzing data on the various compliance options and tools used across the country." (RECA No. 4 at p. 7) DOE acknowledges and appreciates RECA's support, and plans to work with the industry and stakeholders in evaluating the new ERI path and associated energy impact. As previously stated, DOE intends to collect relevant data and track the implementation of the ERI path relative to the traditional compliance options provided by the IECC. DOE will continue to communicate with interested and affected parties as the 2015 IECC is implemented and as further data and resulting analysis becomes available.

NRDC's first two comments offer general support for DOE's determination that the 2015 IECC saves energy compared to the 2012 IECC, for DOE's quantitative finding of energy savings, and for DOE's qualitative assessment of the specific code changes that will result in energy savings. (NRDC, No. 5 at p. 1-2) In its third comment NRDC suggests that "actual energy savings from the 2015 IECC are likely to be much larger than indicated by DOE's analysis", specifically suggesting that the "new Energy Rating Index (ERI) pathway created by RE188-13 is likely to result in significant energy savings." (NRDC, No.5 at p.2) NRDC acknowledges that it is not knowable exactly how

many homes will comply using the ERI pathway, but suggests it is certainly not zero. NRDC suggests that "currently about half of new homes constructed in the U.S. are rated using the RESNET HERS rating", and that "it is likely a large percentage of these homes will choose to comply with the code via the ERI pathway, since this will likely be the simplest method of compliance." (NRDC, No. 5 at p. 2) NRDC further notes that a "Pacific Northwest National Laboratory analysis of the HERS index's relationship to the 2012 IECC performance path found that for all climate zones the ERI values adopted in the 2015 IECC ranged from at least as efficient to substantially more efficient than the 2012 IECC, indicating that homes complying with the ERI path will on average achieve large energy savings compared to the 2012 IECC." (NRDC, No. 5 at p. 2) DOE agrees that the new alternative ERI compliance path, including the associated thresholds as published in the 2015 IECC, is reasonably likely to result in energy savings compared to the 2012 IECC and the majority of current state codes. However, DOE remains unaware of any current data source that would allow for adequate evaluation of the newly created path. DOE continues to base its evaluation of the new path on the recent analysis conducted by PNNL, as referenced in the preliminary determination notice. In its fourth comment, NRDC appreciates DOE's indication in the preliminary determination that "it will attempt to collect data on the utilization of the various compliance pathways and evaluate whether it can quantify savings from compliance pathways other than the prescriptive path in future determinations", and urges DOE to "evaluate energy savings from the ERI pathway in future determinations, as currently the analysis leaves out this potential source of significant energy savings." (NRDC, No. 5 at p.2) DOE acknowledges the importance of evaluating the energy impact of the ERI alternative, but

remains unaware of any current data source that would allow for adequate evaluation of the newly created path. DOE, therefore, maintains its intentions to track the adoption of the ERI path relative to traditional application of the IECC, and may further evaluate this path in future analyses.

One comment was received from an individual submitter, Craig Conner, who indicated that "DOE made errors in estimating the residential energy savings for the change that included a new tropical option for residential construction (CE66-13 Part II, or CE66-II)." (Conner No. 6 at p. 1) Mr. Conner suggests that "DOE modeling was not done in accordance with the IECC standard reference design, and therefore is not as required for a determination." He further suggests that "several major energy saving requirements provided by this new option were ignored or underestimated", and argues that "the definition of the Tropical Zone, which is a subset of existing IECC Climate Zone 1, does not by itself increase or decrease energy", but that "it is the associated requirements that would potentially affect energy use." (Conner No. 6 at p. 1) Mr. Conner cites three aspects of proposal CE66-13 Part II that should have been considered new energy-saving requirements rather than conditions under which other requirements may be lessened, as DOE interpreted them: the restriction that the home not be heated and that 50% of the home be uncooled, the restriction that 80% of domestic water heating be by solar or other renewable sources, and the restriction that natural ventilation be facilitated by operable windows. (Conner No. 6 at p. 1) In response, DOE appreciates Mr. Conner's comments, but does not agree with his assessment regarding the particular proposal. The IECC Standard Reference Design (SRD) is intended for demonstrating

compliance of individual buildings, which differs from the aggregate national analysis applied in DOE determinations. Although the DOE building modeling prototypes and simulation methodology occasionally draw on SRD assumptions, where appropriate, they are also informed by additional sources that may better represent typical construction practices, and to estimate an expected impact of code changes. In this case, DOE considered typical construction affected by the newly defined Tropical Zone, and acknowledges the modified criteria associated with partially-conditioned homes (e.g., with solar water heating systems and operable windows). However, it is not clear that these changes will encourage additional use of energy-saving features, and DOE has maintained its original assessment.

II. Methodology

In arriving at a determination, DOE reviewed all changes between the 2015 and 2012 editions of the IECC. The IECC covers a broad spectrum of the energy-related components and systems in buildings, ranging from simpler residential buildings to more complex multifamily facilities. For the purposes of its determination, DOE focused only on low-rise residential buildings, defined in a manner consistent with the ICC and the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE). Low-rise residential buildings include one- and two-family detached and attached buildings, and low-rise multifamily buildings (not greater than three stories), such as condominiums and garden apartments. The 2015 IECC was developed through the same approach as the previous 2012 edition with approval through the ICC consensus process. The 2015 edition contains no significant changes to the overall scope or the structure of the prescriptive and mandatory provisions of the code, which form the basis of the DOE

determination analyses. As a result, DOE determined that the methodology used for the analysis of the 2012 IECC should again be utilized for the analysis of the 2015 IECC.

