

Before the

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY  
UNITED STATES DEPARTMENT OF ENERGY  
WASHINGTON, D.C.

COMMENTS OF SPIRE INC.,  
THE AMERICAN PUBLIC GAS ASSOCIATION, & THE AMERICAN GAS ASSOCIATION

In response to the Request for Information Entitled  
Energy Conservation Program: Energy Conservation Standards for Consumer Water  
Heaters

85 Fed. Reg. 30853 (May 21, 2020)  
Docket No. [EERE-2017-BT-STD-0019](#)  
RIN 1904-AD91

July 6, 2019

## Introduction

Spire Inc. (Spire), the American Public Gas Association (APGA) and the American Gas Association (AGA), collectively referred to as “Commenters,” appreciate the opportunity to comment on the above-captioned request for information (RFI) concerning energy conservation standards for consumer water heaters (CWHs).

Spire owns and operates natural gas local distribution companies serving 1.7 million customers across Missouri, Alabama and Mississippi, and is submitting comments in this proceeding on its own behalf and on behalf of its operating companies including Spire Missouri Inc. and Spire Alabama Inc.

APGA is the trade association for approximately 1,000 communities across the U.S. that own and operate their retail natural gas distribution entities. They include municipal gas distribution systems, public utility districts, county districts, and other public agencies, all locally accountable to the citizens they serve. Public gas systems provide safe, reliable, and affordable energy to their customers and support their communities by delivering fuel to be used for cooking, clothes drying, and space and water heating, as well as for various commercial and industrial applications.

The American Gas Association, founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 75 million residential, commercial and industrial natural gas customers in the U.S., of which 95 percent — more than 71 million customers — receive their gas from AGA members. Today, natural gas meets more than 30 percent of the United States' energy needs.

Commenters support and actively invest in energy efficiency. For example, in FY18 alone, Spire’s Missouri utilities provided over \$7 Million of energy efficiency and low-income weatherization funding within our Missouri service areas. However, we do not support appliance efficiency standards that impose unjustified costs on consumers or that deprive consumers of gas products that are suitable for their needs. Such standards are not authorized by statute and would be harmful both to Spire’s interests and that of the consumers it serves.

## Comments

### Summary and Overview

Commenters believe that the Department of Energy (DOE) should make significant improvements in data collection and analytical practices in standards rulemaking. While there are a number of issues involved, there are significant and relatively straight-forward improvements that can and should be implemented immediately, in the context of this energy conservation standards rulemaking proceeding. Commenters urge DOE to address the specific issues identified below.

**First, DOE should not adopt standards that would make atmospherically vented water heaters unavailable.** As DOE has already recognized, standards that could only be satisfied through the use of condensing combustion technology would effectively make atmospherically vented gas products

unavailable, a result that would have the unlawful effect of leaving many consumers without the type of products their homes were designed to accommodate. If DOE determines that efficiency improvements for condensing water heaters were warranted, it could establish new standards for a separate product class limited to such products. What it cannot do is impose standards that would require consumers to modify their homes to accommodate products for which they were not designed.

**Second, DOE should not simply assume that purchasers would decline to make economically beneficial efficiency investments in the absence of standards.** DOE is well aware of the fact that more efficient CWHs would be economically beneficial for some consumers but would impose net costs on others. DOE is also aware that consumers often consider the economic costs and benefits of higher efficiency CWHs when they are investing in such products. Under these circumstances, it is not enough for DOE to make vague references to alleged “market failures” and to assume that consumers would leave economically beneficial investments in more efficient CWHs “on the table” in the absence of new standards. Instead, DOE must determine whether and to what extent there is actually a “problem” warranting regulatory intervention. Specifically, DOE must consider whether there are specific market failures that – in the absence of new standards – would cause purchasers of CWHs to decline economically beneficial investments in higher efficiency products. If such market failures are identified, DOE must consider the circumstances in which such market failures would be expected to occur, the prevalence of those circumstances, and the impact those market failures would have on the sale of more efficient CWHs.

**Third, DOE must recognize that it cannot determine the economic impact of standards for water heaters without developing a base case for analysis that reflects the impacts of actual purchasing behavior.** After identifying and determining the impact of relevant market failures, DOE must ensure that the modeling conducted for purposes of lifecycle cost (LCC) and payback analysis start by providing a reasonable representation of baseline market conditions and purchasing behavior. To do this, DOE’s modeling must assign base case efficiencies *appropriately* rather than *randomly*. Random base case efficiency assignment effectively assumes that consumers have no statistically significant preference for economically beneficial efficiency investments and no statistically significant aversion to net cost efficiency investments *regardless of the magnitude of the economic stakes involved*. This assumption is not even arguably valid for products such as CWHs, and it produces a dramatic overstatement of the potential for standards to produce economic benefits for consumers. These points have been thoroughly documented and are not subject to legitimate factual debate.

**Fourth, DOE should stop using incorrect and significantly overstated energy prices for purposes of its LCC and payback analyses.** DOE has consistently used natural gas prices in its LCC and payback analyses that dramatically overstate the utility bill savings efficiency improvements would provide. Specifically, DOE has based its analysis on average gas prices that are significantly higher than the marginal consumption-based gas prices that actually determine the utility bill savings that efficiency improvements would provide. This is an elementary error, because average gas prices include significant fixed charges that are billed without regard to gas consumption and thus would not be affected by reductions in gas consumption. Quantifying the economic benefits of efficiency improvements on the basis of average gas prices is therefore incorrect and results in a substantial overstatement of the economic benefits efficiency improvements would provide.

