

**Attachment A**

Comments of Petitioners and Associated Attachments  
for Docket No. EERE-2018-BT-STD-0018  
(March 1, 2019)

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

**Energy Conservation Program:  
Energy Conservation Standards for Residential  
Furnaces and Commercial Water Heaters**

**Notice of Petition for Rulemaking  
Docket No. EERE-2018-BT- STD-0018**

**Comments of Petitioners  
Spire Inc.  
The American Public Gas Association  
The American Gas Association  
The National Propane Gas Association  
The Natural Gas Supply Association**

**March 1, 2019**

As signatories to the petition for rulemaking that is the subject of the above-referenced notice (the “Petition”), Spire Inc., the American Public Gas Association, The American Gas Association, the National Propane Gas Association and the Natural Gas Supply Association (collectively “Petitioners”) appreciate the U.S. Department of Energy’s prompt request for comment on the Petition and we are pleased to submit these comments and provide additional information concerning the Petition and the relief sought.

Prompt and favorable action on the Petition is warranted. The pending proposals in the commercial boiler and residential furnace rulemaking proceedings<sup>1</sup> are fatally defective, and it serves no useful purpose for them to remain pending during the time required for the Department of Energy (“DOE”) to develop new regulatory proposals. It would be more constructive and transparent for DOE to acknowledge the defect in the proposals by withdrawing them and simultaneously requesting comment to inform its preparation of revised regulatory analyses. This approach is particularly appropriate in view of the nature of the defect identified in the Petition, because:

- The legal conclusion that DOE may not impose standards that would effectively ban atmospherically-vented gas products involves a straight-forward issue of statutory interpretation that is amenable to immediate resolution; and
- Once rendered, that legal conclusion would require DOE to assess significantly different issues and regulatory options than DOE has analyzed in its existing regulatory analysis.

The requested legal determination would resolve one of the most controversial issues in both rulemaking proceedings and allow DOE to redirect its analysis as required while providing a clear explanation of why such a redirection is necessary. The pending proposals are the product of clear legal error, and DOE need not – and should not – wait until it has developed new proposed regulatory actions before correcting that error and soliciting comment to inform its further deliberations. Instead, DOE should take a constructive step forward by acknowledging the legal error underlying its existing proposals and soliciting comment on the issues it must address going forward (including the question of whether separate standards – and thus separate product classes – would be justified for condensing products).

Petitioners urge DOE to respond not just to its Petition, but to a pending March 14, 2017 request that the proposals at issue be reconsidered on the grounds that – due to a fundamental flaw in DOE’s modeling approach – the economic justifications for the proposed standards are invalid.<sup>2</sup> The systemic defect in DOE’s economic analysis provides a separate and independently-sufficient basis for withdrawal of the proposed rules at issue, and Petitioners urge DOE to withdraw its pending proposals on these grounds as well. Like the legal issue raised in the Petition:

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<sup>1</sup> See Energy Conservation Standards for Residential Furnaces, Docket Number EERE-2014-BT-STD-031, RIN No. 1904-AD20 and Energy Conservation Standards for Commercial Water Heaters, Docket Number EERE-2014-BT-STD-042, RIN No. 1904-AD34.

<sup>2</sup> A copy of this request is provided as Attachment A to these comments.

- The issue involving DOE’s modeling is relatively straight-forward and amenable to immediate resolution; and
- Correction of the error involved will require a substantial revision of DOE’s existing regulatory analyses.

Again, there is no reason for DOE to wait until it has developed a revised modeling approach before acknowledging that its current approach is invalid and soliciting comment to inform its preparation of revised analyses. To the contrary, it would be far more constructive and transparent for DOE to acknowledge the defect in its modeling approach so that the public understands that the existing proposals have not been economically justified and that substantial revision of DOE’s regulatory analyses will be required before the pending rulemaking proceedings can be concluded. Petitioners therefore urge DOE to publicly acknowledge the defect in its modeling approach while simultaneously requesting comment on how its approach should be corrected going forward.

Petitioners respectfully submit that – in view of the legal and modeling defects referred to above – DOE is not in a position to take final action on its pending proposals and will need to prepare substantially revised analyses before it can bring these rulemaking proceedings to conclusion. However, DOE *can* take prompt action to resolve critical core issues – the legal issue, the modeling issue, or both – thereby making material progress in these rulemaking proceedings and facilitating a more efficient and orderly resolution of the remaining issues going forward. That is the outcome Petitioners seek.

Petitioners offer the following additional comment in support of such action.

**A. DOE should also withdraw its pending commercial packaged boiler standards**

Petitioners request that their Petition be considered to apply to DOE’s pending rulemaking regarding standards for commercial packaged boilers.<sup>3</sup> The same legal and modeling issues that are fatal to the proposed standards for commercial water heaters and residential furnaces undermine the rulemaking regarding standards for commercial packaged boilers as well. However, the commercial packaged boiler rulemaking was more advanced (having reached the error correction stage) and there is currently litigation pending in the U.S. Court of Appeals for the Ninth Circuit over whether – notwithstanding a pending error correction request identifying the error in DOE’s modeling<sup>4</sup> – DOE has a non-discretionary duty to publish the draft standards it posted for error correction as final.<sup>5</sup> Assuming that DOE prevails in that litigation, Petitioners request that both the proposed standards and the draft standards posted for error correction in the

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<sup>3</sup> Energy Conservation Program: Energy Conservation Standards for Commercial Packaged Boilers; Docket Number EERE-2013-BT-STD-0030, RIN No. 1904-AD01.

<sup>4</sup> A copy of Spire’s pending error correction request is provided as Attachment B to these comments.

<sup>5</sup> *NRDC v. Perry*, No. 15380, 15475.

commercial boiler rulemaking be withdrawn for the same reasons the proposed standards for commercial water heaters and residential furnaces should be withdrawn.

## **B. The issues are clear and ripe for decision**

As already mentioned, both the legal and modeling defects referred to in these comments are ripe for decision, and resolution of these defects would significantly clarify the relevant issues going forward.

### **1. The Legal Issue**

As discussed in the Petition, DOE cannot lawfully adopt standards that would effectively eliminate gas products that are compatible with the conventional atmospheric venting systems built into many of the existing buildings in which gas products are installed. This issue has already been addressed at length in previous rounds of comments in the rulemaking proceedings at issue,<sup>6</sup> and neither the facts nor the law have changed.

Standards achievable only through the use of condensing combustion technology would eliminate product features including compatibility with conventional atmospheric venting systems and the ability to operate without a plumbing connection. These features are required to allow many purchasers to replace their existing gas products without the need for substantial and often impractical building modifications.<sup>7</sup> The unavailability of these features would pose serious problems, and Petitioners filed the Petition because these problems are serious enough that they would compel many consumers to replace their existing gas products with other (primarily electric) alternatives,<sup>8</sup> and other parties are opposing the Petition for precisely the same reason.<sup>9</sup>

In view of the facts, the issue of legal interpretation is an easy one. It would be unreasonable to dismiss the importance of features required to make products compatible with existing buildings on the grounds that the buildings could be modified (and other existing gas products could be replaced) as necessary to permit the use of a new condensing product, and absurd to suggest that

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<sup>6</sup> See e.g., Spire’s January 6, 2017 comments in response to DOE’s notice entitled “Supplemental Notice of Proposed Rulemaking: Energy Conservation Program; Energy Conservation Standards for Residential Furnaces,” Document ID EERE-2014-BT-STD-0031-0309 (“Spire’s January 6, 2017 Residential Furnace Comments”) at pp. 1-4, 11-20, and 51-56.

<sup>7</sup> In addition to extensive previous comment on this issue, see the Affidavit of George L. Welsch (“Welsch Affidavit”), provided as Attachment C to these Comments.

<sup>8</sup> Spire’s January 6, 2017 Residential Furnace Comments at 1-4, 23-24.