Overview of Methodology

The analysis methodology used by DOE contains both qualitative and quantitative components. A qualitative comparison is undertaken to identify textual changes between requirements in the 2015 and 2012 editions of the IECC, followed by a quantitative assessment of energy savings conducted through whole-building simulations of buildings constructed to meet the minimum requirements of each code over a range of U.S. climates. The analysis methodology, which was previously developed through a public comment process, is available on the DOE Building Energy Codes Program website.[5]

Consistent with its previous determinations, DOE compared overall editions of the IECC, and did not issue determinations for individual code changes. DOE interprets the language in section 304(a) of ECPA to mean that when a comprehensive revision of the 1992 MEC, or its successor (which in this case is the 2015 IECC), is published, then that revised or successor code triggers the Secretary's obligation to issue a determination as to whether the revised code improves energy efficiency in residential buildings. (*See* 42 U.S.C. 6833(a)(5)(A)) This determination is made by comparing the revised or successor code to the last predecessor code.

Consideration for Technological and Economic Factors

Section 304(a) of ECPA states that the Secretary is required to make a determination as to whether any successor standard to the 1992 MEC will improve

[5] *See* http://www.energycodes.gov/development/residential/methodology

energy efficiency. (42 U.S.C. 6833(a)(5)(A)) Section 304 of ECPA does not include any reference to economic justification, although such criteria are considered directly by the ICC code development and consensus process, as applicable. Each proposal submitted to the ICC code development process also requires a declaration of whether the proposed code change will increase the cost of construction.

Separate from the Secretary's determination under section 304(a), section 307 of ECPA requires DOE to periodically review the technical and economic basis of the voluntary building energy codes, and participate in the industry process for review and modification, including seeking adoption of all technologically feasible and economically justified energy efficiency measures. (42 U.S.C. 6836(b)) In fulfillment of this directive, DOE evaluates its code change proposals submitted to the ICC, analyzing energy savings and cost-effectiveness, as applicable, and otherwise participates in the ICC process. In addition, DOE performs independent technical and economic analysis of the IECC as part of its direction to provide assistance to States implementing building energy codes. This approach allows DOE to meet its statutory obligation to participate in the industry process for review and modification of the IECC, and to seek adoption of all technologically feasible and economically justified energy efficiency measures. (42 U.S.C. 6836(b))

In preparation for technical assistance activities, DOE previously developed a standardized methodology for assessing the cost-effectiveness of code changes through a public process. (78 FR 47677) This methodology is published on the DOE Building Energy Codes Program website, and has been applied by DOE in the development of code change proposals for the IECC, as well as assessing the cost-effectiveness of

published editions of the IECC. DOE expects to update this methodology periodically to ensure its assumptions and economic criteria remain valid and adequate for the analysis of potential code change proposals, and for States considering adoption of model building energy codes. DOE will continue to use the currently established methodology and parameters for developing materials for the technical assistance of the 2015 IECC.

III. Summary of Findings

In performing its determination, DOE performed both a qualitative and quantitative analysis of the prescriptive and mandatory requirements contained in the 2015 IECC. The chosen methodology for these analyses is consistent with actions of recent determinations, and provides a reasonable assessment of how the code will affect energy savings in residential buildings. A summary of the analyses supporting DOE's determination is outlined in the following sections.

Qualitative Analysis

DOE performed a comparative analysis of the textual requirements of the 2015 IECC, examining the specific changes (approved code changes) made between the 2012 and the 2015 editions. The ICC Code Hearing process considers individual code changes for approval, and then bundles all the approved code changes together to form the next published edition. In creating the 2015 IECC, ICC processed 76 approved code change proposals. DOE evaluated each of these code change proposals in preparing its determination. In conducting the revised analysis, DOE also took into consideration NAHB's comment about DOE's analysis of pipe insulation requirements (NAHB, No. 3 at p. 1)

Overall, DOE found that the vast majority of changes in the 2015 IECC appear to be *neutral* (*i.e.*, have no direct impact on energy savings) within the context of the determination analysis. DOE also found that *beneficial* changes (*i.e.*, increased energy savings) outweigh any changes with a *detrimental* effect on energy efficiency in residential buildings. Of the 76 total changes:

- 6 were considered beneficial;
- 62 were considered neutral;
- 5 were considered negligible;
- 2 were considered detrimental; and
- 1 was considered to have an unquantifiable impact.

Table III.1 presents the findings resulting from the qualitative analysis, along with a description of the change, as well as an assessment of the anticipated impact on energy savings in residential buildings. Additional details pertaining to the qualitative analysis are presented in a technical support document.[6]

Table III.1 Qualitative Analysis Findings

Proposal Number	Code Section(s) Affected[(a)]	Description of Changes	Impact on Energy Efficiency	Reason
RE1-13	R101.4.3 (IRC N1101.3)	Deletes the exception for vestibules in the provisions pertaining to additions, alterations, renovations, and repairs.	Neutral	The residential code has no requirements for vestibules
RE3-13	R103.2 (IRC N1101.8)	Deletes text relating to commercial building components in "Information on Construction Documents."	Neutral	Editorial change

[6] Mendon et al., 2015 IECC: Energy Savings Analysis (PNNL, Richland, WA, December 2014), available at http://www.energycodes.gov/determinations