**Fifth, DOE should collect and preferentially rely on real-world data, at least to confirm the validity of its analysis of product and installation costs.** DOE’s analysis of product and installation costs involves a notoriously complex, opaque, and error prone exercise in which information and assumptions on dozens of individual input parameters are used to synthesize indirect estimates of the prices consumers pay to purchase and install products. Often – as in the case of CWHs – direct evidence of product and installation costs is available and simply needs to be collected and considered. It is critical to ensure that the purchase and installation costs used for purposes of LCC and payback analysis are accurate and that DOE present sufficient direct evidence to demonstrate that they are.

Commenters’ joint responses to some of the specific issues identified in the RFI are provided below. For the convenience of the reader, the issues identified in the RFI are restated in indented text prior to each corresponding response.

### **Specific Responses to Issues Raised**

#### **Issue C.1**

DOE requests feedback on the current consumer water heater product classes and whether changes to these individual product classes and their descriptions should be made or whether certain classes should be separated or merged. Specifically, with regard to consumer water heaters that use condensing technology and the related venting, DOE requests information and data on potential impacts as compared to consumer water heaters that use non-condensing technology, such as, but not limited to, the complexity/cost of installation, changes to a home’s aesthetics, and the potential for fuel switching. DOE also requests comment on other instances where it may be appropriate to separate any of the existing product classes and whether it might reduce any compliance burdens. DOE further requests feedback on whether combining certain classes could impact product utility by eliminating any performance-related features or impact the stringency of the current energy conservation standard for these products.

Response:

As already stated, DOE should not adopt standards that would make atmospherically vented water heaters unavailable. DOE has already published a proposed interpretative rule recognizing that standards effectively banning appliances that utilize negative pressure, non-condensing Category I venting would result in the unavailability of performance related features in violation of the Energy Policy and Conservation Act of 1975 per 42 U.S.C. §§ 6295(o)(4) and 6313(a)(6)(B)(iii)(II)(aa). That conclusion is correct, as explained in detail in comments submitted in support of that proposed rule,<sup>1</sup> and is applicable to CWH products. Accordingly, if DOE concludes that new standards would be warranted for other categories of CWHs, it would need to create separate product classes to preserve the availability of CWHs compatible with Category I venting systems.

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<sup>1</sup> A copy of these comments is provided, and incorporated as a part of these comments, as Attachment A. APGA also recently reiterated the referenced comments in response to DOE’s request for prioritization of rulemakings under the updated Process Rule (85 Fed. Reg. 20886), noting that no appliance efficiency rulemaking impacted by the proposed interpretive rule, such as updating energy conservation standards for CWHs, should proceed until DOE finalizes its proposed interpretive rule. APGA’s comments are available at <https://www.regulations.gov/contentStreamer?documentId=EERE-2020-BT-STD-0004-0019>.

## Issue C.2

DOE seeks information regarding any other new product classes it should consider for inclusion in its analysis. Specifically, DOE requests information on the performance-related features that provide unique consumer utility and data detailing the corresponding impacts on energy use that would justify separate product classes (i.e., explanation for why the presence of these performance-related features would increase energy consumption).

Response:

See the response to Issue C.1 above.

## Issue C.4

DOE seeks information on the technologies listed in Table II.2 regarding their market adoption, costs, and any concerns with incorporating them into products (e.g., impacts on consumer utility, potential safety concerns, manufacturing/production/implementation issues).

Response:

Commenters believe that the physical limitations of safe combustion efficiency have been reached for appliances designed for Category 1 venting systems. The Gas Technology Institute (GTI) previously studied this safety issue and concluded that higher water heater efficiencies would pose hazards of deteriorating venting systems due to corrosion, and the relevant facts are unchanged.<sup>2</sup> However, Commenters remain open to new cost-effective insulation possibilities.

## Issue D.1

DOE requests feedback on what impact, if any, the four screening criteria described in this section would have on consideration of each of the technology options listed with respect to consumer water heaters. Similarly, DOE seeks information regarding how these same criteria would affect consideration of any other technology options not already identified in this document with respect to their potential use in consumer water heaters.

Response:

See the responses to Issues C.1 and C.4 above.

## Issue E.6

DOE seeks input on whether the maximum available efficiency levels are appropriate for potential consideration as possible energy conservation standards for the products at issue – and if not, why not.

Response:

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<sup>2</sup> The GTI study was submitted as Attachment 1 to the American Gas Association's comments of February 9, 2010 in Docket No. EERE-2006-STD-0129-0120. Those comments (identified as document Id. No. EERE-2006-STD-0129-0120) can be accessed at: <https://www.regulations.gov/document?D=EERE-2006-STD-0129-0120>

As indicated in the response to Issue C.1, standards that would effectively ban appliances that utilize negative pressure, non-condensing Category I venting cannot be adopted unless separate product classes are created to preserve the availability of such products.

#### Issue E.21

DOE requests feedback on the technology options available for improving the energy efficiency of grid-enabled water heaters.

Response:

It is important to remember that unenforceable “grid enabled” features can be bypassed with the flick of a switch. Moreover, the logic that grid enabled water heaters are effectively renewable energy storage devices is debatable at best.

#### Issue E.23

DOE requests feedback on whether the manufacturer markups of 1.31, 1.28, 1.30, and 1.45 are still appropriate for gas-fired storage water heaters, electric storage water heaters, oil-fired storage water heaters, and gas-fired instantaneous water heaters, respectively.

Response:

Commenters believe there is no inherent reason that different types of storage water heaters appliance would have different markups. Assuming different markups by product types imposes an artificial bias between product types, DOE should use a consistent markup across all storage water heater types unless it can sufficiently demonstrate why it should not.