<sup>9</sup> Entities that manufacture electric heating products do not have business interests that would be served by improvements in the efficiency of gas products as such. Rather, their business interests would be served by standards for gas products that would cause consumers to choose electric products instead. The same is true of entities seeking to eliminate the use of natural gas and propane, because – from their perspective – a purchasing decision resulting in *no gas product* would be substantially preferable to any outcome resulting in a new gas product.

a statutory scheme designed to ensure the availability of refrigerators with side-mounted (as opposed to top-mounted) freezers<sup>10</sup> would fail to ensure the availability of gas furnaces with features many consumers need to be able to use any gas furnace at all. There is no need for additional data to resolve the issues raised by the Petition, and there are no credible factual issues to be resolved. Suggestions to the contrary are in error, as discussed below.

a. Market research is unnecessary and unlikely to be useful

The Northwest Energy Efficiency Alliance (NEEA) filed a request for extension of the comment period in this proceeding, indicating that it is part of an advocacy group that has commissioned a market research study designed to:

address the prevailing belief in industry that requiring condensing technology for residential furnaces and commercial water heaters is cost prohibitive, due to some “difficult” installation scenarios driven by venting modification and condensate management requirements, especially in constrained spaces.<sup>11</sup>

The request suggests that “[i]ndustry has not offered any data regarding the frequency or specific cost of these “difficult” installations.”<sup>12</sup> The suggestion that such data is necessary reflects a serious misapprehension of the issues relevant to the Petition: in short, the question raised by the Petition is not whether condensing standards would be *cost prohibitive*; it is whether condensing standards would result in the unavailability of desired product features. Moreover – even if economic justification were a relevant issue in this context – there are obvious reasons why market data is unlikely to be helpful in quantifying the frequency of relevant “installation scenarios” or the costs they would impose.

As a matter of engineering fact, non-condensing products are compatible with the existing atmospheric venting systems built into most of the existing buildings in which gas products are installed, and condensing products are not. As a result – in all cases in which an existing atmospherically-vented product is to be replaced – a condensing product cannot be installed in the place of the existing product in the way that a non-condensing product ordinarily could be.<sup>13</sup> Instead of facing the installation costs required to install the type of product for which the building was designed, purchasers face the need to modify the building to accommodate a product with materially different features. There are many existing non-condensing furnaces being replaced every year, so this – by inspection – is a volume problem. It is true that the nature and extent of the building modifications required to replace a non-condensing furnace with a condensing furnace can vary considerably, but they are rarely insubstantial and the problems that justified separate product classes for “space constrained” appliances clearly pale by

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<sup>10</sup> See 42 U.S.C. § 6295(b)(1) (specifying separate product classes – and thus separate standards – for inherently less-efficient side-mounted freezers).

<sup>11</sup> Northwest Energy Efficiency Alliance request for extension of comment period (“NEEA Request”), document ID EERE-2018-BT-STD-0018-0009 in the docket for this proceeding.

<sup>12</sup> NEEA Request.

<sup>13</sup> Welsch Affidavit at ¶¶ 9-14.

comparison.<sup>14</sup> In many cases the required building modifications would impose the need for unwelcome changes in floor plans or sacrifices of currently-occupied space, and in many cases the required modifications would not be practical at all.<sup>15</sup> While it is hard to say *exactly how common* each scenario is, it is clear that the issues are *common*. There are several common types of housing – such as high-rise apartments and condominiums, town homes and multi-story homes with centrally-located furnaces in finished basements – that present obvious challenges, and – due to the various combinations of factors that can prove problematic – there can be serious challenges in many other scenarios as well.<sup>16</sup> These facts are sufficient to establish that the product features required to obviate these problems are desired by many consumers, and that by itself is sufficient to justify favorable action on the Petition.

It is true that more detailed information concerning the specific frequency of various problematic scenarios and the costs they impose would be needed for DOE to determine whether standards eliminating those features would be economically justified, but *that is not an issue relevant to the Petition*. The statutory provisions relevant to the Petition address the elimination of product features, not the economic justification of standards.<sup>17</sup> Consequently, it does not matter whether the costs imposed by the unavailability of the relevant product features could be averaged away or otherwise economically justified. The statutory scheme is clear in this regard. The Environmental Policy and Conservation Act of 1974 (“EPCA”) provides separate product classes based on the difference in product features between wall furnaces and floor furnaces, and DOE could not impose standards making floor furnaces unavailable by characterizing the resulting loss of product features is a matter of “installation costs” to be addressed as an issue of economic justification rather than as a prohibited loss of available product features. Consumers who want floor furnaces cannot be required to settle for wall furnaces any more than consumers who want side-by-side refrigerator-freezers can be made to settle for refrigerators with top-mounted freezers instead. The same is true for consumers who want appliances small enough to fit in the space they have available for them and for consumers who want gas furnaces that can be put into their existing furnace closets and connected to their existing vent systems. There is no need for detailed data quantifying the costs that elimination of such gas furnaces would impose, because standards must *always be economically justified*<sup>18</sup> and the statutory provisions protecting the availability of product features would be meaningless if they could be ignored on the grounds that standards eliminating product features would be economically justified.<sup>19</sup>

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<sup>14</sup> Welsch Affidavit at ¶ 13.

<sup>15</sup> Welsch Affidavit at ¶¶ 11-14.

<sup>16</sup> Welsch Affidavit at ¶ 14.

<sup>17</sup> See 42 U.S.C. §§6295(o)(2) and 6313(a)(6)(B)(iii)(II).

<sup>18</sup> See 42 U.S.C. §§6295(o)(4) and 6313(a)(6)(A)(ii)(II).

<sup>19</sup> An agency obviously “may not construe [a] statute in a way that completely nullifies textually applicable provisions meant to limit its discretion.” *Whitman v. American Trucking Associations*, 531 U.S. 457, 485 (2001); see *Hearth Patio & Barbecue Association v. DOE*, 706 F.3d 499, 506 (D.C. Cir. 2013); *NRDC v. EPA*, 489 F.3d 1364, 1373 (D. C. Cir. 2007).

In any event, there are obvious reasons why market data is unlikely to be useful in quantifying either the frequency of the various relevant product replacement scenarios or the costs elimination of the product features at issue would impose in each.

First, “installation costs” are not a sufficient measure of the value of the product features that would become unavailable if condensing standards for gas furnaces were imposed, because loss of those features would often impose the need for *undesired* building modifications. For example, if the features provided by non-condensing furnaces were unavailable, it would often be necessary to install a new furnace in currently-occupied space or to install new venting that intrudes on currently occupied space, and – particularly in the case of homes with only one or two exterior walls – furnace replacements would often require the sacrifice of existing window or balcony space. The economic cost of such building modifications does not account for unsatisfactory impacts of the modifications themselves, and thus fails to quantify the value of the product features consumers would lose if condensing standards were imposed.

Second, market data cannot be expected to be representative of the relevant furnace replacement scenarios. The problem, in short, is that market data reflects transactions that are actually occurring, and the transactions of greatest relevance in the context of the Petition *tend not to occur*. Again, that is ultimately the point: Petitioners’ concern is not merely that condensing standards would cause gas product replacements to become unduly costly, it is that *condensing standards would cause many gas product replacements not to occur at all*. Current market data cannot be expected to reflect either the frequency of such “non-installations” or the costs that they would impose if they were to occur; as a result, the outcomes of greatest concern to Petitioners would be represented by no data points at all. More broadly, there is an inverse relationship between the magnitude of the difficulties (and costs) involved in replacing non-condensing gas products with condensing products and the frequency with which such replacements actually occur. Market data can, therefore, be expected to understate both the frequency of more problematic replacement scenarios and the costs that more problematic product substitutions would impose (*i.e.*, both the frequency of particular scenarios and the costs associated with each particular scenario would be skewed low). These problems with the unrepresentativeness of market data would exist even if standards banning non-condensing products were already in place, because a rule banning non-condensing gas products cannot force purchasers to choose gas products that are unsuitable for their needs. In short, market data on the replacement of noncondensing gas products with condensing gas products would inherently exclude data points representing the outcomes of greatest concern to Petitioners: those in which such replacements do not occur.

