RE126-19

IECC: R202 (IRC N1101.6), R403.5.1 [IRC N1103.5.1] (New), TABLE R403.5.1 [IRC N1103.5.1] (New)

Proponent: Lauren Urbanek, representing Natural Resources Defense Council (lurbanek@nrdc.org)

2018 International Energy Conservation Code

Add new text as follows:

R403.5.1 (IRC N1103.5.1) Water heating equipment. Service water heating equipment shall be one or more of the following types:

1. Storage gas water heater with a uniform energy factor (UEF) that meets the requirements of Table R403.5.1.
2. Storage electric water heater utilizing not less than 1.0 kW of on-site renewable energy.
3. Heat pump water heater with a UEF not less than of 2.0.
4. Tankless water heater.
5. Grid-enabled water heater.
6. Solar water heating system having a solar fraction of not less than 0.5.

TABLE R403.5.1 (IRC N1103.5.1)
MINIMUM UNIFORM ENERGY FACTOR (UEF) FOR STORAGE GAS WATER HEATERS

FIRST HOUR RATING[a]	MINUMUM UEF
Very Small	0.24
Low	0.50
Medium	0.64
High	0.68

a. The first hour rating of a water heater is determined by the federal test procedure. It is listed on the Energy Guide label affixed to the water heater.

SECTION R202 (N1101.6)
GENERAL DEFINITIONS

Add new definition as follows:

GRID-ENABLED WATER HEATER. An electric water heater that includes controls that enable activation for use as part of an electric thermal storage or demand response program.

SOLAR FRACTION. The fraction of total annual water heating energy met by a solar water heater.

Reason: This proposal improves the energy efficiency of the prescriptive path of the code while continuing to offer builders the same level of flexibility they already enjoy. Builders may still install any type of water heater that works for the home and location, including storage gas or electric water heaters. While it is true that not every home may be able to utilize every option listed, there is an option that is appropriate for any home. This proposal also modifies only the prescriptive path, which leaves builders the flexibility of the performance and ERI paths.
This proposal is structured so that it does not trigger provisions of the National Appliance Energy Conservation Act (NAECA). See attached for a legal memorandum.

Residential envelopes have been getting tighter and better over the last few years. As a result, domestic water heating energy is emerging as a significant end-use from the efficiency stand-point. There are multiple ways of improving the efficiency of generating hot water in homes.

The US Department of Energy's analysis for the standard that took effect in 2015 found that high-efficiency gas storage water heaters cost less upfront to install in new construction than standard efficiency models, due to lower venting costs of the high-efficiency equipment[1]. Furthermore, this efficiency level is cost-effective for customers compared to a standard model, saving more than $200 in energy costs. This means that customers will save money on their bills by installing a more efficient gas storage water heater *and* will pay less to purchase the efficient model than the less-efficient model. Gas furnaces that meet the Uniform Energy Factors specified in this proposal are widely available. Uniform Energy Factors are specified, per the DOE federal test procedure, based on the equipment's First Hour Rating, which is clearly labeled on the yellow Energy Guide label affixed to each

Storage electric water heaters may be installed, when coupled with solar energy. The purpose of this requirement is to offset the electricity used to heat the water, saving money for the consumer. In addition, solar energy is a strong selling point for a new home.

DOE analysis found that heat pump water heaters that replace electric storage water heaters are wildly cost-effective in all climate zones, in spite of their higher equipment costs. Homeowners will save more than $500 in energy costs compared to even an efficient electric storage water heater.

Tankless water heaters were cost-effective in the warmer climate zones, but were not as cost-effective in the colder climate zones.

As part of DOE's appliance and equipment standards initiative, stakeholders expressed the importance of electric resistance water heaters to electric thermal storage (ETS) programs, so those grid-enabled water heaters are also incorporated into this proposal. Utilities use ETS programs, sometimes also known as load shifting or demand response programs, to manage peak demand load by limiting the times when certain appliances are operated. In certain water-heater based ETS programs, a utility typically controls a water heater remotely to allow operation only when electricity demand is during off-peak hours. During that off-peak operation, the electricity consumed is stored by the water heater as thermal energy for use during peak hours when the utility prevents the water heater from using electricity.

A solar water heating system can be designed in a variety of different ways. They can directly heat the water using the sun, can indirectly transfer heat from the sun to water in a storage tank, or can use pumps and valves to move water from collectors to a storage tank. They can have either gas or electric backup heating capabilities. This proposal requires at least half of the total energy delivered to the water heater to be generated through solar energy.

[1] U.S. Department of Energy, Energy Efficiency and Renewable Energy Office. Water Heater Technical Support Document Analytical Tools. Retrieved on January 11, 2019 from https://www.regulations.gov/document?D=EERE-2006-STD-0129-0046.

LEGAL MEMORANDUM CONCERNING NRDC's PROPOSED R403.5.1 AND THE NATIONAL APPLIANCE ENERGY CONSERVATION ACT

Introduction

The Natural Resources Defense Council (NRDC) proposes the addition of R403.5.1 to Chapter 4 of the 2018 International Efficiency Conservation Code (IECC).[1] The proposed addition prescribes six types of water heaters which may be installed by builders in order to comply with the prescriptive compliance pathway of IECC Chapter 4. Some commenters on similar past proposals expressed concern that such a provision would be preempted by the National Appliance Energy Conservation Act, which amended the Energy Policy Conservation Act and set up the energy efficiency standards program for appliances, including water heaters. This is not the case. The proposed code addition comports with the federal statutory provision for building codes because it does not require installation of water heaters that exceed the current federal minimum level.