#### Issue G.6

DOE seeks input on water use data by season to more accurately calculate the inlet water temperature.

Response:

Addressed under G.8 below. Also, people set water heater temperatures differently. Outlet temperature is as important as inlet.

#### Issue G.8

DOE requests comment on the methodology for determining energy use for each consumer water heater product class, including the impact of ambient conditions and draw patterns.

Response:

Except for differences in seasonal and regional water heater inlet temperatures, DOE should assume the same conditions across classes. In the past, DOE has assumed that consumers with gas-fueled

water heaters use more hot water than consumers with electric-powered water heaters. Such assumptions appear as biases and should be avoided.

#### Issue G.10

DOE requests comment on the methodology for determining energy use for grid-enabled water heaters.

Response:

See the response to Issue E.21 above.

#### Issue H.1

DOE requests comment on the overall methodology that it intends to use to conduct the LCC and PBP analysis for consumer water heaters.

Response:

By statute, DOE must prepare and consider both payback and LCC analyses in determining whether standards are economically justified. Specifically, DOE must consider:

- The "savings in operating costs throughout the estimated average life of the covered product . . . compared to any increase in the price of, or in the initial charges for, or maintenance expenses of the product that are "likely to result from the imposition of the standard"<sup>3</sup> (*i.e.*, an LCC analysis); and
- Whether "the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy . . . savings during the first year that the consumer will receive as a result of the standard"<sup>4</sup> (*i.e.*, a payback analysis).

The statutory language makes it clear that both types of analysis are designed to assess the economic justification of standards from the perspective of product purchasers: *i.e.*, through a comparison between the costs required efficiency improvements would impose on purchasers and the operating cost savings purchasers could expect those efficiency improvements to provide. Unfortunately, there have been serious problems with the way that DOE has performed such analysis. In particular:

- DOE's LCC and payback analyses are not designed to assess the economics of efficiency investments that would occur *as a result of new standards* as the statute requires;

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<sup>3</sup> 42 U.S.C. § 6295(o)(2)(B)(i)(II).

<sup>4</sup> 42 U.S.C. § 6295(o)(2)(B)(iii).

- DOE’s modeling has sometimes excluded relevant efficiency investments from its analyses and has sometimes accounted for non-relevant efficiency investments (*i.e.*, for the costs of, and savings provided by, products other than those covered by the standard at issue);
- DOE has calculated the operating cost savings resulting from efficiency improvements using energy price estimates that do not represent the actual savings (*i.e.*, reductions in monthly utility bills) that those improvements would provide; and
- DOE has relied on cost estimation techniques that do not provide a reasonable assessment of the costs required efficiency improvements would impose on consumers.

These issues are addressed in turn below.

- a. DOE’s modeling must be based on the efficiency investments that would occur as a result of new standards

Where products that would satisfy an efficiency standard are already available in the market, the effect of a standard would be to cause consumers to make efficiency investments that they would otherwise decline. Such a standard could only provide net economic benefits for consumers if the economic benefits of those otherwise-declined investments would – at least on average – exceed their costs. For this to be possible, there must be some reason why purchasers would decline economically beneficial efficiency investments in the absence of the standard. The premise that purchasers would decline such investments is ordinarily based on the assumptions that:

- Investments in products efficient enough to satisfy the standard would require a greater initial investment; and
- Market failures exist that would cause purchasers focused on higher initial costs to forego economically beneficial investments in such products.

DOE must determine whether or to what extent these assumptions are true; it cannot simply assume that market failures would cause consumers to leave economically beneficial investments “on the table” in the absence of new standards. Unfortunately, such an assumption is a built-in feature of DOE’s current LCC and payback modeling approach.

DOE recognizes that the economics of investments in higher-efficiency products can vary considerably depending on a variety of variables, and that such investments would often be economically beneficial for some purchasers but would impose net costs on others. Where this is the case, the economic impact of standards necessarily depends on the extent to which purchases made in the absence of standards reflect any statistically significant preference for economically beneficial efficiency investments or aversion to net cost efficiency investments. To the extent they do:



- The percentage of efficiency investments with economically beneficial outcomes would be higher for base case efficiency investments than for investments resulting from a standard;
- The percentage of efficiency investments with net cost outcomes would be lower for base case efficiency investments than for investments resulting from a standard; and
- The average economic outcome of base case efficiency investments would therefore be better than the average for all potential efficiency investments while the average for investments resulting from the standard would be worse.

Consequently, the economic impact of a standard **cannot be determined without an understanding of base case purchasing behavior**. For this reason, it is essential that DOE consider whether there are market failures that would cause purchasers of CWHs to decline economically beneficial investments in higher efficiency products in the absence of new standards and – if there are – that it determine the circumstances in which such market failures would be expected to occur, the prevalence of those circumstances, and the impact those market failures would have on the sale of more efficient CWHs. In short, DOE must assess the impact that base case purchasing behavior would have on the distribution of economic outcomes (and hence on the average economic outcome) of the efficiency investments that would occur as a result of a standard. DOE’s assessment of “base case” conditions cannot continue to focus only on the question of *how many* efficiency investments would be declined in the absence of standards, because that factor has no bearing on the *economics* of the efficiency investments being declined.

DOE’s current modeling approach for LCC and payback analysis is not even designed to assess the economic impact of the efficiency investments that would occur as the result of a standard. Instead, it provides an assessment of a randomly selected universe of efficiency investments that is representative of all potential efficiency investments rather than of those that would result from a standard. This approach would only be valid if purchasing decisions made in the absence or new standards would reflect no statistically-significant preference for economically beneficial efficiency investments and no statistically-significant aversion to net cost investments *regardless of the magnitude or the economic stakes involved*. There is no basis to suggest that approach provides a reasonable representation of actual purchasing behavior, and it is facially unreasonable to assume that it does.