Finally, the usefulness of market data is likely to be limited by the fact that it is difficult to compare cases in which non-condensing products are (or might be) replaced with condensing products. There are simply too many variables involved, including existing floor plans and product locations, the vertical and lateral distances from product locations to the outdoors, the availability of the space (and access) required to accommodate equipment and venting, the nature and extent of co-venting issues, constraints imposed by applicable building codes or restrictive covenants, building orientations, and so forth. As a result, it probably isn’t reasonable to expect that data on individual installations can be reliably sorted into reasonably precise “scenarios” for purposes of assessment or comparison.



b. There are no credible factual issues to be resolved

Mitsubishi Electric U.S. (“Mitsubishi Electric”) – a manufacturer of electrical heating products – filed comments in response to the Petition claiming that Petitioners have mischaracterized the facts relevant to the Petition. These comments claim to “carefully dismant[le] the contradictions and inaccuracies” of Petitioner’s arguments and “clarif[y] the real world challenges and costs of installing equipment whether it is condensing or non-condensing.”<sup>20</sup> In summary, Mitsubishi Electric asserts that non-condensing products provide no useful features and that – even when existing non-condensing products are being replaced – condensing products are, with “extremely rare exceptions” no more difficult or costly to install than condensing products.<sup>21</sup> These assertions are demonstrably false.

Mitsubishi Electric’s assertions rest in large part on the surprising claim that non-condensing furnaces generally cannot be replaced with non-condensing furnaces without the need for “costly building modifications and system reconfigurations” substantially as burdensome as those that would be required to replace a non-condensing furnace with a condensing furnace.<sup>22</sup> The short and sufficient answer to this claim is that Mitsubishi Electric is wrong: in the *real world*, existing non-condensing furnaces are commonly, safely, and appropriately replaced with non-condensing furnaces without the need for furnace relocation or any other “costly building modifications [or] system reconfigurations,” let alone with difficulties remotely approaching those that the substitution of a condensing gas furnace would typically impose.<sup>23</sup> Mitsubishi Electric’s erroneous claim to the contrary is based on two subsidiary claims, both of which are also demonstrably false.

The most important of these subsidiary claims is summarized by Mitsubishi Electric as follows:

The Gas Industry Petitioners further argue that .80 AFUE non-condensing furnaces are not induced draft and therefore can be used to replaced (sic) atmospherically vented appliances where existing vents are shared, whereas condensing furnaces cannot. This is an entirely false assertion. Both condensing and non-condensing furnaces have positive

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<sup>20</sup> Mitsubishi Electric U.S. Comments on Gas Industry Petition for Rulemaking (“Mitsubishi Electric Comments”), document ID EERE-2018-BT-STD-0018-0010 in the docket for this proceeding, at 1.

<sup>21</sup> Mitsubishi Electric Comments at 1.

<sup>22</sup> Mitsubishi Electric Comments at 1.

<sup>23</sup> Welsch Affidavit at ¶¶ 9, 11-12. While installation costs make up a substantial portion of the cost of any furnace replacement, the installation costs for condensing products are generally close to double the installation costs for non-condensing products in the “easy” cases; more often, installation of a condensing product would either be significantly more costly or impractical. Welsch Affidavit at ¶ 13.

pressure vents and neither should ever share a vent with a gravity vent water heater as this will lead to back-drafting and CO poisoning hazards.<sup>24</sup>

This claim is based on a fundamental misunderstanding of the relevant technology: specifically, on the erroneous understanding that “all or most .80 AFUE equipment is power vented.” In fact, the overwhelming majority of 80% AFUE furnaces are fan-assisted but *not* power-vented, which means that they are Category I products that are compatible with atmospheric venting systems (and atmospherically-vented water heaters) just as Petitioners have said. Mitsubishi Electric’s error on this point is one that building inspectors have been specifically cautioned against:

Inspectors should not confuse fan-assisted furnaces with those that are power vented. When a gravity-vented flue is connected to a power-vented flue, back-drafting can occur at the draft diverter of the gravity flue, exposing occupants of the building to noxious gases. With a category I furnace, this is not a problem because both appliances are gravity-vented, even an induced draft furnace.<sup>25</sup>

The technical explanation is as follows:

A Plus 80 furnace is designed for greater fuel efficiency than a standard gravity vented furnace. This is achieved by lengthening the heat exchanger to allow more heat transfer into the circulating air. But longer heat exchangers produce draft resistance and they lower the temperature of the exhaust gases relative to atmospheric temperature. To enable proper venting, an inducer fan is built into the system. The fan applies a slight negative pressure on the heat exchanger to ensure that the products of combustion are evacuated upward. The fan, however, does not exert positive pressure into the flue pipe. The exhaust in the flue is gravity-vented. Therefore, its vent pressure is rated as “non-positive,” which is why it can be vented in common with a gravity vented water heater.<sup>26</sup>

In short, non-condensing furnaces *are* compatible with existing atmospheric venting systems and co-vented atmospherically-vented products, as correctly stated in the Petition.

Mitsubishi Electric summarizes its other subsidiary argument as follows:

Safety code compliance issues frequently require costly building modifications or system modifications to safely install .80 AFUE non-condensing equipment, primarily because of poor design of hall closet return plenums which frequently restrict airflow to the equipment in most homes where such installs are employed.

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<sup>24</sup> Mitsubishi Electric Comments at 1, 4-5.

<sup>25</sup> M. Casey and B. Stone, *Common Venting of Gas Appliances*, available from the California Real Estate Inspectors Association at: <https://www.creia.org/common-venting-of-gas-appliances>

<sup>26</sup> Id. For a similar explanation of this issue, see M. Casey and B. Stone, *The Venting in Common of Multiple Gas Appliances*, American Society of Home Inspectors News, March 2011, available at: [www.ashireporter.org/HomeInspection/Articles/The-Venting-in-Common-of-Multiple-Gas-Appliances/2067](http://www.ashireporter.org/HomeInspection/Articles/The-Venting-in-Common-of-Multiple-Gas-Appliances/2067)

On the face of it, the claim that “costly building modifications or system modifications” are “frequently” required to replace non-condensing furnaces with new non-condensing furnaces does not necessarily preclude the possibility that – *even more frequently* – such modifications are *not* required. However, even the suggestion that there are problems in a substantial minority of cases would be incorrect: non-condensing gas furnaces – including those in existing furnace closets – can typically be replaced with non-condensing gas furnaces without furnace relocation or any other costly building modifications being necessary to address safety, code compliance, or other concerns.<sup>27</sup> The fact that this is true despite alleged problems with the “poor design of hall closet return plenums” is hardly surprising, because such problems – when encountered – can typically be addressed without furnace relocation or other relatively dramatic measures, as Mitsubishi Electric appears to acknowledge.<sup>28</sup> Mitsubishi Electric offers a variety of allegations – including some remarkable disparagement of installation contractors and building inspectors – but none of it adds up to a credible basis to doubt the fact that non-condensing products generally can be (and commonly are) replaced with non-condensing products without installation problems even remotely comparable to those the substitution of non-condensing products would typically impose.

In addition to claiming that substantial building modifications are almost always required to replace a non-condensing furnace with another non-condensing furnace, Mitsubishi Electric suggests that the substitution of a condensing furnace would rarely impose any substantial problems at all. Mitsubishi Electric’s larger argument is that “[w]ith extremely rare exceptions” condensing products are not *more difficult* to install than non-condensing products, so its claims may be based in part on comparisons skewed by Mitsubishi Electric’s erroneous understanding that costly building modifications are required to install *non-condensing* furnaces. However, some of Mitsubishi Electric’s specific claims are harder to explain.

Mitsubishi Electric baldly asserts that there is “rarely a problem” installing the vents condensing products would require and “never a problem installing condensate lines.”<sup>29</sup> This assertion is accompanied by an argument that amounts to little more than a claim that it is easy to install condensing products in cases in which one assumes conditions that make it easy.<sup>30</sup> According to Mitsubishi Electric, more serious difficulties are “extremely rare” and are “typically encountered” in two-story homes and town houses in which a combination of three factors “may” combine to “make a condensing furnace install more challenging.”<sup>31</sup> The most obvious problems with this narrative is that Mitsubishi Electric’s brief list of complicating factors is conspicuously incomplete and it is wrong to suggest that complicating factors are largely limited

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<sup>27</sup> Welsch Affidavit at ¶ 9.

<sup>28</sup> Mitsubishi Electric Comments at 5.

<sup>29</sup> Mitsubishi Electric Comments at 1.

<sup>30</sup> Mitsubishi Electric Comments at 1, 2.