Legal Analysis

As explained in greater detail below, the issue is whether these proposed additions would effectively require builders to use products that are more efficient than required by federal efficiency standards and thus would trigger preemption. Because they do not there is no preemption concern here.

The National Appliance Energy Conservation Act provides that state building codes may include provisions concerning the efficiency of appliances covered by federal efficiency standards if they meet seven specified requirements.[2] Commenters in the past expressed concern that the provision would not meet two of these requirements: Sections 6297(f)(3)(B) and 6297(f)(3)(E). The basic requirement of these two provisions is that the building code not require use of an appliance more efficient than the level set by the Department of Energy under the Act.

The first of these focuses on the code as a whole. It states, in relevant part, that the code may not "require that the covered product have an energy efficiency exceeding the applicable energy conservation standard ... ." The second provision concerns building codes that offer optional combinations of items.[3] Our proposed changes easily satisfy this provision because, as discussed below,

---

[1] This memorandum is submitted as an attachment to NRDC's July 21, 2016 proposed amendment.
[2] 42 U.S.C. § 6297(f)(3).
[3] It is not clear whether the optional "combinations of items" applies to the prescriptive pathway at all. 42 U.S.C § 6297(f)(3)(E). Assuming that it does, we believe the relevant "combination" would be the combination of each of the different water heater options and the rest of the prescriptive options. The proposed standard avoids preemption because it includes multiple optional combinations that include minimum efficiency water heaters and only two that require higher efficiency appliances.

four of the six options do not involve products that exceed existing federal standards. (A fifth option may not require a standard-exceeding product depending on the first hour rating of the water heater.)

The presence of some more efficient options does not trigger preemption. In interpreting these provisions, the Ninth Circuit Court of Appeals has recognized that "a builder is not 'required' to select a [more efficient] option . . . simply because there is an economic incentive to do so."[4]

The proposed amendment would be not preempted because it allows installation in new residential buildings of minimum-efficiency water heaters. The statutory preemption test focuses on the "covered product," which is defined in this case as water heaters.[5] Thus, a building code is not preempted so long as it does not require installation of a covered product – in this case a water heater – that is above the minimum efficiency level. The proposed amendment plainly does not do so for several reasons. First, the performance path (Section 405) and the Energy Rating Index path (Section 406) focus on overall energy use and include no water heater requirements at all.

Second, even just considering the prescriptive pathway, the proposed amendment still does not require use of a water heater that exceeds minimum federal standards. The proposed amendment allows builders to select any of the six prescribed types of water heaters, at least two of which clearly do not exceed the federal requirements: tankless water heaters (R403.5.1.4) and grid-enabled water heaters (R403.5.1.5). For tankless water heaters, the proposed code amendment contains no minimum efficiency standard and thus the federal standards would apply.[6] For grid-enabled water heaters, the proposed code complies with the federal provision.[7] As such, builders can comply with the standard by using water heaters that meet, but do not exceed, federal efficiency standards. Indeed, even if these minimum efficiency options were not available, the prescriptive path would still not "require" use of higher efficiency water heaters since any type of water heater can be used under the prescriptive approach if combined with other options such as a solar water heater.[8]

The proposed amendment is also similar to existing building code provisions. The prescriptive compliance path in California's 2016 building code, for instance, requires installation of either gas/propane instantaneous water heaters or gas/propane storage type water heaters in new residential dwellings.[9] California's prescriptive compliance path allows use of certain minimum efficiency water heaters but does not allow use of every type of minimum efficiency water heater. Like the proposed

---

[4] *Building Industry Ass'n of Wash. v. Wash. State Bldg. Code Council*, 683 F.3d 1144, 1151 (9th Cir. 2012).
[5] 42 U.S.C. § 6292(a)(4).
[6] Energy Conservation Program for Consumer Products: Definitions and Standards for Grid-Enabled Water Heaters, Final Rule, 80 Fed. Reg. 48004-01 (August 11, 2015).
[7] *Id.*
[8] *See Building Industry Ass'n of Wash.*, 683 F.3d at 1151.
[9] 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Section 150.1(c)(8)(A), available at http://www.energy.ca.gov/title24/2016standards/index.html.

code, the California code allows builders to choose an alternate compliance path, which allows use of any water heater.[10]

Conclusion

The core requirement for a building code to avoid preemption is that it not require above-minimum efficiency appliances. This requirement is met by the NRDC proposal because the proposal offers multiple ways that minimum efficiency water heaters can be used under both the prescriptive and performance pathways.

[10] *See* International Energy Conservation Code, R401.2, available at http://codes.iccsafe.org/app/book/toc/2015/I-Codes/2015%20IECC%20HTML/index.html.

Bibliography: U.S. Department of Energy, Energy Efficiency and Renewable Energy Office. Water Heater Technical Support Document Analytical Tools. Retrieved on January 11, 2019 from https://www.regulations.gov/document?D=EERE-2006-STD-0129-0046.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal provides a list of options for a builder to choose from. In some instances the builder may choose an option which increases construction costs, but there are many options that will not increase costs. For instance, the US Department of Energy's analysis for the water

heater standard that took effect in 2015 found that high-efficiency gas storage water heaters cost less upfront to install in new construction than standard efficiency models, due to lower venting costs of the high-efficiency equipment.

Proposal # 5421

RE126-19