

New efficiency standards for residential water heaters are on the horizon

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What the 2015 standards mean for manufacturers, contractors and consumers

Starting in April 2015, new water heater energy efficiency standards will be in effect.

In less than two years, new water heater energy efficiency standards will be in effect, starting in April 2015. [U.S. Department of Energy](#) (DOE) Secretary Steven Chu announced in April of 2010 that the Department had finalized higher energy efficiency standards for a key group of heating appliances that will together save consumers up to \$10 billion and prevent the release of up to 164 million metric tons of carbon dioxide over 30 years. These new standards — for residential water heaters, pool heaters and direct heating equipment such as gas fireplaces — will reduce air pollution, prevent the release of harmful nitrogen oxides and mercury, and avoid emissions equivalent to taking 46 million cars off the road for one year, the DOE said.

Residential water heating products affected by the new 2015 Energy Conservation Standards include gas-fired, oil-fired, electric, tabletop, instantaneous gas-fired and instantaneous electric. See the chart below for new energy factor requirements for all these products.

WATER HEATERS AFFECTED BY NEW STANDARDS		
Product Class	Energy factor as of January 20, 2004	New Energy Factor Requirements
Gas-fired Water	$0.67 - (0.0019 \times \text{Rated Storage Volume in gallons})$.	For tanks with a Rated Storage Volume at or below 55 gallons: $EF = 0.675 - (0.0015 \times \text{Rated Storage Volume in gallons})$. For tanks with a Rated Storage Volume above 55 gallons: $EF = 0.8012 - (0.00078 \times \text{Rated Storage Volume in gallons})$.
Oil-fired Water Heater	$0.59 - (0.0019 \times \text{Rated Storage Volume in gallons})$.	$EF = 0.68 - (0.0019 \times \text{Rated Storage Volume in gallons})$.
Electric Water Heater	$0.97 - (0.00132 \times \text{Rated Storage Volume in gallons})$.	For tanks with a Rated Storage Volume at or below 55 gallons: $EF = 0.960 - (0.0003 \times \text{Rated Storage Volume in gallons})$. For tanks with a Rated Storage Volume above 55 gallons: $EF = 2.057 - (0.00113 \times \text{Rated Storage Volume in gallons})$.
Tabletop Water Heater	$0.93 - (0.00132 \times \text{Rated Storage Volume in gallons})$.	$EF = 0.93 - (0.00132 \times \text{Rated Storage Volume in gallons})$.
Instantaneous Gas-fired Water Heater	$0.62 - (0.0019 \times \text{Rated Storage Volume in gallons})$.	$EF = 0.82 - (0.0019 \times \text{Rated Storage Volume in gallons})$.
Instantaneous Electric Water Heater	$0.93 - (0.00132 \times \text{Rated Storage Volume in gallons})$.	$EF = 0.93 - (0.00132 \times \text{Rated Storage Volume in gallons})$.
NOTE: The Rated Storage Volume equals the water storage capacity of a water heater, in gallons, as specified by the manufacturer.		
Source: Office of Energy Efficiency and Renewable Energy, Department of Energy. 10 CFR Part 430, [Docket Number: EE-2006-BT-STD-0129] RIN 1904-AA90 Energy Conservation Program: Energy Conservation Standards for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters.		

According to [The Energy Efficiency Standards group](#), efficiency metric for residential water heaters is the energy factor (EF), which indicates a water heater's overall energy efficiency based on the amount of hot water produced per unit of fuel consumed over a typical day. The EF accounts for recovery efficiency — how efficiently the heat from the energy source is transferred to the water; standby losses — the percentage of heat loss per hour from the stored water compared to the heat content of the water (for water heaters with storage tanks); and cycling losses — the loss of heat as the water circulates through a water heater tank, and/or inlet and outlet pipes.

"These energy-conserving appliance standards are a critical part of the Administration's overall efforts to save energy in homes and businesses nationwide," says Secretary Chu. "By raising the energy efficiency requirements of our everyday appliances, we will save money for American families and companies, reduce carbon pollution, and enhance our energy security for decades to come."

The standards released in 2010 increase the stringency of the existing minimum conservation standards for these three types of residential heating products, which account for about 18% of energy use in homes across the country. The standards will significantly reduce energy consumption by these products, including decreasing energy use in large electric storage water heaters by 47% and by more than 30% in large gas water heaters, according to the DOE.

Establishing standards

According to Harvey M. Sachs, Ph.D. and Senior Fellow at the [American Council for an Energy Efficiency Economy](#) (ACEEE), DOE cannot establish standards without first showing that they are cost effective by detailed technical analysis.