<sup>31</sup> Mitsubishi Electric Comments at 1.

to – or even most prevalent in – the context of two story housing.<sup>32</sup> However, the more fundamental problem is that Mitsubishi Electric is applying an unreasonably high standard for what qualifies as a “problem” at all. This is demonstrated by the fact that Mitsubishi Electric expressly identifies the need to relocate a furnace to an attic as a *non-problem*,<sup>33</sup> an assessment that would undoubtedly stun both consumers who simply want to replace an existing furnace and installation contractors who understand the practical problems commonly associated with attic installations.

In truth, the replacement of a non-condensing furnace with a condensing furnace requires the installation of a product for which the existing building was not designed. As a result, the consumer has to give up the option of having a new furnace installed in place of the existing furnace and connected to the existing vent system. In some cases, it may be possible to run the vents for a condensing furnace vertically through the existing atmospheric vent as Mitsubishi Electric suggests, but this usually isn’t an option due to common problems such as co-vented products, inadequate space inside the existing vent, or vent runs that are offset significantly or too long. Similarly, in some cases it may be possible to address co-venting problems by using a specialized vent system that allows the vent for the condensing product to run inside the atmospheric vent being used by a formerly co-vented product, but only in the unusual circumstance in which: (1) there are only two commonly-vented products, (2) the specialized vent system is approved for use with both products and the existing vent, and (3) code officials are prepared to allow a deviation from code provisions that ordinarily preclude such venting. Far more often, the incompatibility of a condensing product with the existing building create more serious difficulties, and – in many cases – those difficulties impose the need for undesired or even impractical building modifications. Many consumers would be outraged if products with the features required to obviate these difficulties were made unavailable.

In the interests of efficiency, many consumers are willing to give up their ability to replace their furnace without having to sacrifice the corner of a bedroom to a new vent chase or having a steam plume visible through their window, just as many consumers are prepared to sacrifice their preference for a side-mounted freezer to obtain the higher efficiency of a top-mounted freezer. However, these are choices between products that offer different product features, and Congress made it abundantly clear that choices between product features must be left in the hands of consumers rather than being imposed upon them by efficiency standards.

As a matter of statutory interpretation, DOE may not require efficiency improvements that can only be achieved through the sacrifice of product features that consumers desire, much less through the sacrifice of product features that would effectively leave many consumers without any gas product at all.

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<sup>32</sup> For example, Mitsubishi Electric makes no mention of co-venting problems or the particularly difficult challenges common in the context of high-rise housing. See Welsch Affidavit at ¶ 14.

<sup>33</sup> Mitsubishi Electric Comments at p. 5.

## 2. The Modeling Issue

DOE's modeling approach is not designed to address the economic impacts a new standard would have. In summary:

- Recognizing that the economic impact of investments in higher-efficiency products varies considerably based on factors such as installation scenarios and product use, DOE uses modeling in which thousands of individual trial cases are used to simulate the range of potential economic outcomes expected to be encountered in the real world.
- There is no dispute as to what DOE's modeling is *supposed to do*: it is supposed to provide an assessment of the economic impact of a standard based on trial cases representing the investments in higher-efficiency products that would occur as the result of a new standard (*i.e.*, the investments that would only occur if a new standard is imposed).
- There is no dispute as to what DOE's model *actually does instead*: it provides an assessment of economic impacts based on randomly-selected trial cases representative of all efficiency investments: those purchasers would choose to make in the absence of regulation as well as those that would occur only if a new standard is imposed.<sup>34</sup>
- This approach would only be valid if there is reason to expect that there would be no difference – in terms of the quality of economic outcomes – between the universe of efficiency investments purchasers would choose to make in the absence of regulation and that of the investments they would make only if a new standard were imposed, *and there is no such reason*. To the contrary, it is objectively unreasonable to suggest that purchasers acting in the absence of regulation are so universally and completely indifferent to the economic outcome of their efficiency investments that their investments should reflect no statistically-significant preference for economically beneficial investments (or aversion to economically disastrous investments), and available evidence clearly indicates that the opposite is true.<sup>35</sup>
- In short, DOE's modeling is designed to consider the right *number* of efficiency investments (based on the projected market share that lower-efficiency products would

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<sup>34</sup> Rather than distinguishing the efficiency investments that would occur in the absence of regulation (*i.e.*, the base case efficiency investments) from those that would occur as the result of a new standard (*i.e.*, the rule impact investments), DOE's model "assigns" investments to the base and rule impact cases on a random basis.

<sup>35</sup> For example, regional data for residential furnaces shows dramatically higher market shares for condensing furnaces in the coldest areas than in the warmest, providing clear evidence that – in the absence of regulation – investments in higher-efficiency furnaces are far more likely to be made in cases where the economic justification for such investments is strongest and far less likely to be made in cases where the economic justification is weakest. Spire's January 6, 2017 Residential Furnace Comments at 58-59.

retain in the absence of regulation), but it is not designed to consider the *right* efficiency investments: those that would only occur if new standards were imposed. As a result, DOE's modeling simply does not provide an assessment of the economic impacts a new standard would have, and regulatory analysis based on such modeling is invalid.

No further analysis is needed to determine that the pending proposed standards for residential furnaces and commercial water heaters are fatally defective and should be withdrawn. The relevant issues have already been addressed at length in multiple previous comment submissions in the rulemaking proceedings at issue<sup>36</sup> and it is time for the conceptually obvious defect in DOE's modeling – and consequent need for DOE to revise its regulatory analyses – to be acknowledged.

C. **DOE should issue notices withdrawing its pending proposals and requesting comment to inform its development of new proposed actions**

Petitioners urge DOE to respond to the Petition by:

- Issuing a notice withdrawing its proposed rules in the commercial water heater, residential furnace, and (assuming a favorable decision in NRDC v. Perry) commercial packaged boiler rulemaking proceedings on the grounds that those proposals (a) would have the unlawful effect of making currently-available product features unavailable and (b) are based on economic justifications that are invalid due to a basic defect in DOE's modeling approach, and
- Requesting comment in each of those rulemaking proceedings on how, in view of the identified problems with the pending proposals, DOE should modify its approach in developing new proposals in each of those rulemaking proceedings.

Petitioners believe that DOE can and should take such action without further administrative process. If DOE concludes that it cannot resolve both the legal and modeling issues, it should resolve at least one of those issues to facilitate forward progress as it continues to consider the other.



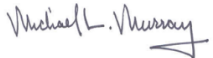


For further information, please contact:

Mark Krebs  
Energy Policy and Standards Specialist  
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<sup>36</sup> See e.g., Spire's January 6, 2017 Residential Furnace Comments at 4-8 and 58-62.

Respectfully submitted

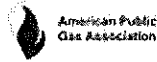
				
Mark Darrell	Bert Kalisch	Mike Murray	Michael Calderera, P.E.	Dena E. Wiggins
Senior Vice President, Chief Legal and Compliance Officer	President & CEO	General Counsel	SVP, Advocacy & Technical Services	President & CEO
Spire Inc.	American Public Gas Association	American Gas Association	National Propane Gas Association	Natural Gas Supply Association
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## ATTACHMENTS

List:

- A. [March 14, 2017 Request for Reconsideration of Pending Proposals](#)
- B. [Spire-APGA Corrections Request final](#)
- C. Affidavit of George Welsch

The above documents can be accessed via regulations.gov when these comments are posted.



March 14<sup>th</sup>, 2017

The Honorable Secretary Rick Perry  
U.S. Department of Energy  
1000 Independence Ave., SW  
Washington, DC 20585

**Subject:** EERE Sets Appliance Minimum Efficiency Standards Using Faulty and Biased Modeling – Request for Reconsideration of Proposed Rules and Opportunity for Comment

**Background:**

Many DOE's appliance minimum efficiency analyses rely on modeling that is invalid due to a basic methodological flaw. This faulty modeling calls into question EERE's overall claims of what their "energy efficiency" efforts have saved consumers in both their gas and electric utility bills; potentially going back years.

On February 9<sup>th</sup>, Spire and APGA sent DOE a letter with the subject "*Error Correction Request and Request for Withdrawal of Draft Final Rule: Energy Conservation Program: Energy Conservation Standards for Commercial Packaged Boilers: Docket Number EERE-2013-BT-STD-0030: RIN 1904-AD01.*" That request was also sent to regulations.gov and posted on February 14<sup>th</sup> as Spire-APGA Corrections Request final.