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
RE5-13	R202 (IRC N1101.9)	Deletes the definition of "entrance door."	Neutral	The definition applied to nonresidential buildings only
RE6 -13	R202 (NEW) (IRC N1101.9 (NEW))	Adds definition of "Insulating Siding" and notes that the insulation level of this siding must be R-2 or greater.	Neutral	Addition of definition
RE9-13	R202 (NEW) (IRC N1101.9 (NEW)), R304 (NEW) (IRC N1101.16 (NEW))	Adds an appendix with non-mandatory provisions for homes to be "solar-ready." Designed to be readily referenced by adopting authorities as needed.	Neutral	No direct impact, but has the potential to increase efficiency in the future
RE12-13	R401.2 (IRC N1101.15)	Minor clarification that the code's mandatory requirements should be met in all compliance paths.	Neutral	Clarification of code requirements
RE14-13	R401.3 (IRC N1101.16)	Adds more options for the allowable locations for posting the certificate of occupancy.	Neutral	Not energy related but does eliminate a small enforcement hindrance
RE16-13	R401.3 (IRC N1101.16)	Similar to RE14-13. Allows more options for the allowable locations for posting the certificate of occupancy.	Neutral	Not energy related but does eliminate a small enforcement hindrance
RE18-13	R402.1 (IRC N1102.1), R402.1.1 (NEW) (IRC N1102.1.1 (NEW))	Cross-references vapor barrier requirements by referencing IRC R702.7.	Neutral	Adds consistency and clarifies code requirements
RE30-13	Table R402.1.1, (IRC Table N1102.1.1)	Modifies footnote h to these tables to allow combined sheathing/siding.	Neutral	Adds an option for combined insulated sheathing/siding that meets code requirements
RE43-13	R402.1.2 (IRC N1102.1.2)	Adds use of term "continuous insulation" instead of "insulating sheathing."	Neutral	Minor clarification of terminology
RE45-13	Table R402.1.3 (IRC N1102.1.3)	Slightly increases frame wall U-factor in climate zones 1 and 2. The R-value table remains unchanged.	Negligible	Intended to correct a perceived misalignment between the code's R-value-based requirements and the alternative U-factor-based requirements. The changes are very

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
				small and unlikely to change wall insulation levels in most homes.
RE50-13	Table R402.1.3 (IRC Table N1102.1.3)	Slightly increases frame wall U-factor in climate zones 1-5 but reduces it in climate zones 6-8. The R-value table remains unchanged.	Negligible	Intended to correct a perceived misalignment between the code's R-value-based requirements and the alternative U-factor-based requirements. The changes are very small and unlikely to change wall insulation levels in most homes.
RE53-13	R402.2.1 (IRC N1102.2.1)	Clarifies decreased ceiling insulation allowance for ceilings with attic spaces only.	Neutral	Clarification of the code requirement
RE58-13	R402.2.4 (IRC N1102.2.4)	Clarifies that vertical doors are not "access doors" in R402.2.4 and shall be permitted to meet the fenestration requirements of Table 402.1.1.	Neutral	Clarification of the code requirement
RE60-13	R402.2.7 (IRC N1102.2.7), Table R402.4.1.1 (IRC Table N1102.4.1.1)	Allows the floor cavity insulation to not be in contact with the underside of the subfloor decking if it is in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing.	Neutral	Allows a combination of cavity and continuous insulation to meet the floor R-value requirement
RE63-13	Table R402.1.1 (IRC Table N1102.1.1), R402.2.13 (NNEW) (IRC N1102.2.13 (NEW))	Clarifies footnote h text by rewording it and moving it to new section R402.2.13.	Neutral	Clarification of code requirements

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
RE68-13	R402.3.5 (IRC N1102.3.5)	Slightly increases sunroom U-factor.	Detrimental	Applies to only climate zones 2 and 3; impacts only thermally isolated sunrooms
RE83-13	Table R402.4.1.1 (IRC Table N1102.4.1.1)	Clarifies requirements for wall corner and headers to have insulation that has at least R-3 per inch, and clarifies that it is the cavities in such components that require the insulation.	Neutral	Minor addition and clarification of code requirements
RE84-13	Table R402.4.1.1 (IRC Table N1102.4.1.1)	Allows a combination of cavity and continuous insulation to meet the floor R-value requirement.	Neutral	Subset of RE60-13; makes minor clarifying revisions to wording.
RE85-13	Table R402.4.1.1 (IRC Table N1102.4.1.1)	Reorganizes Table 402.4.1.1 by adding an additional column and separating “air barrier criteria” from “insulation installation criteria,” for clarity.	Neutral	Clarification of code requirements
RE86-13	Table R402.4.1.1 (IRC Table N1102.4.1.1), R402.4.2 (IRC N1102.4.2)	Clarifies language relating to fireplace sealing/door requirements.	Neutral	Clarification of code requirements
RE91-13	R402.4.1.2 (IRC N1102.4.1.2), Chapter 5	Adds references to the American Society for Testing and Materials (ASTM) standards E779 and E1827 for blower door testing.	Neutral	Adds more detailed references for procedures
RE103-13	R403.1.1 (IRC N1103.1.1)	Adds requirements for the thermostat to be pre-programmed by the manufacturer.	Neutral	Clarifies that the requirement is the manufacturer’s responsibility
RE105-13	R403.1.1 (IRC N1103.1.1)	Makes the programmable thermostat requirement apply to any heating/cooling system.	Neutral	No direct impact on energy
RE107-13	R403.2.1 (IRC N1103.2.1)	Increases insulation requirements for return ducts in attics from R-6 to R-8.	Beneficial	Modestly reduces conduction losses from return ducts in attics

Proposal Number	Code Section(s) Affected[(a)]	Description of Changes	Impact on Energy Efficiency	Reason
RE109-13	R403.2 (IRC N1103.2), R403.2.2 (IRC N1103.2.2), R403.2.3 (NEW) (IRC N1103.2.3 (NEW)), R403.2.4 (NEW) (IRC N1103.2.4 (NEW))	Makes the maximum allowable duct leakage rates prescriptive, allowing performance path trade-offs.	Neutral	Zero-sum tradeoff within IECC performance path rules; applies only to compliance via performance path
RE111-13	R403.2.2 (IRC N1103.2.2)	Aligns the IECC with the International Mechanical Code (IMC) by removing exception from duct sealing for low-pressure continuously welded ducts.	Neutral	Requires sealing of additional locking joints for consistency between the IECC and IMC. Impact is negligible because the mandatory duct pressure test governs duct leakage regardless of specific sealing strategies.
RE117-13	R403.2.2 (IRC N1103.2.2)	Deletes exception relating to partially inaccessible duct connections.	Neutral	Editorial change to eliminate irrelevant text
RE118-13	R403.2.2 (IRC N1103.2.2)	Reverses the order of how the two duct testing options are presented.	Neutral	Rearrangement of text