DOE’s modeling approach is therefore invalid and unquestionably results in a systematic overstatement of the potential for standards to provide economic benefits for consumers. The magnitude of this overstatement can be enormous. For example, an independent review of the analysis for DOE’s proposed residential furnace standards (which used the same basic methodology) revealed that over half of the total economic benefits claimed to justify those standards were attributable to efficiency investments that purchasers would be expected to make *even if market failures caused them to ignore efficiency benefits entirely*. Specifically, over half of the economic benefits claimed to justify DOE’s proposed residential furnace standards were attributable to efficiency investments *in which the higher efficiency product was the low-cost option in terms of initial*

*investment*.<sup>5</sup> LCC and payback analyses based on DOE's current modeling approach do not even arguably quantify the economic impact standards could be expected to have on consumers and unquestionably produce a dramatic overstatement of the potential for standards to benefit consumers. DOE must acknowledge that fact and modify its modeling approach accordingly.<sup>6</sup>

- b. For purposes of LCC and Payback analyses, DOE should assume that standards will not result in lost product sales.

The purpose of LCC and payback analyses is to compare the cost of required efficiency improvements with the savings in operating costs those efficiency improvements would provide. As explained in Attachments B and C,<sup>7</sup> this analysis is corrupted to the extent that "bad" economic outcomes are excluded from the analysis on the grounds that they would be *so bad* that consumers would be driven to abandon the regulated product in favor of some alternative option. The question is whether the cost of required efficiency improvements can be justified by the operating cost savings those improvements would provide, and that question cannot be answered honestly if cases in which the answer is "no" are preferentially excluded from the analysis.

- c. DOE's assessment of operating cost savings must be based on the actual utility bill savings required efficiency improvements would provide.

As discussed in the response to Issue H.10 below, DOE's LCC and payback analyses are based on incorrect and overstated gas prices and therefore significantly overstate the operating cost savings that efficiency improvements would provide. This error needs to be corrected going forward.

- d. DOE should collect and preferentially rely on real-world data for the key parameter inputs in its LCC and payback analyses.

The most critical parameter inputs for LCC and payback analyses are installed costs and operating cost savings. In addition to using the wrong data to determine operating cost savings, DOE has largely discounted direct evidence of product and installation costs in favor of "built up" cost estimates

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<sup>5</sup> See Spire's January 1, 2017 comments in the residential furnace rulemaking, identified as Document No. EERE-2014-BT-STD-0031-0309 in in Docket No. EERE-2014-BT-0031 ("Spire's Residential Furnace Comments") at pp. 60-61 and Attachment C to Spire's Residential Furnace Comments at p. 23. These comments and their supporting attachments can be accessed at <https://www.regulations.gov/document?D=EERE-2014-BT-STD-0031-0309>. As already discussed, the whole premise that efficiency standards can provide economic benefits for consumers rests on the assumption that purchasers might decline economically beneficial efficiency investments that would require a higher initial investment.

<sup>6</sup> For further discussion of this issue see Attachment A at pp. 15-16 and Attachment B at pp. 6-8. Attachment B is a submission provided in connection with an ongoing peer review of DOE's regulatory analysis in standards rulemaking and is incorporated as a part of this comment submission.

<sup>7</sup> Attachment C was submitted in response to DOE's proposed "process rule" amendments and is incorporated as a part of this comment submission.

developed through an opaque, error-prone, and excessively complex analysis.<sup>8</sup> Whatever the perceived virtues of these indirect estimates might be, it is unreasonable for DOE to rely on them for purposes of LCC and payback analyses when – as is usually the case – direct evidence of the prices consumers pay can easily be collected. Even if market data is insufficient to address the full range of relevant information needs, direct evidence of the prices consumers pay is transparently *the best* evidence of the prices consumers pay, and such data should be preferred to indirect estimates whenever possible.

At a minimum, DOE should collect and present sufficient market data on product and installation costs to demonstrate that its methodologies for estimating product and installation costs are credible and produce results consistent with direct evidence of actual product and installation costs.

### Issue H.3

DOE seeks input on the approach and data sources it intends to use to develop installation costs, specifically, its intention to use the most recent RS Means Mechanical Cost Data.

Response:

DOE should only rely on estimated installation costs if it collects and presents sufficient direct evidence of product installation costs to confirm that its methodology produces results consistent with direct evidence of the installation costs consumers would pay. See Section c. of the response to Issue H.1 above.

### Issue H.5

DOE seeks input on issues and costs associated with venting of flue gases of gas-fired storage and instantaneous water heaters, in particular regarding retrofit issues related to installing a new vent system for power vent and condensing water heaters, disconnecting the existing water heater from non-condensing furnace common venting system, and upgrading existing non-condensing venting (chimney relining or vent resizing). DOE also seeks input on how often and in what applications direct venting or sealed combustion are used or required.

Response:

As discussed in Attachment A, DOE should not impose standards that would deprive purchasers of atmospherically vented CWHs. In short, Congress recognized that buildings have long been designed to accommodate standard appliance installations and made it clear that DOE should not impose standards that would require existing buildings to be modified to permit the installation of products they were not designed to accommodate. This is true whether the modifications would be necessary to accommodate products of a different physical size or to accommodate products that are incompatible with the atmospheric venting system built into an existing home.<sup>9</sup>

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<sup>8</sup> See Spire's Residential Furnace Comments at pp. 71-73 and 91-94. DOE occasionally suggests that it does consider some real-world market data in its analysis, but it is not clear how it does so or even what data it considers.