The basis for our request for error correction was that a modeling flaw that fundamentally corrupted EERE's analyses in the commercial boiler rulemaking. This flaw was not limited to just the commercial boiler docket. As we have already informed DOE, this flaw also invalidated EERE's analysis in at least the following dockets as well:

- Docket EERE-2014-BT-STD-0031  
Energy Conservation Standards for Residential Furnaces
- Docket EERE-2014-BT-STD-0042  
Energy Conservation Standards for Commercial Water Heaters

In short: DOE only has the authority to impose efficiency standards that are economically justified.<sup>1</sup> These are not.

**Purpose:**

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<sup>1</sup> 42 U.S.C. § 6295(o)(2) is applicable to consumer products; 42 U.S.C. 6313(a)(6)(A)(ii) (II) and (a)(6)(B)(ii) is applicable to commercial packaged boilers and commercial water heaters.



The purpose of this submission is to request that DOE recognize the error in its basic methodology and provide a corrected regulatory analysis in these three proceedings before any final actions are taken. We further suggest that DOE issue a single Federal Register notice in Docket Numbers EERE-2013-BT-STD-0030, EERE-2014-BT-STD-0031, and Docket EERE-2014-BT-STD-0042 to acknowledge the modeling error, announce DOE's intent to prepare corrected regulatory analyses in each proceeding, and solicit comment to facilitate that effort.

Our attached Request for Reconsideration and Opportunity for Comment provides a brief explanation of the relevant issues, which we believe are fully substantiated by the work of our consultants (the Gas Technology Institute, et. al.) comments submitted by Spire, APGA, AGA (and others) in response to DOE's SNOPR regarding Energy Conservation Standards for Residential Furnaces.

If DOE wants to initiate its consideration via a simple meeting, we would be happy to do so along with providing DOE with anything else it deems necessary to initiate corrective action. Another option to consider would be for DOE to hold a workshop so that DOE's new leadership can hear from other industry stakeholders about other methodologies that have used to force more stringent minimum energy efficiency standards. For just a few reoccurring examples of such additional problems:

- Until DOE "determinations" properly consider that HVACR equipment must be installed to the manufactures minimum installation standards DOE analysis will continue to overestimate energy savings on HVAC equipment by 30-50%. As it stands over 90% of 14 SEER AC unit are functioning at 8 to 10 SEER range.
- DOE's failure to properly consider energy savings as reflected by "tail-block" utility rates can also overestimate energy savings on HVAC equipment by 30-50%.

We appreciate your prompt consideration of this request. We also look forward to working with the new DOE administration to ensure that safe and affordable energy is kept available to U.S. consumers in accordance with the opening paragraph of An America First Energy Plan.

Sincerely,

Spire, Inc.  
American Public Gas Association  
Air Conditioning Contractors of America  
National Multifamily Housing Council  
National Apartment Association  
National Leased Housing Association

Copy: Mr. Daniel Simmons  
Ms. Suzie Jaworowski  
Mr. Travis Fisher  
Mr. Brian McCormack

**March 14<sup>th</sup>, 2017**

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

**Request for Reconsideration of Proposed Rules  
and  
Opportunity for Comment**

**Energy Conservation Program:  
Energy Conservation Standards for Commercial Packaged Boilers  
Docket Number EERE-2013-BT-STD0030, RIN No. 1904-AD01**

**Energy Conservation Program:  
Energy Conservation Standards for Commercial Water Heaters  
Docket Number EERE-2014-BT-STD-0042; Rin No. 1904-AD34**

**Energy Conservation Program:  
Energy Conservation Standards for Residential Furnaces  
Docket Number EERE-2014-BT-STD-0031; RIN No. 1904-AD20**

## Introduction

The undersigned, the American Public Gas Association (APGA), Spire Inc. (Spire), the Air Conditioning Contractors of America (ACCA), the National Multifamily Housing Council (NMHC), the National Apartment Association (NAA) and the National Leased Housing Association (NLHA) respectfully request that DOE correct a systemic methodological error that invalidates the economic justification for efficiency standards proposed in at least the following pending rulemaking proceedings:

1. Energy Conservation Program: Energy Conservation Standards for Commercial Packaged Boilers, Docket Number EERE-2013-BT-STD0030
2. Energy Conservation Program: Energy Conservation Standards for Commercial Water Heaters, Docket Number EERE-2014-BT-STD-0042
3. Energy Conservation Program: Energy Conservation Standards for Residential Furnaces, Docket Number EERE-2014-BT-STD-0031

DOE only has the authority to impose efficiency standards that are economically justified.<sup>1</sup> As a result, analysis of the economic impacts of standards considered in efficiency rulemaking is a central – and necessary – feature of DOE’s regulatory analysis. The systemic error in DOE’s analysis involves DOE’s use an arbitrary modeling function to generate a base case for analysis that dramatically overstates the potential for efficiency standards to produce economic benefits. Use of an artificial base case necessarily skews the resulting economic analysis, ensuring that the results, in every case, substantially overstate the benefits of any efficiency standard under consideration.<sup>2</sup>

Efficiency standards can only provide economic benefits to the extent that purchasers of appliances and equipment fail to invest in more efficient products when it would be economically beneficial for them to do so. In fact, the potential benefits of an efficiency standard are simply the benefits of the efficiency investments purchasers would make if the standard left them with no choice. Accordingly, the economic impacts of an efficiency standard cannot be determined without an understanding of actual purchasing behavior.

Remarkably, DOE’s methodology for economic analysis *does not even consider actual purchasing behavior*. Instead, DOE uses a random distribution function in its complex Life-Cycle Costing (LCC) spreadsheets and Monte Carlo analyses to generate an artificial base case for analysis. That base case does not reflect the demonstrated tendency of purchasers of appliances and equipment to make efficiency investments that would be economically beneficial

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<sup>1</sup> 42 U.S.C. § 6295(o)(2) (applicable to consumer products); 42 U.S.C. § 6313(a)(6)(A)(ii) (II) and (a)(6)(B)(ii) (applicable to commercial packaged boilers and commercial water heaters).

<sup>2</sup> The methodological error has been discussed in detail in comments and technical reports APGA and Spire submitted to the docket in the rulemaking proceeding concerning standards for residential furnaces (Docket Number EERE-2014-BT-STD-0031).

(and to forego efficiency investments that would be economically unreasonable).<sup>3</sup> Rather, it depicts the marketplace *as it would exist if purchasers of appliances and equipment never even attempted to make economically reasonable decisions*. Under this artificial paradigm, efficiency standards always produce many more beneficial outcomes – and many fewer negative outcomes – than they would in the real world. Consequently, the use of this artificial base case systematically skews DOE's analysis to produce significantly more regulatory benefits than truly exist. The results of such analysis do not even arguably reflect the economic impacts efficiency standards would have in the real world, and therefore provide no basis to conclude that efficiency standards are economically justified as required by law. In fact, if DOE had used realistic base cases for analysis in the rulemaking proceedings referred to above, the results would very likely have shown that more consumers would be harmed than benefitted by the proposed standards. At a minimum, DOE has failed to provide the economic justification required for the adoption of its proposed standards, and the proposed rules in the proceedings referred to above are legally deficient.

DOE cannot ignore the fact that the economic impacts of efficiency regulation are directly dependent on the nature of the decisions purchasers make in the absence of regulation. Nor can it use the expedient of an arbitrary modeling function to avoid the need to determine and consider the facts with respect to actual purchasing behavior, particularly when the result is to produce a base case that conspicuously fails to reflect the reality it purportedly represents. The use of an arbitrarily-generated base case in lieu of a base case designed to represent the purchasing decisions that would actually be affected by new efficiency standards is a clear methodological error that invalidates the results of every economic analysis in which it is employed.

#### **Technical Description of the Error**

As DOE recognizes, the economic consequences of individual consumer investments in higher-efficiency products vary considerably due to factors such as differences in individual installation conditions and product use patterns. Consequently, such investments can provide substantial economic benefits for some purchasers while imposing substantial net costs on others. To assess the range of economic impacts of new proposed standards, DOE relies on Monte Carlo analyses based on ten thousand "trial cases" that purport to represent the full range of product installation scenarios and product use patterns that exist in the United States.