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
RE125-13, Part I	R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)	Adds requirements for demand-activated control on hot water circulation systems and heat trace systems. Makes IECC, IRC, and IPC consistent and clarifies requirements for these systems.	Beneficial	Demand activated control reduces the runtime of circulation pumps
RE132-13	R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2)	Deletes requirement for domestic hot water (DHW) pipe insulation to kitchen and the generic requirement on long/large-diameter pipes. However, adds DHW pipe insulation for 3/4-inch pipes.	Beneficial	Energy lost due to the elimination of hot water pipe insulation on the kitchen pipe is typically more than made up by added insulation requirements for pipes 3/4 inches in diameter, the most common size for trunk lines
RE136-13, Part I	R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), IPC 202, IPC [E]607.2.1.1 (NEW), IRC P2905 (NEW), IRC P2905.1 (NEW)	Adds demand control requirements for recirculating systems that use a cold water supply pipe to return water to the tank.	Beneficial	Demand activated control reduces the runtime of circulation pumps

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
RE142-13	R403.6 (IRC N1103.6)	Requires heating, ventilation, and air-conditioning equipment to meet Federal efficiency standards.	Neutral	DOE's Appliances and Commercial Equipment Standards Program regulates the minimum efficiency of units produced by equipment manufacturers
RE163-13	R405.4.2 (IRC N1105.4.2), R405.4.2.1 (NEW) (IRC N1105.4.2.1 (NEW)), R405.2.2 (NEW) (IRC N1105.4.2.2 (NEW))	Specifies details of a compliance report for the performance approach.	Neutral	No direct impact on energy
RE167-13	Table R405.5.2(1) (IRC Table B1105.5.2(1))	Fixes missing standard reference design specifications for thermal distribution systems.	Neutral	Adds details for modeling the standard reference design in the performance path
RE173-13	Table R405.5.2(1) (IRC Table N1105.5.2(1))	Adjusts Table R405.5.2(1) (the performance path) terminology for doors and fenestration.	Neutral	Simple clarification of the intent of the code
RE184-13	R101.4.3, R202, R406 (NEW), (IRC N1101. 3, N1101.9, N1106(NEW))	Revamps alterations language and moves it from chapter 1 to section R406.	Neutral	Trade-offs between weakened and strengthened requirements possible but there is no feasible method for quantifying the energy impact of these trade-offs.
RE188-13	R202 (NEW) (IRC N1101.9 (NEW)), R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 NEW)	Optional new approach in section 406 requiring an ERI with a tradeoff limitation on the thermal envelope requirements.	Not quantifiable at this time	New alternative compliance path—no data is currently available to adequately estimate the number of homes that may be constructed using this compliance path.
RE193-13	R202 (IRC N1101.9), 403.10 (New) (IRC N1103.10 (New))	Adds requirements for testing of combustion venting systems.	Neutral	Impacts air quality; no direct impact on home energy usage

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
RE195-13	R402.1.2	Subtracts out R-0.6 for insulating siding from R-value table to prevent double counting of siding.	Neutral	Adds consistency in R-value calculations
RB96-13, Part I	Table R402.4.1.1	Specifies that air sealing shall be provided in fire separation assemblies.	Neutral	Minor clarification of code requirements
RB100-13	R303.4	Corrects the air infiltration threshold in R303.4 to be 5 air changes per hour or less to align it with the infiltration limits set by the code.	Neutral	Consistency change
SP19-13, Part III	303.1; IECC C404.7; IECC R403.9	Makes numerous wording changes to pool and spa requirements. Doesn't appear to make substantive changes.	Neutral	No direct impact on home energy usage
ADM22-13, Part III	IECC: R108.2	Revises "owner's agent" to "owner's authorized agent" in R108.2.	Neutral	Simple language change
ADM30-13, Part III	IECC: R103.4	Adds "work shall be installed in accordance with the approved construction documents" to R103.4.	Neutral	Simple language change
ADM40-13, Part III	IECC: R103.1	Adds "technical reports" as acceptable data for submittal with a permit application.	Neutral	Simple language change
ADM51-13, Part III	IECC: R202 (IRC N1101.9)	Adds "retrofit" and other terms to definition of "alteration."	Neutral	Simple language change
ADM57-13, Part III	IECC: R202 (IRC N1101.9)(New)	Adds definition of "approved agency."	Neutral	Simple language change
ADM60-13, Part III	IECC: R202 (IRC N1101.9)	Revises definition of "repairs."	Neutral	Simple language change
CE4-13, Part II	R101.4, R202 (IRC N1101.9); R402.3.6 (IRC N1102.3.6), Chapter 5 (RE) (NEW) (IRC N1106 (NEW))	Editorial relocation of code text pertaining to "existing buildings" to a separate chapter.	Neutral	Editorial change
CE8-13, Part II	R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))	Revises language requiring the code to apply to historic buildings if no "compromise to the historic nature and function of the building" occurs.	Beneficial	Additional buildings must meet the code requirements