<sup>9</sup> See Attachment A at 8-12, 23-24.

The cost of the building modifications that would be required – including the cost required to provide new vent systems or to disconnect commonly-vented products – is irrelevant, because standards that would make atmospherically vented products unavailable would not be permissible even if they could be economically justified.<sup>10</sup> Similarly, the precise frequency of the various “installation” problems that would be imposed if atmospherically vented CWHs were made unavailable is immaterial in view of the nature of the problems presented.<sup>11</sup>

#### Issue H.6

DOE seeks input on issues and costs associated with condensate disposal for condensing gas-fired storage and instantaneous water heaters, specifically how often and in what applications a condensate filter is installed or a condensate pump is installed.

Response:

See the response to Issue H.5 above. Commenters believe that separate product classes should be established between condensing and non-condensing technologies, first. Then, Issue H.6 can be entertained.

#### Issue H.7

DOE seeks input on issues and costs associated with installing consumer water heaters in multi-family buildings and mobile homes.

Response:

See the response to Issue H.5 above.

#### Issue H.10

DOE seeks comment on its planned approach and sources for developing gas, oil, and electricity prices.

Response:

As already indicated, DOE has consistently used natural gas prices in its LCC and payback analyses that dramatically overstate the utility bill savings efficiency improvements would provide. The problem is simple:

- Consumers typically pay a fixed monthly charge for natural gas service plus a separate consumption-based charge billed at marginal rates;

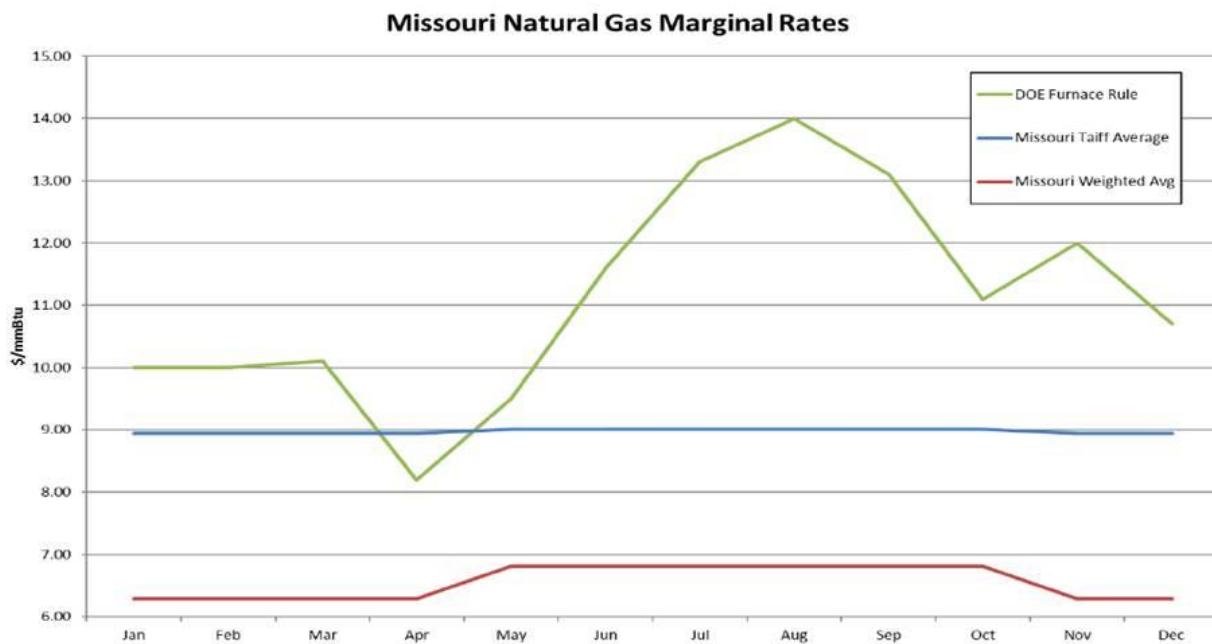
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<sup>10</sup> 42 U.S.C. §§ 6295(o)(4) only limits DOE’s discretion in cases in which standards would otherwise be justified, and all standards for consumer products must be economically justified.

<sup>11</sup> See Attachment A at 19-23.

- The gas savings efficiency improvements would provide would have no impact on the fixed monthly charge; they would only reduce the amount of gas subject to the consumption-based charge based on marginal rates; and
- Instead of calculating utility bill savings based on marginal rates, DOE uses average gas prices that include fixed charges that would be unaffected by gas savings.

Specifically, DOE relies on Energy Information Administration (EIA) monthly average prices for natural gas that include both fixed and consumption-dependent charges. Quantifying the economic benefits of efficiency improvements on the basis of such prices is incorrect and substantially overstates the economic benefits efficiency improvements would provide. The magnitude of this error is illustrated by the following figure (submitted in Spire’s comments in the residential furnace rulemaking), which shows the dramatic difference between the numbers DOE relied upon for gas prices in Missouri and the actual consumption-based marginal rates being charged in Missouri:



The problem is no different today: the EIA monthly average residential prices for natural gas in Missouri (2019) range from \$8.49 to \$25.18 per mcf<sup>12</sup> while residential marginal rates in Missouri are far lower (for example, the residential marginal rates Spire charges in St. Louis range from \$0.62268 to \$0.66709 per therm<sup>13</sup>. DOE’s LCC and payback analyses are based on the wrong natural gas price numbers, plain and simple, and therefore substantially overstate the operating cost savings efficiency improvements provide. Spire’s marginal commercial rates can be much less. Since this RFI also covers water heaters used in commercial applications, EIA utility costs can further overstate savings.