These ten thousand trial cases must reflect the fact that some consumers already have installed or will install appliances satisfying a new efficiency standard even in the absence of regulation. It is only the remaining trial cases – those representing the cases in which consumers have not invested in more efficient products and would not invest such products unless a new standard forced them to do so – that should be considered in determining the economic impacts of a new efficiency standard.

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<sup>3</sup> These tendencies are demonstrated, for example, by the fact that the market share of higher-efficiency gas furnaces is dramatically higher in colder regions (where the economic justification for higher-efficiency furnaces tends to be strongest) than it is in warm-weather regions (where investments in higher-efficiency furnaces tend to be economically unattractive).

As stated above, DOE does not attempt to determine the extent to which purchasers of a product succeed or fail to make economically beneficial efficiency investments on their own. Instead, its model randomly assigns consumer choices, as though the efficiency investments purchasers would make on their own are no more likely to be economically beneficial – and no less likely to be economically disastrous – than those that would only occur only if new standards left purchasers no choice. This creates an artificial base case for analysis that completely misrepresents the decisions of consumers that have purchased an efficient appliance prior to the rule or would do so even in the absence of the rule, and thereby misrepresents the nature of the trial cases in which purchasing decisions would actually be altered by new standards.

The impact of this methodological error is dramatic because the average economic outcome for investments in high-efficiency products is driven by those appliance installations in which relatively dramatic economic consequences would result. In the real world, the scenarios in which high-efficiency products would provide the greatest economic benefits are precisely those in which purchasers are most likely to choose such products *on their own*. Conversely, the scenarios in which high-efficiency products would impose the highest net costs are those in which purchasers are least likely to choose such products on their own. It follows that – in the ten thousand trial cases used as the basis for analysis – high efficiency products assumed to be present in the absence of regulation should be present in a high percentage of the cases in which such products would produce the highest economic returns and a very low percentage of the cases in which they would impose the highest net costs. By erroneously assigning high-efficiency products to installation scenarios on a random basis, DOE's methodology produces a massive reallocation of positive economic outcomes from the "base case" to the "standards case." Simultaneously, it produces a massive reallocation of negative economic outcomes from the "standards case" to the "base case."

To eliminate this methodological error, it will be necessary for DOE to determine the extent to which purchasers of specific products forego investment in more efficient products and the circumstances in which they choose to do so. DOE will then need to design its ten thousand trial cases in a manner that reasonably reflects these facts. Only then will there be a valid way to assess the economic consequences of proposed standards and to determine what standards – if any – would be economically justified as required by law.

DOE should correct this methodological error going forward. In addition, DOE should correct the analysis it has provided to date in all three of the rulemaking proceedings referred to above and reconsider its proposed actions. Otherwise, any standards imposed in these proceedings not be economically justified as required by law.

### **Summary & Additional Modeling Flaws**

- 1. The basic methodological error (described above): Erroneous assignment of base-case efficiency.**

DOE's methodology assigns the base case efficiencies of products arbitrarily, in a manner that is plainly contrary to actual purchasing behavior. This methodology provides no valid basis for assessment of the economic impacts of efficiency standards.

**2. Coverage of affected customer classes is inadequate.**

The DOE approach does not adequately account for multiple consumer classes. For example, in the present version of the residential furnace docket, DOE represents only single-family, owner-occupied residential consumer housing, ignoring other major classes including multi-family housing, renters, public housing occupants, and other groups, all of which would be affected by residential gas furnace minimum efficiency standards. Similar concerns affect the other proceedings. Each consumer class has different economic criteria and roles in purchase decisions. The single-family, owner-occupied housing model biases the analysis in a singular and extreme way.

**Relief Requested**

For the reasons expressed above, we respectfully request that DOE:

1. Correct its methodological error going forward;
2. Request comment in each of the rulemaking proceedings referred to above to facilitate appropriate revision of the regulatory analyses in each proceeding; and
3. On the basis of such comment, revise the LCC spreadsheets and Monte Carlo analyses in each proceeding, reconsider the level and appropriateness of each proposed standard, and seek comment on the results of those analyses.

Since we seek to correct modeling biases that have become institutionalized, it is important to consider the use of new independent evaluators (*i.e.*, other than DOE's National Labs and Navigant who initially introduced these errors). This may require a separate solicitation which may ultimately result in a basic reformulation of LCC analysis used in standard setting.

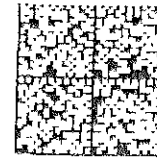
Respectfully submitted,

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National Multifamily Housing Council  
National Apartment Association  
National Leased Housing Association

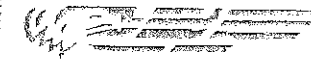


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Saint Louis, MO 63101

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FIRST CLASS



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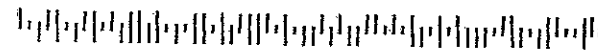


**Received**

**MAR 27 2017**

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MISSOURI GAS ENERGY

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*Energy Policy and Standards Specialist*

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

**Error Correction Request and Request for Withdrawal of Draft Final Rule**

**Energy Conservation Program: Energy Conservation Standards for  
Commercial Packaged Boilers**

**Docket Number EERE-2013-BT-STD-0030**

**RIN 1904-AD01**

**[ErrorCorrectionInfo@EE.DOE.Gov](mailto:ErrorCorrectionInfo@EE.DOE.Gov)**

**Submitted by Spire, Inc. and the American Public Gas Association  
February 11, 2017**



Pursuant to 10 C.F.R. § 430.5, DOE has posted the above-referenced draft final rule (the “Draft Rule”) on its web site and requested that interested parties notify it of any “typographical or other errors, as described in such regulations, by no later than midnight on February 11, 2017.” By this submission, Spire Inc. (“Spire”) and the American Public Gas Association (“APGA”) (together, “Joint Requestors”) hereby notify DOE of a fundamental error in the modeling upon which the Rule was based. This error completely invalidates the regulatory analysis that provides the basis both for the selection of the energy efficiency standards the Draft Rule would impose and the Secretary’s determination that such standards are economically justified. As a result of this error, the regulatory analysis does not support the standards the Draft Rule would impose and the Joint Requestors respectfully request that the Draft Rule be withdrawn.

Withdrawal of the Draft Rule is warranted and appropriate under the corrections procedure specified by 10 C.F.R. § 430.5. Regardless, withdrawal of the Draft Rule is within DOE’s discretion, and is necessary to prevent the issuance of standards that plainly have not been economically justified as required by law. Accordingly, Joint Requestors request that the Draft Rule be withdrawn and that the issues involved be addressed appropriately through further collaborative rulemaking proceedings. Similar errors are evident in other rulemaking proceedings, such as the Furnace SNOPR and commercial water heating NOPR, and these systematic errors must be systematically addressed and corrected, even though the associated proceeding are on different timelines in other dockets.

Finally, the proposed rule raises serious safety concerns for non-condensing furnaces, which themselves warrant withdrawal and reconsideration.

### **Interest in this Proceeding**

Spire, formerly the Laclede Group, Inc., is a holding company that owns and operates Laclede Gas Company, including its Missouri Gas Energy operating division, the two largest natural gas distribution companies in the state of Missouri, Alabama Gas Corporation, the largest natural gas distribution company in the state of Alabama, and Mobile Gas Service Corporation and Willmut Gas and Oil Company, which operate in Alabama and Mississippi, respectively. Spire's utility companies have been distributing gas in one form or another in their respective service areas for more than a century and a half. Today, they collectively provide natural gas distribution service to more than 1.7 million residential, commercial and industrial customers.