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
CE11-13, Part II	R101.4.3, (IRC N1101.3)	Adds existing single-pane fenestration with surface films to the list of exceptions in R101.4.3.	Neutral	Exceptions are allowed only if energy use is not increased
CE15-13, Part II	R101.4.3 (IRC N1101.3), R202 (NEW) (IRC N1101.9 (NEW))	Revises exemption for roofing replacement.	Neutral	Editorial change
CE23-13, Part II	R101.5.2 (IRC N1101.6), R402.1 (IRC N1102.1)	Relocates exception for "low energy" buildings from R101.5.2 to R402.1.	Neutral	Editorial change
CE33-13, Part II	R102, R102.1.1 (NEW)	Changes title of section R102 to "Applicability - Duties and powers of the Code Official" and revises language on "alternative materials, design and methods of construction and equipment."	Neutral	Editorial change
CE37-13, Part II	R103.2.1 (NEW)	Requires the building's thermal envelope to be represented on construction documents.	Neutral	Simple documentation requirement
CE38-13, Part II	R103.3, R104.1, R104.2 (NEW), R104.3, R104.3.1 (NEW), R014.3.2 (NEW), R104.3.3 (NEW), R104.3.4 (NEW), R104.3.5 (NEW), R104.3.6 (NEW), R104.5	Revises a number of administrative requirements to enhance the ability to ensure compliance with the code and improve the usability of the code.	Neutral	No direct impact on energy
CE43-13, Part II	R106.2	Deletes R106.2 "Conflicting requirements" because it is redundant with "Conflicts" in R106.1.1.	Neutral	Editorial change
CE44-13, Part II	R108.4	Revises language pertaining to "fines" in section R108.4.	Neutral	Editorial change
CE49-13, Part III	R202 (NEW) (IRC N1101.9 (NEW))	Adds definition of a "circulating hot water system."	Neutral	Editorial change

Proposal Number	Code Section(s) Affected[a]	Description of Changes	Impact on Energy Efficiency	Reason
CE50-13, Part II	R202 (NEW) (IRC N1101.9 (NEW))	Add definition of "climate zone."	Neutral	Editorial change
CE51-13, part II	R202 (IRC N1101.9)	Revises the definition of "conditioned space."	Neutral	Revision of definition
CE52-13, Part II	R202 (NEW) (IRC N1101.9 (NEW))	Adds definition of "continuous insulation."	Neutral	Definition addition
CE59-13, Part II	R202 (IRC N1101.9)	Revises the definition of "vertical glazing."	Neutral	Revision of definition
CE61-13, Part II	Table R301.1	Adds "Broomfield County" to Table C301.1 and R301.1.	Neutral	Editorial change
CE62-13, Part II	Figure R301.1 (IRC Figure N1101.10), Table R301.1 (IRC Table N1101.10)	Eliminates the "warm humid" designation for counties in the "dry" moisture regime in Southwest Texas.	Neutral	No efficiency requirements depend on the warm-humid designation in Climate Zone 2/Dry
CE63-13, Part II	R303.1.1 (IRC N1101.12.1)	Requires labeling R-value on packaging of insulated siding and listing of same on the certification.	Neutral	Labeling requirement
CE65-13, Part II	R303.1.3 (IRC N1101.12.3), Chapter 5	Adds the American National Standards Institute (ANSI)/Door and Access Systems Manufacturers Association (DASMA) standard 105 as an alternative to National Fenestration and Rating Council (NFRC) 100 for determining U-factors of garage doors, where required.	Neutral	Adds an option of using ANSI/DASMA 105 instead of NFRC 100
CE66-13, Part II	R301.4 (NEW) (IRC N1101.10.3 (NEW)), R406 (NEW) (IRC N1106 (NEW))	Defines a new "Tropical" climate zone and adds an optional compliance path for semi-conditioned residential buildings with a list of pre-defined criteria to be deemed as code compliant in this climate zone.	Detrimental	Exception to code requirements applicable to a small number of homes in tropical areas
CE67-13, Part II	R303.1.4.1 (N1101.12.4) (NEW), Chapter 5	Adds ASTM C1363 as the required test standard for determining the thermal resistance (R-value) of insulating siding.	Neutral	Addition of testing requirements

Proposal Number	Code Section(s) Affected[(a)]	Description of Changes	Impact on Energy Efficiency	Reason
CE161-13, Part II	R402.3.2 (IRC N1102.3.2)	Allows dynamic glazing to satisfy the SHGC requirements provided the ratio of upper to lower SHGC is 2.4 or greater and is automatically controlled to modulate the amount of solar gain into the space.	Negligible	Similar energy impact to non-dynamic glazing
CE177-13, Part II	R402.1.2 (NEW), (IRC N1102.4.1.2 (NEW))	Requires open combustion appliances to be outside conditioned space or in a room isolated from conditioned space and ducted to the outside.	Neutral	Relates to indoor air quality and does not impact energy directly.
CE179-13, Part II	Table R402.4.1.1 (IRC Table N1102.4.1.1)	Exempts fire sprinklers from air sealing requirements.	Negligible	The home/unit would still have to pass the blower door test
CE283-13, Part II	R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)	Requires drain water heat recovery systems to comply with Canadian Standards Association (CSA) Standard 55 and adds references to CSA Standard 55 to chapter 5.	Negligible	Enables credit for efficiency improvements due to the use of drain water heat recovery devices
CE362-13, Part II	R403.2 (New) (IRC N1103.2 (New))	Adds requirement for outdoor setback control for hot water boilers that controls the boiler water temperature based on the outdoor temperature.	Beneficial	Lowering boiler water temperature during periods of moderate outdoor temperature reduces energy consumption of the boiler
(a) Code sections refer to the 2012 IECC.				

KEY: The following terms are used to characterize the effect of individual code change on energy efficiency (as contained in the above table): *Beneficial* indicates that a code change is anticipated to improve energy efficiency; *Detrimental* indicates a code change may increase energy use in certain applications; *Neutral* indicates that a code change is not anticipated to impact energy efficiency; *Negligible* indicates a code change may have energy impacts but too small to quantify; and *Not Quantifiable* indicates that a code change may have energy impacts but can't be quantified at this time.