"That doesn't mean it doesn't have an increased first cost, but the first cost increment is always more than made up in a reasonable time in savings," says Sachs. "The second thing is the DOE's analysis has almost always been wrong, but they have almost always over estimated the costs of new minimum standard products. The reason for this is pretty simple. The manufacturers re-design their products and production processes to bring costs down for their products.

"The real technology shifts are for the roughly 10% of the market that is bigger than gas-fired storage water heaters of 55 gallons, which will have to go to condensing, and electric will have to go to heat pumps," adds Sachs. "For everything smaller, there are very small changes. Product is already on the market today that meets the new standards."

According to Karen Meyers, corporate director of government relations at [Rheem](#), year after year, Rheem has introduced heating, cooling and water heating systems that save energy and reduce operating costs.

"Encouraging consumers to adopt more efficient water heaters is something that we take seriously, since 60% of a home's total energy consumption is for heating, cooling and water heating products (source: ENERGY STAR program)," states Meyers. "Given our nation's energy goals, we understand why the DOE is driving regulation that puts higher-efficiency solutions in the marketplace."

However, Meyers points out, it is important to realize that water heaters are not "one size fits all." "That's one of our concerns with the new standards," says Meyer. "Currently, the standards require manufacturers to use specific technologies to produce water heaters, and, the fact is, there are many unique application needs that must be considered when developing water heaters. Considerations such as whether the market uses natural gas or electricity, any venting requirements, or whether the home is a historic property or new construction must be taken into account when developing new products."

According to [A.O. Smith's](#) Chief Engineer and Director of Government Affairs Charlie Adams, A.O. Smith is a believer in high-efficiency equipment and has been manufacturing high efficiency equipment for several years now.

"However, we do have some concerns about the regulations going into effect," says Adams. "We have provided comments back to the DOE during the rule making process, so we are on record saying that we support high efficiency and are believers in it, but to require condensing gas

technology, to require heat pump technology in the larger size units, can be troublesome in the replacement market.”

Preparing for the standards

What do these new energy efficiency standards mean for contractors and consumers, and what are manufacturers doing to prepare for them?

Bradford White is in the middle of its largest plant expansion in company history to meet growing demand, and to accommodate the production of 2015 compliant products.

“The plant expansion includes the installation of the most advanced manufacturing equipment to give us the capability and flexibility to produce the new products required in 2015,” says Charles Smith, product manager at Bradford White Water Heaters. “In addition, we opened iTEC, our International Technical Excellence Center, to help educate customers and business partners on the 2015 DOE regulations and the new products that will be required.”

Regarding products that meet the new energy efficiency requirements, Bradford White, along with other manufacturers, already has models in its current product lineup that meet the requirements.

“It is important for contractors to understand that products manufactured before April 16, 2015, can be bought and installed after the changeover date” says Smith. “As far as new compliant products are concerned, Bradford White will produce and sell these in a manner that best helps the wholesaler and contractor community make a smooth transition to the new standards. It has been our experience that there is not strong demand for the new products until the required date.”

To help contractors, wholesalers and business partners prepare for the 2015 energy efficiency standards, Bradford White has been sharing information with customers as early as 2011 and at last year’s PHCC Convention.

“We’ve also educated our sales, product and marketing staff, so that they can speak with customers as needed on this topic,” says Smith. “Lastly, we are working on additional informational materials that will soon be available for distribution and on our website.”

Currently Rheem also has numerous electric and gas products that meet the pending energy efficiency standard, and the company is working to develop a variety of new products that will meet or exceed the new standards.

“And we have some [products] that will require modification if they are to meet the new efficiency standards,” says Butch Aikens, Rheem’s tankless sales manager for the Southeast Region.

According to Meyers, to meet the new federal minimum efficiency standards, Rheem will also have to employ some new technologies.

“For instance, any residential, tank-type, electric water heater more than 55 gallons will require heat pump technology after these standards go into effect,” says Meyers. “Rheem has considerable experience with heat pump technology; we were actually the first [major] manufacturer to launch a heat pump water heater in 2009. However, this technology is the highest efficiency option available today, so it’s concerning that the new EF standards will force us to use maximum technology to meet a federal minimum requirement.”

Rheem is already communicating with its distributors, contractors and homebuilders about the 2015 changes, as these new federal minimum efficiency levels will impact the entire supply chain.

“We’re also determining what kinds of educational pieces and training sessions will be most appropriate for our customers as we near the deadline,” says Meyers.

A.O. Smith also has products of both technologies (condensing gas technology and heat pump water technology) in the marketplace today.

According to Adams, the increases in minimum efficiencies for both the smaller and larger water heaters requires “optimizing known technologies.”

