



**Department of Energy**  
Washington, DC 20585

**DOE Position on  
Energy Efficiency and Renewable Energy<sup>1</sup> in Residential Building Energy Codes  
During the 2018 IECC Code Development Cycle**

**Overview**

There is a national conversation taking place on the role of renewable energy in achieving zero energy buildings. Of particular interest is the appropriate role of renewable energy in current and upcoming residential building energy codes, including the 2015 International Energy Conservation Code (IECC), the 2018 IECC, and future code cycles.

This paper provides background on this topic, summarizes DOE's authority related to building energy codes as they apply to renewable energy, and offers DOE's views on a path forward.

**Background**

The U.S. Department of Energy (DOE) strongly supports *energy efficiency* and *renewable energy*, both of which are vital to achieving national energy and emission reduction goals. High efficiency buildings reduce the energy needed from the electrical grid and renewable energy reduces the emissions associated with producing that energy. Together, these clean energy resources can produce significant economic and environmental gains.

Building energy codes have been in place in the U.S. since the late 1970's. They address the split-incentive market barrier which describes the situation of the builder having a different economic incentive (low construction costs, no exposure to energy bill payments) than the home owner. Building energy codes have delivered tremendous energy savings to homeowners across the country, estimated at \$15.6 billion between 1992 and 2012<sup>2</sup>.

The role of renewable energy as a way to meet the targets and provisions of residential building energy codes has recently gained attention. Through the 2012 IECC code edition, code requirements relied solely on energy efficient technologies and practices to reduce energy use, with the 2012 edition reducing energy use by over 30% from the 2006 edition. The 2015 edition of the IECC increased energy efficiency very slightly beyond that of 2012 and also added a new compliance path, the Energy Ratings Index (ERI). Though there is no mention of renewables in Section 406 of the 2015 edition of the code, which describes the ERI compliance path, the ERI path was modeled after RESNET's Home Energy Rating System which gives credit for renewables, allowing them to be "traded off" against efficiency. In other words, a new home that includes photovoltaics (PV) would not need to have as much energy efficiency built in as one that did not have PV to achieve the same score. Based on the implicit connection to the Home Energy Rating System, some organizations believe that renewables are included in the ERI path. Subsequently, several proposals involving renewables were submitted earlier this year

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<sup>1</sup> The terms "renewable energy" and "renewables" in this document refer to on-site photovoltaic systems except where specifically noted otherwise.

<sup>2</sup> <https://www.energycodes.gov/building-energy-codes-program-national-benefits-assessment-1992-2040-0>.

to the 2018 IECC development process, most of which attempt to either define renewables or limit their use in the ERI path.

### **DOE Authority on Energy Efficiency and Building Energy Codes**

DOE engages in a number of activities related to building energy code development, adoption and implementation consistent with Title III of the Energy Conservation and Production Act, as amended, (42 U.S.C. 6831 *et seq.*). Section 304(a), as amended, of ECPA directs DOE to, among other things:

- Participate in the code amendment process, including seeking adoption of all technologically feasible and economically justified energy efficiency measures (42 U.S.C. § 6836(b)(2)), and
- Review updated editions of the model codes and issue a determination as to whether the new edition will improve energy efficiency in residential and/or commercial buildings (42 U.S.C. 6833(a)(5)(A), 42 U.S.C. 6833(b)(2)(A)).

After issuing a positive determination for the 2015 IECC, the Department conducted a subsequent analysis showing that the code delivered positive economic benefits and consumer cost savings in all fifty states. DOE did not consider renewable energy in either of these analyses because, consistent with all past analyses, only the prescriptive compliance path was studied. Acknowledging the potential future importance of the ERI path it was noted explicitly in the 2015 IECC determination that DOE may include other paths in future determinations.

### **Looking Forward**

There is a robust national conversation taking place around renewable energy and, in particular, achieving zero energy buildings on a wide scale, including the State of California's aim to require this for all residential new construction by 2020. The fact that zero energy buildings by definition require renewable energy means that energy codes, if they continue their trajectory, would need to include them. DOE is interested in helping outline a pathway for the inclusion of renewables in future versions of the code. To do so, in our view, there are several issues which need to be addressed:

- *Requirements for efficiency.* Consistent with federal statute and with the goal of developing and adopting building energy codes that advance technically feasible and economically justified energy efficiency measures, there must be improvement in energy efficiency in building energy codes that meet or exceed those in the prior code editions for DOE to make a positive determination about any codes updates.
- *Code Scope.* Energy efficiency measures are inextricably tied to individual buildings and fit well within the building codes framework which requires compliance at the individual building level. The link between on-site renewables and individual buildings is different. Grid-connected renewable energy may be used in the building it is attached to – but it may also be used miles away depending on moment-by-moment conditions on the grid. This lack of connection to a specific building makes it fundamentally different than any other requirement in any of the building codes, and brings into play questions about what credit should be given to an individual building when some of the benefit of a measure installed to meet a code requirement is not realized by that building.
- *Appropriate Metrics.* Kilowatts, the standard metric used for photovoltaic array sizes, are inconsistent with building energy codes as they are a measure of maximum capacity rather than energy and thus are not directly comparable to energy efficiency. Additionally, there is nothing in the intent section or any other section of the IECC that refers to load or capacity, as opposed to energy.

## Conclusions and Next Steps

DOE supports cost-effective energy efficiency continuing to increase as fast as possible in new code versions, and supports federal, state, and utility goals and other actions to increase use of renewable energy outside the building codes.

Regarding the incorporation of renewable measures into building codes in the future, and trading off renewables against cost-effective energy efficiency in building energy codes, DOE will support the following:

- Savings represented in the 2015 IECC are cost-effective to consumers and should serve as the minimum for the 2018 code editions. Therefore, any potential trade-offs between efficiency and renewables should only be allowed at or below the ERI values in Table R406.4 of the 2015 IECC. DOE will oppose proposals in the IECC development process in which efficiency is reduced by weakening the overall energy efficiency requirements in the current code or by allowing trade-offs for renewables above the ERI values in Table R406.4 of the 2015 IECC. More broadly speaking, DOE does not support unlimited trade-offs for renewables.
- Renewables have a place in future energy codes, but the proper way to include them should be determined in a setting where all aspects of the issue can be fully considered. Any compliance credit for on-site renewables should consider energy delivered to the home on which they are installed instead of gross energy production or system size.

Next steps include:

- DOE engagement with key stakeholders before the October code hearings on the contents of this document and exploration of critical aspects and concerns with issues surrounding renewable energy and the energy codes.
- DOE participation in the code hearings supporting the positions stated in this document and other long-standing positions.
- DOE participation in any ANSI/RESNET/ICC 301 Standard process which would establish revised provisions for counting renewable energy in the HERS score (and thus how it counts towards compliance in the energy code).
- DOE to identify a tool, such as NREL's PVWatts® Calculator, which provides location-specific estimates of the amount of annual energy delivered per kW of installed PV panels. DOE will also determine whether tools exist that can calculate the percentage of energy produced by an on-site system that is consumed on-site. No compliance credit should be given for power sent off-site or for renewable power generated off-site (often referred to as RECS or renewable energy credits).