In addition to the changes approved for inclusion in the prescriptive and mandatory paths, ICC also approved a proposal based on an Energy Rating Index (ERI) in the 2015 IECC. While this change does not directly alter stringency of the code, it does provide an additional compliance path as an alternative to the traditional IECC

prescriptive and performance paths. DOE determination analyses have historically focused on the prescriptive compliance path. This has been done because: (1) the prescriptive path is generally considered the predominant compliance path in practice, and; (2) the performance path effectively allows a limitless number of ways to comply with the code, and no accepted methodology exists for how to analyze it. Equally important, there is no aggregated source of data allowing for documentation of how buildings meet the performance path criteria. In the absence of such data, an analysis of the performance path would have no empirical basis.

The inclusion of a new type of compliance path in the 2015 IECC, which is based on an Energy Rating Index (ERI), prompted DOE to review its historical approach, and make a decision as to whether a change in methodology would be appropriate for the current determination analysis. Three primary points were considered:

1) The impact of the ERI path on national residential energy consumption is dependent on the number of homes that use this new path, and the unique building characteristics of those homes. As no jurisdiction has yet implemented the 2015 IECC, there is no way to know how many homes will use this path.
2) An analysis conducted by Pacific Northwest National Laboratory (PNNL) suggests that most homes built using the ERI path, as specified in the 2015 IECC, are likely to be at least as efficient as the homes built to meet the prescriptive requirements of the IECC or the traditional performance path.[7]

[7] Taylor et al., Identification of RESNET HERS Index Values Corresponding to Minimal Compliance with the IECC (PNNL, Richland, WA, May 2014), available at http://www.energycodes.gov/hers-and-iecc-performance-path

3) Including the new ERI path but not the traditional performance path would be arbitrary relative to historical determination analysis. An accepted methodology, along with a supporting data source, by which to analyze the performance path would also be necessary, and is not currently available.

Based on these three points, DOE concluded that it is appropriate to follow its historical approach for the current determination. However, DOE acknowledges that the landscape of code compliance may be changing, and therefore plans to track the implementation and application of the new ERI path, as well as collect relevant data that may enable DOE to further evaluate the ERI path in future analyses. It will also investigate the possibility of collecting data that could provide the basis for a broader analysis of performance-based compliance paths. Finally, DOE will explore whether the total number of homes built under each path can be determined and tracked over time. DOE anticipates that multiple paths may be considered in future determinations, but will only be included if the potential energy savings are relative to the traditional DOE analysis.

Table III.2 summarizes the overall impact of the code change proposals in the qualitative analysis. Overall, the sum of the beneficial code changes (6) is greater than the number of the detrimental code change proposals (2).

Table III.2 Overall Summary of Code Change Proposal Impact in Qualitative Analysis

Detriment	Neutral	Benefit	Negligible Impact	Unquantifiable at this time	Total
2	62	6	5	1	76

Quantitative Analysis

The quantitative analysis of the 2015 IECC was carried out using whole-building energy simulations of prototype buildings designed to meet the requirements of the 2012 IECC and the 2015 IECC. DOE simulated 32 representative residential building types across 15 U.S. climate locations, with locations selected to be representative of all U.S climate zones, as defined by the IECC. Energy use intensities (EUI) by fuel type and by end-use, as regulated by the IECC (*i.e.*, heating, cooling, domestic water heating and lighting) were extracted for each building type, and weighted by the relative square footage of construction (represented by building type in each climate regions). The methodology used for carrying out the quantitative analysis remains unchanged from the preliminary determination of the 2015 IECC, however, the overall findings have been updated based on comments received (see *Public Comments Regarding the Determination* section of this notice).

The quantitative analysis of buildings designed to meet the requirements of the 2015 IECC indicates national site energy savings of 0.98 percent of residential building energy consumption, as regulated by the IECC (in comparison to the 2012 IECC). Associated source energy savings are estimated to be approximately 0.87 percent, and national average energy cost savings are estimated to be approximately 0.73 percent. Table III.3 and Table III.4 show the energy use and associated savings resulting from the 2015 IECC by climate zone and on an aggregated national basis. Further details on the quantitative analysis can be found in the technical support document.

Table III.3 Estimated Regulated Annual Site and Source Energy Use Intensities (EUI), and Energy Costs by Climate-Zone (2012 IECC)

Climate Zone	Site EUI	Source EUI	Energy Costs

	(kBtu/ft^2-yr)	(kBtu/ft^2-yr)	($/residence-yr)
1	13.96	38.57	845
2	16.99	43.24	1104
3	16.90	40.43	988
4	19.52	44.00	1069
5	27.62	47.49	1162
6	29.28	49.21	1195
7	36.18	63.25	1501
8	50.28	89.49	2320
National Weighted Average	**20.82**	**44.17**	**1086**

Table III.4 Estimated Regulated Annual Site and Source Energy Use Intensities (EUI), and Energy Costs by Climate-Zone (2015 IECC)

Climate Zone	**Site EUI** (kBtu/ft^2-yr)	**Source EUI** (kBtu/ft^2-yr)	**Energy Costs** ($/residence-yr)
1	13.85	38.33	841
2	16.84	42.90	1096
3	16.71	40.03	980
4	19.31	43.56	1060
5	27.38	47.14	1155
6	29.03	48.84	1187
7	35.86	62.72	1490
8	49.80	88.65	2299
National Weighted Average	**20.61**	**43.78**	**1078**

Table III.5 presents the estimated energy savings (based on percent change in EUI and energy costs) associated with the 2015 IECC. Overall, the quantitative analysis indicates increased energy efficiency of residential buildings, as regulated by the updated code.