“Some considerations have led A.O. Smith to do consumer and industry research to understand the best approaches to resolve the issues that are going to be raised by these new standards,” says Adams.

In most cases, more insulation will mean thicker insulation spaces in the heater, so the same size tank will be larger.

“This will lead to some cases in existing applications today where there is an existing electric water heater that needs to be replaced after April 2015, so the same water heater, gallon capacity wise, will be larger in physical dimensions and it may or may not fit,” explains Adams. “We are making sure we understand the needs and limitations in the marketplace as best as possible. We want to make sure we are optimizing the products to make sure they are best suited to the marketplace instead of the engineering lab.”

Contractors, consumers

Where can contractors go to obtain knowledge about the higher energy efficiency standards? Bradford White has a network of manufacturers’ representative agencies that are prepared to help educate both the contractor and wholesaler regarding the 2015 standards. Bradford White is also working with professional organizations, such as the Plumbing-Heating-Cooling Contractors – National Association on a national and local level to help deliver information regarding the 2015 requirements.

“These communications will be a mix of face-to-face meetings, web-based material and printed materials we can send to customers,” says Smith. “Speaking at conferences will be part of our strategy to help contractors understand the implications of the 2015 requirements. Bradford White is committed to the professional contractor and that means providing information and education on critical topics affecting the industry. Since the new standards will actually affect how contractors have to plan their business needs well in advance of April 2015, we encourage them to learn as much as possible as soon as possible.”

At Rheem, the pending standards are discussed during training courses and how it may impact contractors’ future businesses. Rheem offers several types of training for contractors, including field training and training at the company’s corporate facility.

“We also encourage contractors to take advantage of any advanced training offered in the future since many will have to embrace technologies they may not have worked with too much in the past,” says Aikens. “An example will be that many will have to add a multi-meter to their tool box if they want to be able to service the products they sell.”

Because of space constraints, there is going to be more than one solution that the contractor can offer a consumer. The contractor will need to make the new water heater fit in the same space the old water heater has been in for years.

“It’s going to be a challenge for both the contractor and consumer,” says Adams.

A.O. Smith employees are also discussing the new energy efficiency standards during its contractor training courses.

“We feel like it is our responsibility to ensure that our channel partners are appropriately notified of these changes,” says David Chisolm, A.O. Smith director of marketing. “Essentially every water heater that is purchased today will be impacted in some form or fashion by the NAECA III implementation. Getting ahead of the communication curve is essential.”

According to Sachs, the 2015 standards are an opportunity for on-the-ball contractors.

“The contractor that carries the right products will have a lot of opportunity in this environment,” says Sachs. “The installation value-added with some of these technologies will be higher. An awful lot of people who think about DIY today for a large electric water heater will turn to professional contractors for heat pump water heater installation. The value added right now is in part of the assurance that it will work.”

The contractor will be able to suggest to the consumer their best options when replacing a water heater, says Sachs. “So I think for a professional plumber this is definitely an opportunity, not a burden. The contractor has a wider selection, ‘You are interested in a gas tankless, but in that same price range you may want to think about these alternatives that may do a better job for your home, or save you more money.’ ”

Other breeds

How will the new energy efficiency standards affect the tankless market? According to Sachs, tankless is increasing its market share.

“People with lots of teenagers think it’s great if you can’t run out of hot water,” says Sachs. “If you look at installation cost data, installing a large tankless water heater typically requires upgrading gas service to the water heater, and if you put in a heat pump water heater in some cases you need to put in a little pump to pump the condensate out.”

Even though tanks will be at higher efficiency levels with the new standards coming, they will still not reach the levels of tankless, according to Jason Fleming, marketing manager at Noritz, plus tankless offers additional benefits like space savings and continuous hot water.

“We are still going to have all of the advantages of tankless,” says Fleming. “It’s true there is a learning curve with tankless installations. In Southern California where people are more familiar with it, the price of installation is more competitive. Where people are less familiar, the costs can creep up.”

Fleming adds that the more education the contractor gets the more familiar they are with the technology and installation, and the installation will cost less for everyone. Now people are starting to have tankless water heaters that have been around for 10-plus years, so the cost to replace this will be reduced when it comes time to replace them.

Rheem, Bradford White and A.O. Smith all offer tankless water heaters.

Solar thermal is a different breed of water heating, according to Sachs.

“It doesn’t have the sex appeal of solar electric panels, and what we don’t have yet is the combination of someone that has really thought about low-cost manufacturing an all in one system, so that the box that it comes in has everything the plumber needs and he doesn’t have to do the engineering, which increases the costs. There is not a proper marketing mechanism either for this. Solar thermal has its work cut out for it. It’s a very small industry at the moment, but one with enormous potential for growth.”