<sup>12</sup> <https://www.eia.gov/dnav/ng/hist/n3010mo3m.htm>

<sup>13</sup> <https://www.spiree.nergy.com/rates-and-tariffs>

A more detailed comparison of actual residential marginal rates for natural gas and the EIA average residential prices is presented in the table below. EIA “City Gate” prices are also provided for comparison.

### 2019 Residential Natural Gas Rate Comparison

Dollars per Million BTU

	EIA City Gate <sup>1</sup> \$/MMBtu	EIA Average Residential <sup>2</sup> \$/MMBtu	Actual Marginal Rate <sup>3</sup> \$/MMBtu	EIA Res. vs Marginal \$/MMBtu	EIA Res. Vs Marginal %
Jan.	\$4.04	\$9.45	\$6.46	+ \$2.99	146%
Feb.	\$3.85	\$9.47	\$6.46	+ \$3.01	315%
Mar.	\$4.01	\$9.49	\$6.46	+ \$3.03	313%
Apr.	\$3.68	\$10.94	\$6.46	+ \$4.48	244%
May	\$3.65	\$12.88	\$6.67 <sup>4</sup>	+ \$6.21	207%
Jun	\$4.05	\$15.72	\$6.67 <sup>4</sup>	+ \$9.05	174%
Jul	\$4.16	\$17.94	\$6.67 <sup>4</sup>	+ \$11.27	159%
Aug	\$4.20	\$18.58	\$6.67 <sup>4</sup>	+ \$11.91	156%
Sep	\$4.13	\$17.81	\$6.67 <sup>4</sup>	+ \$11.14	160%
Oct	\$3.40	\$12.62	\$6.67 <sup>4</sup>	+ \$5.95	212%
Nov	\$3.44	\$9.42	\$6.46	+ \$2.96	318%
Dec	\$3.49	\$9.38	\$6.46	+ \$2.92	321%
<b>Avg</b>	<b>\$3.842</b>	<b>\$12.801</b>	<b>\$6.565</b>	<b>+ \$6.246</b>	<b>205%</b>

Notes:

<sup>1</sup> <https://www.eia.gov/dnav/ng/hist/n3050us3m.htm>

<sup>2</sup> <https://www.eia.gov/dnav/ng/hist/n3010us3m.htm>

<sup>3</sup> <https://www.spireenergy.com/rates-and-tariffs>

Actual marginal rates are Spire’s marginal rates (*i.e.*, all consumption-based charges) for residential customers in St. Louis

The above rates overstate the average residential marginal rate paid by consumers. Actual marginal residential rates in the months indicated are \$6.23 per million Btu for the first 50 Million and \$6.67 per million for gas consumption beyond the first 5. Spire’s marginal commercial rates are also available per the same web page.

As the numbers in the two right-most columns show, the EIA average residential prices are *far higher* than the marginal rates that would apply to the gas savings efficiency improvements would provide. On average, the EIA average prices are more than double the actual marginal rates presented.

This is a problem DOE simply must correct. What Commenters suggest is extensive and independently verifiable analyses that properly account for how consumers realize reduced energy consumption within their utility bills.

### Issue H.12

DOE seeks comment as to whether water heater repair costs vary as a function of product efficiency. DOE also requests any data or information on developing repair costs.

Response:

The more efficient a product, the more complicated the controls. Failure of such controls, out of warranty, can easily negate life-cycle savings

### Issue H.13

DOE seeks comment on its planned approach of using a Weibull probability distribution to characterize product lifetime. DOE also requests product lifetime data and information on whether product lifetime varies based on product characteristics, product application, or product efficiency.

Response:

Commenters do not believe using Weibull probability function to characterize product lifetime is sufficient. Use of Weibull is unlikely to capture “infant mortality” (early product failure) likely to dominate early years of new product introduction. Further, Weibull assumes continuous probability distribution, when product lifetimes can more reasonably be expected to ‘cluster’ in a discontinuous fashion.

### Issue H.14

DOE seeks comment on its planned discount rate methodology.

Response:

DOE’s Final Rule for Docket EERE-2017-BT-STD-0062 indicated that it will include broader consideration of highly debatable variables such as discount rates as shown by the following excerpt:<sup>14</sup>

*(ii) Private Impacts on consumers. The analysis of consumer impacts will include: Estimated private energy savings impacts on consumers based on national average energy prices and energy usage; assessments of impacts on subgroups of consumers based on major regional differences in usage or energy prices and significant variations in installation costs or performance; sensitivity analyses using high and low discount rates reflecting both private transactions and social discount rates and high and low energy price forecasts; consideration of changes to product utility, changes to purchase rate of products, and other impacts of likely concern to all or some consumers, based to the extent practicable on direct input from consumers; estimated life-cycle cost with sensitivity analysis; consideration of the increased first cost to consumers and the time required for energy cost savings to pay back these first costs; and loss of utility.*

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<sup>14</sup> <https://www.regulations.gov/document?D=EERE-2017-BT-STD-0062-0163>

Regardless, how and when DOE considers these discount rate issues from here forward is yet to be seen given the ongoing status of the National Academies “peer review.” Consequently, we reserve further comment.

#### Issue H.17

DOE seeks any data and comment on its planned consumer choice methodology approach.

Response:

As discussed in the response to Issue H.1 above, the use of some form of “consumer choice” methodology is essential to the creation of an appropriate base case for LCC and payback analysis. However, use of a “consumer choice” model to selectively alter the inputs for LCC or payback analyses, as DOE suggests, would be improper.