Spire supports energy conservation. Spire's utility businesses have supported energy efficiency education for homeowners and businesses alike for many years, and have invested significant resources in rebate programs promoting the sale of high-efficiency equipment and appliances. However, ill-conceived efficiency regulations can do considerable unnecessary harm, and Spire, its natural gas distribution companies, and the communities and customers those companies serve would be directly and adversely affected by the energy conservation standards the Draft Rule would impose. Specifically, the Draft Rule would effectively force many purchasers of commercial packaged boilers to switch from gas boilers to alternatives that would impose higher energy costs for commercial boiler operators and produce a loss of customers – and a direct loss of revenue – for natural gas distribution companies including those owned by Spire. Spire therefore has a keen interest in the subject of the Draft Rule and submitted extensive comments to the docket in this proceeding, including a submission dated June 22, 2016.<sup>1</sup> Spire is therefore a party to this rulemaking as defined by 10 C.F.R. § 430.5(b).

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<sup>1</sup> Spire's Comments dated June 22, 2016 are available in the docket at:  
[file:///C:/Users/BDDay/Downloads/Spire\\_Comments\\_on\\_Commercial\\_Boiler\\_NOPR.pdf](file:///C:/Users/BDDay/Downloads/Spire_Comments_on_Commercial_Boiler_NOPR.pdf)

Similarly, APGA has its own interest and is a party to this proceeding. APGA is the national association for publicly-owned natural gas distribution systems. There are approximately 1,000 public gas systems in 36 states, and more than 730 of these systems are APGA members, who will be affected directly by the implementation of the Draft Rule.<sup>2</sup>

### **The Primary Error in Question**

*Base and standards case used for economic modeling do not reflect reality.* The regulatory analysis offered in support of the Draft Rule is based on a modeling methodology in which DOE starts by constructing ten thousand “trial cases” that are supposed to represent the full range of commercial gas boiler installation scenarios that exist in the United States. The methodology then calls for DOE to conduct simulations to determine how new efficiency standards would change commercial boiler installation outcomes in these trial cases. This is how DOE measures the economic consequences of those changed outcomes. In some cases, commercial boilers that satisfy the efficiency standards that the Draft Rule would impose have already been installed or would be installed in the absence of regulation; in other cases, such boilers would only be installed if new standards are adopted. DOE’s analysis is supposed to identify the latter cases – those trial cases in which installation outcomes would be altered by new energy efficiency standards – and then determine the economic consequences of those altered outcomes.

The fundamental error in the analysis underlying the Draft Rule is that the ten thousand trial cases DOE used as its basis for analysis were not constructed to reflect the reality that – in

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<sup>2</sup> APGA and the American Gas Association filed comments on June 22<sup>nd</sup>, 2016 with the Department of Energy in response to the Notice of Proposed Rulemaking – Energy Conservation Standards for Commercial Packaged Boilers. - Docket No. EERE-2013-BT-STD-0030; RIN 1904-AD01

the absence of regulation – purchasers generally choose high-efficiency commercial gas boilers in installation scenarios in which an investment in such equipment would make economic sense for the purchaser. Instead, the ten thousand trial cases were improperly constructed by randomly “assigning” high-efficiency boilers to installation scenarios without regard to the economic consequences of the installation involved, as though – in the absence of regulation – purchasers of commercial boilers literally never consider the economics of such purchases at all. The result is that the ten thousand trial cases do not represent the market that actually exists; instead they represent an imaginary market in which purchases of high-efficiency gas boilers made in the absence of regulation are no more likely to be economically beneficial for the purchaser – and no less likely to be economically disastrous for the purchaser – than purchases that would only occur as a result of regulatory compulsion. The existence of this error is revealed by the fact that Cell D10 of the spreadsheet entitled “No New Stds Case Efficiency” links to a linear random distribution function picking base case boiler efficiency. This spreadsheet can be found in DOE Boiler LCC spreadsheets CPB\_ECS\_NOPR\_LCC\_2016-03-15.xlsm at the following link: <https://www.regulations.gov/document?D=EERE-2013-BT-STD-0030-0045>

Unfortunately, the problem can only be observed if the spreadsheet is opened with an Oracle Crystal Ball plug-in; otherwise, only the numeric output of the last computation spreadsheet run is visible.

The result of this error is a dramatic distortion of the base case for regulatory analysis. In the real world, installation scenarios in which high-efficiency boilers would provide the greatest economic benefits are those in which purchasers are most likely to purchase such boilers on their own; it follows that a disproportionate percentage of such installation scenarios should be represented in the “base case” (*i.e.*, among the trial cases in which boilers meeting the new

standards would be present in the absence of new regulation). Conversely, installation scenarios in which high-efficiency boilers would result in the greatest net costs are those in which purchasers are least likely to choose such boilers in the absence of regulation; it follows that a disproportionate percentage of such installation scenarios should be represented in the “standards case” (*i.e.*, among the trial cases in which boilers meeting the new standards would be absent unless new standards are imposed). By erroneously assigning high-efficiency boilers to installation scenarios on a random basis, DOE produced a universe of trial cases in which the distribution of even the best and worst economic outcomes is exactly the same for installations of high-efficiency boilers required by rule as it is for installations that purchasers would choose to make on their own in the absence of regulation. This error in DOE’s methodology produced a massive reallocation of positive economic outcomes from the “base case” to the “standards case,” and a massive reallocation of negative economic outcomes from the “standards case” to the “base case.” The result is an obviously skewed regulatory analysis that does not even arguably address the universe of installation outcomes that would actually be affected by the adoption of new standards. The entire economic analysis underlying the Draft Rule is therefore completely erroneous and invalid, and it provides no justification at all for the standards the Draft Rule would impose.

### **The Correction Required**

The error in question is elementary: standards cannot be economically justified unless their impacts are identified and the economic consequences of those impacts are considered. In effect, DOE provided an economic analysis that did not even attempt to identify the real impacts of the standards that the Draft Rule would impose. Instead, it created an artificial universe of supposedly impacted installation scenarios. The imaginary market thus created by DOE

improperly included a substantial range of positive outcomes that would occur (or have already occurred) in the absence of new standards while improperly excluding a substantial range of negative outcomes that would only occur if new standards are imposed. Correction of this error would dramatically reduce the economic benefits claimed to justify the Draft Rule and would fundamentally alter the outcome of DOE's regulatory analysis. Accordingly, editorial revisions would not be adequate to correct the error, and the Draft Rule should be withdrawn.

### **Additional Errors**

DOE's unreasonable methodology to deny consumer economic logic is not the only error in need of correction. For example, and most importantly, DOE erred by putting consumer safety at risk. Spire commented extensively on this problem in its [filed comments of June 22, 2016](#), as did many others. These include the following excerpts:

#### [From AHRI 22JUN16 comments](#)

*DOE needs to understand the full range of venting approaches in the field. DOE's approach to venting and installation is simply much too limited and misses the subtlety of the venting issue. This has significant consequences. First, DOE is proposing minimum efficiency standards that reduce the current margin of safety in venting systems on existing commercial boiler installations by reducing the energy available to drive the products of combustion through the venting system. Second, because manufacturers and installing contractors cannot accept this potential reduction in the safe and proper operation of the venting system, there are additional installation costs associated with upgrading or reworking the vent system to provide a safe and proper venting system for the higher efficiency boiler.*

#### [From AGA and APGA 22JUN16 Comments](#)

*The Department should revise its technical analysis and economic justification for the proposed 85.0% levels because they considerably reduce the margin of safety levels which are included in product designs to help ensure that premature failures do not occur. The 85.0% thermal efficiency ("ET") minimum efficiency requirement that is proposed for Small Gas-Fired Hot Water Commercial Packaged Boilers and 85.0% combustion efficiency ("EC") for Large Gas-Fired Hot Water Commercial Packaged Boilers are dangerously close to promoting excessive condensation in both the venting system and the interior heat exchanger of these boilers. Excessive condensation could result in premature failure of the boiler and the vent.<sup>6</sup> The current*

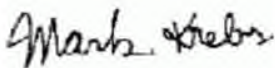
*minimums at 80.0% ET and 82.0% EC, for Small and Large Gas-Fired Hot Water Commercial Packaged Boilers, respectively, as developed by the ASHRAE 90.1 committee, reflect a balance between a justifiable margin of safety and an improved energy efficiency level. The Department has failed to meet its burden for deviating from the ASHRAE standard.*

### **Request for Withdrawal**

As already stated, withdrawal of the Draft Rule pursuant to 10 C.F.R. § 430.5 is necessary to correct a fundamental error in DOE's regulatory analysis. In any event, withdrawal of the Draft Rule is within DOE's discretion and is plainly warranted on the merits.