Table III.5 Regulated Annual Energy Savings Estimated from the Quantitative Analysis

Climate Zone	**Site EUI**[(a)]	**Source EUI**[(a)]	**Energy Costs**[(a)]
1	0.78%	0.61%	0.43%
2	0.88%	0.79%	0.68%
3	1.13%	0.99%	0.83%

4	1.08%	0.99%	0.82%
5	0.87%	0.74%	0.63%
6	0.85%	0.75%	0.61%
7	0.88%	0.84%	0.71%
8	0.95%	0.94%	0.94%
National Weighted Average	**0.98%**	**0.87%**	**0.73%**
(a) Percentages are calculated before rounding and may not exactly match percentages calculated between Table III.3 and Table III.4.			

IV. Determination Statement

Review and evaluation of the 2012 and 2015 editions of the IECC indicate that there are differences between the two editions. Qualitative analysis of the updated code reveals that many of the code changes are anticipated to have a neutral impact on energy efficiency, while a small number of code changes are anticipated to yield improved energy efficiency, and a smaller number of code changes are anticipated to be detrimental to energy efficiency. In addition, quantitative analysis of the code indicates regulated site energy, source energy, and energy cost savings of 0.98 percent, 0.87 percent and 0.73 percent, respectively. Finally, DOE acknowledges the reasonable probability that the new ERI compliance path will result in energy efficiency improvements that cannot be quantified at this time. DOE has rendered the conclusion that the 2015 IECC will improve energy efficiency in residential buildings, and, therefore, should receive an affirmative determination under Section 304(a) of ECPA.

V. State Certification

Based on today's determination, each State is required to review the provisions of its residential building code regarding energy efficiency, and determine whether it is appropriate for such state to revise its building code to meet or exceed the energy

efficiency provisions of the 2015 IECC. (42 U.S.C. 6833(a)(5)(B)) This action must be made not later than 2 years from the date of publication of a Notice of Determination, unless an extension is provided.

State Review and Update

The State determination must be: (1) made after public notice and hearing; (2) in writing; (3) based upon findings and upon the evidence presented at the hearing; and (4) made available to the public. (42 U.S.C. 6833(a)(2)) States have discretion with regard to the hearing procedures they use, subject to providing an adequate opportunity for members of the public to be heard and to present relevant information. The Department recommends publication of any notice of public hearing through appropriate and prominent media outlets, such as in a newspaper of general circulation. States should also be aware that this determination does not apply to IECC chapters specific to nonresidential buildings, as defined in the IECC. Therefore, States must certify their evaluations of their State building codes for residential buildings with respect to all provisions of the IECC, except for those chapters not affecting residential buildings. Because state codes are based on a variety of model code editions, DOE encourages States to consider the energy efficiency improvements of the 2015 IECC, as well as other recent editions of the IECC, which may also represent a significant energy and cost savings opportunity. DOE determinations regarding earlier editions of the IECC are available on the DOE Building Energy Codes Program website.[8] Further national and state analysis is also available.[9]

[8] Available at http://www.energycodes.gov/regulations/determinations/previous
[9] Available at http://www.energycodes.gov/development/residential/iecc_analysis

State Certification Statements

State certifications are to be sent to the address provided in the **ADDRESSES** section, or may be submitted to BuildingEnergyCodes@ee.doe.gov, and must be submitted in accordance with the deadline identified in the **DATES** section. If a State makes a determination that it is not appropriate to revise the energy efficiency provisions of its residential building code, the State must submit to the Secretary, in writing, the reasons for this determination, which shall be made available to the public. (42 U.S.C. 6833(a)(4))

The DOE Building Energy Codes Program tracks and reports State code adoption and certifications.[10] Once a State has adopted an updated residential code, DOE typically provides software, training, and support for the new code, as long as the new code is based on the national model code (*i.e.*, the 2015 IECC). DOE has issued previous guidance on how it intends to respond to technical assistance requests related to implementation resources, such as building energy code compliance software. (79 FR 15112) DOE also recognizes that some States develop their own codes that are only loosely related to the national model codes, and DOE does not typically provide technical support for those codes. DOE does not prescribe how each State adopts and enforces its energy codes.

Requests for Extensions

Section 304(c) of ECPA requires that the Secretary permit an extension of the deadline for complying with the certification requirements described above, if a State can

[10] Available at http://www.energycodes.gov/adoption/states

demonstrate that it has made a good faith effort to comply with such requirements, and that it has made significant progress toward meeting its certification obligations. (42 U.S.C. 6833(c)) Such demonstrations could include one or both of the following: (1) a substantive plan for response to the requirements stated in Section 304; or (2) a statement that the State has appropriated or requested funds (within State funding procedures) to implement a plan that would respond to the requirements of Section 304 of ECPA. This list is not exhaustive. Requests are to be sent to the address provided in the **ADDRESSES** section, or may be submitted to BuildingEnergyCodes@ee.doe.gov.

VI. Regulatory Review and Analysis

Review under Executive Orders 12866 and 13563

Today's action is not a significant regulatory action under Section 3(f) of Executive Order 12866, "Regulatory Planning and Review" (58 FR 51735). Accordingly, today's action was not reviewed by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB). DOE has also reviewed this regulation pursuant to Executive Order 13563, issued on January 18, 2011. (76 FR 3281) Executive Order 13563 is supplemental to and explicitly reaffirms the principles, structures, and definitions governing regulatory review established in Executive Order 12866.

Review under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq*.) requires the preparation of an initial regulatory flexibility analysis for any rule that by law must be proposed for

public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking" (67 FR 53461), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. (68 FR 7990) DOE has also made its procedures and policies available on the Office of General Counsel website.[11]

DOE has reviewed today's action under the provisions of the Regulatory Flexibility Act and the procedures and policies published in February 2003. Today's action on the determination of improved energy efficiency between IECC editions requires States to undertake an analysis of their respective building codes. Today's action does not impact small entities. Therefore, DOE has certified that there is no significant economic impact on a substantial number of small entities.