As already indicated, the purpose of LCC and payback analysis – as defined by statute – is to compare the cost of required efficiency improvements with the operating cost savings those efficiency improvements would provide. To perform such analyses correctly, the focus must be on the potential efficiency investments that would otherwise be declined in the absence of a standard, and it must account for the costs and benefits of required efficiency improvements without any mitigation of economically unacceptable outcomes. In short, the issue for purposes of LCC and payback analysis is what the costs and benefits of required efficiency improvements would be, not how consumers would react when faced with the individual outcomes.

As discussed in Section B of the response to Issue H.1 above, DOE does not have the license to preferentially exclude negative outcomes from its LCC or payback analyses, and that is precisely what the “consumer choice” model under discussion would do. In fact, DOE’s planned “consumer choice” analysis would further distort LCC and payback analysis beyond recognition by generating results that mix the costs and benefits of the kinds of outcomes standards are supposed to achieve (sales of more efficient products) with the costs and benefits of alternative actions consumers might take in the face of standards that make the regulated products economically unacceptable. As further explained in Attachments A, B and C, the latter type of analysis would be nonresponsive to DOE’s obligation to consider statutorily-specified LCC and payback analyses and potentially inimical to the statutory purposes of appliance efficiency regulation.<sup>15</sup>

It may be important for DOE to consider whether consumers would respond to otherwise justifiable standards in ways that would undermine the effectiveness of the standards. However, DOE must recognize that efficiency standards must be economically justified by the benefits required efficiency improvements would provide, not by collateral benefits that might occur if standards drove consumers to select alternatives to the regulated product. To put the point a different way, it is the *required efficiency improvements* that must be both technologically feasible and economically justified; DOE has

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<sup>15</sup> See Attachment A. at pp. 13-15; Attachment B at pp. 8-10, Attachment C, and Spire’s Residential Furnace Comments at pp. 20-28.



no authority to require economically unjustifiable efficiency improvements on the grounds that the collateral impacts of such standards would be beneficial.

### Issue H.18

DOE seeks any data or comments on the consumer choice model in new construction, specifically identifying what the principal factors are driving the selection of different water heater categories in new construction. For example, how often are gas water heaters installed if a gas furnace is selected as the heating system in new construction?

Response:

The decision to install different types of water heaters is sometimes the choice of the home buyer and sometimes of the home builder. Further, that choice is sometimes primarily driven by the choice of space heater fuel and the relative prices of such fuels and sometimes is only secondarily driven by such factors. Further, climate zones will differ one to the other in what factors control such decisions.

### Issue J.3

DOE seeks information regarding whether there is a rebound effect associated with more-efficient consumer water heaters, as would be expected to impact a potential amended energy conservation standard for those products, and if so, what that effect would be. If data indicate that there is such an effect, DOE will account for the rebound effect in its calculation of NES.

Response:

DOE should avoid the controversy of rebound effects.

### Issue L.1

#### 1. Market Failures

In the field of economics, a market failure is a situation in which the market outcome does not maximize societal welfare. Such an outcome would result in unrealized potential welfare. DOE welcomes comment on any aspect of market failures, especially those in the context of amended energy conservation standards for consumer water heaters.

Response:

As discussed in the response to Issue H.1, above, DOE cannot simply assume the existence of serious market failures; it must determine whether, under what circumstances, and to what extent there are relevant market failures that could be expected to cause purchasers to leave net economic benefits “on the table” in the absence of new standards.

### Issue L: Other Energy Conservation Topics

In addition to the issues identified earlier in this document, DOE welcomes comment on any other aspect of energy conservation standards for consumer water heaters not already addressed by the specific areas identified in this document.

Response:

a. Non-Regulatory Alternatives

DOE should also give thorough and proper consideration to non-regulatory alternatives such as the availability of utility rebates. Commenters contend that such rebates are more than sufficient for moving the consumer water heater market to higher efficiencies. Moreover, setting higher minimum efficiency standards would effectively end such rebates. Whether rebates continue, albeit at higher efficiency levels, should not be assumed because cost-effectiveness should not be assumed

A \$200 rebate is available from Spire for the high efficiency water heater efficiency option. This more than offsets the incremental cost; meaning essentially an instantaneous payback. However, making the given (0.65 EF) high efficiency option mandatory, such rebates would likely no longer be offered

Given that existing rebates are being questioned, the same applies to future rebates. Assuming DOE mandates a higher efficiency level, new rebates should not be assumed or even part of the calculus for determining new minimum efficiency standards. The result may be that DOE forces consumers into the high efficiency model without the rebate.

b. “Ground truthing” the results of LCC and payback analysis

Commenters urge DOE to engage conduct “ground truthing” of the results of its LCC and payback analyses. Specifically, DOE should collect data for representative real-world installations so that it can provide comparisons between actual efficiency investment outcomes and the model outcomes for comparable efficiency investments simulated in its LCC and payback analysis. This approach would provide a means to confirm that DOE’s modeling provides a reasonable representation of the reality is designed to simulate.

Ideally, DOE should obtain data on cases involving common installation scenarios, obtaining data on actual product and installation costs and actual utility bill impacts. However, DOE can also obtain data based on potential installations, using actual product prices, bids for installation costs, and the actual marginal rates determining the savings efficiency improvements would provide. Spire recently submitted an example of such an analysis for commercial warm air furnaces in Docket No. EERE-2019-BT-STD-0042. Those comments are relevant to this RFI, because consumer water heaters also cover many water heaters used for commercial applications and are incorporated herein as Attachment D.

As a further example, Spire has prepared the following simple payback analysis for replacing an existing (pre-2010) 40-gallon gas water heater. Costs are based upon Home Depot list prices and installation quotes for water heaters with a standard 0.58 uniform energy factor and a high efficiency equivalent with a 0.65 uniform energy factor. The following text is excerpted from the quote:

### 1<sup>st</sup> Option

Here is the Home Depot link:

<https://www.homedepot.com/p/Rheem-Performance-40-Gal-Tall-6-Year-36-000-BTU-Natural-Gas-Tank-Water-Heater-XG40T06EC36U1/313657858>

Performance 40 Gal. Tall 6-Year 36,000 BTU Natural Gas Tank Water Heater - \$389.00

Code requirements - \$169.00

Installation - \$544.00

Permit - \$30.00

Total for everything - \$1132.00

- Will need to be drained annually

### 2<sup>nd</sup> Option

Here is the Home Depot Link

<https://www.homedepot.com/p/Rheem-Performance-Platinum-40-Gal-Tall-12-Year-40000-BTU-Natural-Gas-Tank-Water-Heater-XG40T12HE40U0/313689129>

Performance Platinum 40 Gal. Tall 12 Year 40,000 BTU Natural Gas Tank Water Heater - \$569.00

Code requirements - \$169

Installation - \$544.00

Permit - \$30.00

Total for everything - \$1312.00

- Self cleaning

The utility cost savings were derived using the following DOE/FEMP tool:

[Energy Cost Calculator for Electric and Gas Water Heaters.](#)

The marginal energy cost (rounded to \$0.68/therm) is used as a high-end (residential) consumer marginal energy rate input for the DOE/FEMP tool and is derived from Spire's rates (including a Purchased Gas Adjustment of \$0.41274 per therm), which is documented at:

<https://www.spireenergy.com/rates-and-tariffs>.

Below is the "input selection" screen shot from the DOE/FEMP tool:

INPUT SECTION		
Input the following data (if any parameter is missing, calculator will set to default value).		Defaults
TYPE OF WATER HEATER	Gas <input type="text"/>	Electric
AVERAGE DAILY USAGE (GALLONS PER DAY)*	64 <input type="text"/> gallons	64*
ENERGY FACTOR†	.65 <input type="text"/>	0.92 (electric) 0.61 (gas)
ENERGY COST	\$.68 <input type="text"/> / therm <input type="text"/>	\$0.06 per kWh \$.60 per therm
QUANTITY OF WATER HEATERS TO BE PURCHASED	1 <input type="text"/> unit(s)	1 unit

Below is the “output section” screen shot:

OUTPUT SECTION				
PERFORMANCE PER WATER HEATER	YOUR CHOICE	BASE MODEL	FEMP RECOMMENDED LEVEL	BEST AVAILABLE
NEW ENERGY FACTOR	.65	0.59	0.62	0.85
ANNUAL ENERGY USE therm	229	253	241	175
ANNUAL ENERGY COSTS	\$156 <>	\$172	\$164	\$119
LIFETIME ENERGY COSTS	\$1618	\$1784	\$1701	\$1234
LIFETIME ENERGY COST SAVINGS	\$166	\$0	\$83	\$550
LIFETIME ENERGY COST SAVINGS FOR 1 WATER HEATER(S)	\$166	\$0	\$83	\$550

Your selection of a gas water heater using 64 gallon(s) per day will have a \$166 energy cost savings per water heater over an estimated 13 year life expectancy compared to the base model.

The resultant residential yearly savings works out to \$16 per year. For an incremental cost of \$180, this works out to a 11.25-year simple payback.

Recalculating for a low-end (larger commercial) consumer marginal energy rate input of \$0.54 per therm (per the same Spire link but for Spire’s St. Louis rates):

OUTPUT SECTION				
PERFORMANCE PER WATER HEATER	YOUR CHOICE	BASE MODEL	FEMP RECOMMENDED LEVEL	BEST AVAILABLE
NEW ENERGY FACTOR	.65	0.59	0.62	0.85
ANNUAL ENERGY USE therm	229	253	241	175
ANNUAL ENERGY COSTS	\$124 <>	\$137	\$130	\$95
LIFETIME ENERGY COSTS	\$1286	\$1421	\$1348	\$985
LIFETIME ENERGY COST SAVINGS	\$135	\$0	\$73	\$436
LIFETIME ENERGY COST SAVINGS FOR 1 WATER HEATER(S)	\$135	\$0	\$73	\$436

The resultant large commercial yearly savings works out to \$13 per year. For an incremental cost of \$180, this works out to a 13.85-year simple payback.

This concludes the joint comments of Spire, APGA, and AGA. For further information, please address any requests to:

Mark Krebs  
 Energy Policy & Standards Specialist  
[Mark.Krebs@spireenergy.com](mailto:Mark.Krebs@spireenergy.com) Sincerely,

Signed:

SPIRE INC.



Mark C. Darrell  
Senior Vice President, Chief Legal and Compliance Officer

AMERICAN PUBLIC GAS ASSOCIATION



Stuart Saulters  
Vice President of Governmental Relations

AMERICAN GAS ASSOCIATION



Matthew J. Agen  
Assistant General Counsel

Attachments:

- A. September 9, 2019 Comments of "Gas Industry Petitioners" for Docket No. EERE-2018-BT-STD-0018
- B. January 8, 2020 Memorandum to Members of the Peer Review of Committee from Barton Day
- C. Payback and Life-Cycle Cost Analysis Requirements for Standards Rulemaking
- D. July 1, 2020 Comments of Spire Inc. for Docket No. EERE-2019-BT-STD-0042