Review under the National Environmental Policy Act of 1969

Today's action is covered under the Categorical Exclusion found in DOE's National Environmental Policy Act regulations at paragraph A.6 of appendix A to subpart D, 10 CFR part 1021. That Categorical Exclusion applies to actions that are strictly procedural, such as rulemaking establishing the administration of grants. Today's action is required by Title III of ECPA, as amended, which provides that whenever the 1992 MEC, or any successor to that code, is revised, the Secretary must make a determination, not later than 12 months after such revision, whether the revised code would improve energy efficiency in residential buildings and must publish notice of such determination

[11] Available at http://energy.gov/gc/office-general-counsel

in the *Federal Register*. (42 U.S.C. 6833(a)(5)(A)) If the Secretary determines that the revision of 1992 MEC, or any successor thereof, improves the level of energy efficiency in residential buildings, then no later than two years after the date of the publication of such affirmative determination, each State is required to certify that it has reviewed its residential building code regarding energy efficiency and made a determination whether it is appropriate to revise its code to meet or exceed the provisions of the successor code. (42 U.S.C. 6833(a)(5)(B)) Today's action impacts whether States must perform an evaluation of State building codes. The action would not have direct environmental impacts. Accordingly, DOE has not prepared an environmental assessment or an environmental impact statement.

Review under Executive Order 13132, "Federalism"

Executive Order 13132 (64 FR 43255) imposes certain requirements on agencies formulating and implementing policies or regulations that pre-empt State law or that have federalism implications. Agencies are required to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and carefully assess the necessity for such actions. Congress found that:

(1) Large amounts of fuel and energy are consumed unnecessarily each year in heating, cooling, ventilating, and providing domestic hot water for newly constructed residential and commercial buildings because such buildings lack adequate energy conservation features;

(2) Federal voluntary performance standards for newly constructed buildings can prevent such waste of energy, which the Nation can no longer afford in view of its current and anticipated energy shortage;

(3) The failure to provide adequate energy conservation measures in newly constructed buildings increases long-term operating costs that may affect adversely the repayment of, and security for, loans made, insured, or guaranteed by Federal agencies or made by federally insured or regulated instrumentalities; and

(4) State and local building codes or similar controls can provide an existing means by which to ensure, in coordination with other building requirements and with a minimum of Federal interference in State and local transactions, that newly constructed buildings contain adequate energy conservation features. (42 U.S.C. 6831)

Pursuant to Section 304(a) of ECPA, DOE is statutorily required to determine whether the most recent edition of the MEC (or its successor) would improve the level of energy efficiency in residential buildings as compared to the previous edition. If DOE makes an affirmative determination, the statute requires each State to certify that it has reviewed its residential building code regarding energy efficiency and made a determination whether it is appropriate to revise its code to meet or exceed the provisions of the successor code. (42 U.S.C. 6833(a)(5)(B))

Executive Order 13132 requires meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications unless funds necessary to pay the direct costs incurred by the State and local governments

in complying with the regulation are provided by the Federal Government. (62 FR 43257)

DOE has examined today's action and has determined that it will not pre-empt State law and will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Today's action impacts whether States must perform an evaluation of State building codes. No further action is required by Executive Order 13132.

Review under Unfunded Mandates Reform Act of 1995

The Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) generally requires Federal agencies to examine closely the impacts of regulatory actions on State, local, and tribal governments. Subsection 101(5) of Title I of that law defines a Federal intergovernmental mandate to include any regulation that would impose upon State, local, or tribal governments an enforceable duty, except a condition of Federal assistance or a duty arising from participating in a voluntary Federal program. Title II of that law requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and tribal governments, in the aggregate, or to the private sector, other than to the extent such actions merely incorporate requirements specifically set forth in a statute. Section 202 of that title requires a Federal agency to perform an assessment of the anticipated costs and benefits of any rule that includes a Federal mandate that may result in costs to State, local, or tribal governments, or to the private sector, of $100 million or more. Section 204 of that title requires each agency that proposes a rule containing a

significant Federal intergovernmental mandate to develop an effective process for obtaining meaningful and timely input from elected officers of State, local, and tribal governments.

Consistent with previous determinations, DOE has completed its review, and concluded that impacts on state, local, and tribal governments are less than the $100 million threshold specified in the Unfunded Mandates Act. Accordingly, no further action is required under the Unfunded Mandates Reform Act of 1995.

Review under the Treasury and General Government Appropriations Act of 1999

Section 654 of the Treasury and General Government Appropriations Act of 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. Today's action would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

Review under the Treasury and General Government Appropriations Act of 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. Both OMB and DOE have published established relevant guidelines (67 FR 8452 and 67 FR 62446, respectively). DOE has reviewed today's action under the OMB and DOE guidelines, and has concluded that it is consistent with applicable policies in those guidelines.

Review under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," (66 FR 28355), requires Federal agencies to prepare and submit to the OMB a Statement of Energy Effects for any proposed significant energy action. A "significant energy action" is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of the OMB OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use, should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use. Today's action would not have a significant adverse effect on the supply, distribution, or use of energy and is therefore not a significant energy action. Accordingly, DOE has not prepared a Statement of Energy Effects.

Review under Executive Order 13175

Executive Order 13175, "Consultation and Coordination with Indian tribal Governments", (65 FR 67249), requires DOE to develop an accountable process to ensure "meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications." "Policies that have tribal implications" refers to regulations that have "substantial direct effects on one or more Indian tribes, on the

relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes." Today's action is not a policy that has "tribal implications" under Executive Order 13175. DOE has reviewed today's action under Executive Order 13175 and has determined that it is consistent with applicable policies of that Executive Order.

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Energy Efficiency and Renewable Energy