On January 20, 2017, the White House issued a Memorandum for the Heads of Executive Departments and Agencies instituting a regulatory freeze pending review of new regulations not yet submitted to the Office of the Federal Register for publication. The Draft Rule is subject to that regulatory freeze, and – since the Draft Rule would impose standards that lack the economic justification expressly required by law –the review required by the regulatory freeze memorandum can and should result in a withdrawal of the Draft Rule to facilitate further analysis of the relevant issues and development of a new proposal appropriately addressing DOE's statutory obligations.

Respectfully submitted,



Mark Krebs  
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**BEFORE THE  
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY  
UNITED STATES DEPARTMENT OF ENERGY  
WASHINGTON, D.C.**

**Energy Conservation Program:  
Energy Conservation Standards for Residential  
Furnaces and Commercial Water Heaters**

**Notice of Petition for Rulemaking  
Docket No. EERE-2018-BT- STD-0018**

**Affidavit of George L. Welsch**

STATE OF MISSOURI  
COUNTY OF ST. LOUIS.

I, GEORGE L. WELSCH, being duly sworn, state as follows:

1. I am over 18 years of age and suffer from no legal incapacity.
2. I have personal knowledge as to the matters stated herein.
3. I am the President and owner of Welsch Heating & Cooling Company, a Nationally-recognized heating and air conditioning contractor serving the needs of consumers in and around Saint Louis, Missouri. My office address is 2175 Welsch Industrial Court, P.O. Box 28545, Saint Louis, MO, 63146.
4. I graduated from Washington University in St. Louis with a B.S. in Mechanical Engineering, am a Registered Professional Engineer in the State of Missouri and have been the Chairman of the Board of Examiners for Mechanical Licensing in St. Louis County since 1999. I have approximately fifty-five years of experience in the heating and air conditioning business and have served on the Board of Directors and as the National President of the Sheet Metal and Air Conditioning Contractors National Association ("SMACNA"), which is one of the principal trade association for heating and air conditioning contractors.
5. I have been involved in thousands of gas furnace installations and am familiar with residential furnace technology, with the range of residential gas furnace and related venting products sold in the United States, and with the technical, practical and economic considerations involved in the purchase and installation of residential gas furnaces.



6. On September 23, 2016, the U. S. Department of Energy issued a supplemental proposed rule proposing a minimum efficiency standard of “92.0 AFUE” for residential non-weatherized gas furnaces with certified input capacities of more than 55,000 Btu/hr. This proposed standard can only be achieved by products using condensing combustion technology (“condensing products”).
7. Gas products that use condensing combustion technology (“condensing products”) achieve higher measured efficiencies than conventional gas products by recovering more heat from combustion gasses before they are vented. As a result, condensing products produce cooler exhaust gasses than conventional (i.e., non-condensing) gas products and produce liquid condensate that conventional gas products generally do not (hence the use of the term “condensing” to describe condensing products).
8. There are millions of residential furnace installations throughout the United States in buildings that have built-in “Class B” metal venting systems. These venting systems are designed to vent combustion gasses at atmospheric pressure, using the buoyancy of relatively hot combustion gases to carry them vertically (typically through the roof of the building). These venting systems can be many stories in height when sized appropriately and are commonly sized to serve multiple gas appliances such as furnaces and water heaters. Gas furnaces utilizing these venting systems are frequently installed in closets located in relatively central positions in the interior of a living unit and are often stacked vertically in multi-family housing to access a common venting system.
9. Most if not all non-condensing gas furnaces are “Category I” appliances that are, by definition, designed to be vented at atmospheric pressure. As such, these products are compatible with Class B atmospheric venting systems and can generally be (and commonly are) used to replace existing non-condensing furnaces without substantial difficulties and in full compliance with applicable building and safety code requirements. In the case of such replacements, the new furnace is typically installed in the same location as the existing furnace and connected to the same vent system with only relatively modest modifications being required to address safety, code compliance, or other issues. My business has performed thousands of furnace replacements of this kind that have been inspected for code compliance and approved without substantial difficulty.
10. Condensing products are not compatible with class “B” metal venting systems. The cooler combustion gasses generated by condensing products lack sufficient buoyancy to be vented at atmospheric pressure and produce acidic liquid condensation that would dangerously corrode a class “B” venting system. For these reasons, condensing products require power (*i.e.*, positive pressure) venting through vent systems constructed of material (typically PVC pipe) that is not subject to corrosion by acidic condensate. Because the positive pressure created by a power-vented product could cause a back-draft of combustion products into the occupied space of a building through any commonly-vented products, a separate venting system is required for each individual condensing gas product.



11. Because condensing furnaces are incompatible with existing Class B venting systems, it is often difficult – and in many cases impractical – to replace an existing non-condensing furnace with a condensing furnace. Installation of a vertical venting system in place of an existing Class B metal venting system is often impractical due to limitations on the maximum allowable vent lengths for condensing gas products or lack of the space that would be required to bundle the venting for more than one or two condensing products through the existing chase. The alternative of a horizontal installation can be problematic or impractical because a minimum pitch of  $\frac{1}{4}$  inch per lateral foot is required to drain condensate from a vent, and this would often require the venting to run through occupied space. For example, a 24-foot lateral run from a furnace to an exterior wall would require a vent that is at least six inches lower at the furnace end than at the exterior wall, which would typically make it impossible for the vent to be enclosed in the space available between occupied floors. Lateral venting can also be problematic or impractical due to limitations on side-venting imposed by restrictive covenants, building codes, restricted access to exterior walls, or the spacing or orientation of surrounding buildings.

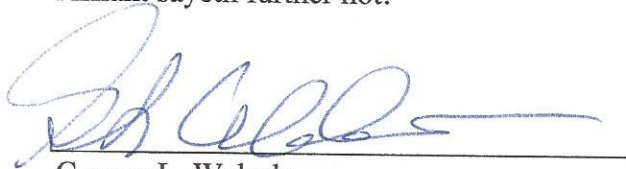
12 In addition, the replacement of non-condensing gas products with condensing gas products can create problems for other commonly-vented appliances. Where venting for the new condensing product replaces the existing Class B venting system, any commonly-vented products dependent on that system would also need to be replaced, creating a new set of venting issues for any gas replacement products. Where the existing Class B venting system is left in place, the elimination of one commonly-vented product would in many cases leave it improperly-sized for the remaining commonly-vented appliances. This would create the risk of an unsafe and very dangerous back-draft condition. This can be a particularly problematic issue in cases involving multi-family housing that have furnaces in different housing units stacked vertically utilizing a common venting system. In these situations, which are relatively common, impact on commonly-vented appliances would often preclude the replacement of a non-condensing furnace with a condensing furnace. This would be true even if the conditions were such that separate venting of the new furnace would be relatively easy.

13. My business has replaced many existing non-condensing furnaces with condensing furnaces. Such replacements make sense for many consumers when the complications involved are not excessive, but installation costs are always a substantial part of the cost of furnace replacements and it has been my experience that – even in the least challenging cases – the installation work required for condensing products is generally close to twice as costly as that for non-condensing products. More often, costs for installation of a condensing product would be significantly higher, the installation would require undesirable building modifications, or the installation simply would not be practical.

14. My business has installed gas furnaces in numerous cases in which DOE's proposed minimum efficiency standard of "92% AFUE" for residential non-weatherized gas furnaces with certified input capacities of more than 55,000 Btu/hr. would leave purchasers without any suitable options for gas furnace replacements. For example, there are many high-rise apartment and condominium buildings with Class B venting systems in which condensing gas furnaces could not be installed without the need for substantial building modifications. Also in these instances, removing one or more non-condensing furnaces from the Class B common vent system would likely require replacement of most if not all of the other appliances using that vent

system. Similarly, there are many multi-story homes with Class B venting systems and furnaces centrally located in finished basements in which condensing furnaces could not be installed without the need for substantial building modifications involving furnace relocations or other sacrifices of currently occupied space. As an engineer and contractor, I believe that the likely result of DOE's proposed standard in these and many other cases would be that existing non-condensing gas furnaces would be replaced – not with new condensing gas furnaces – but with alternatives such as electric furnaces, which are less energy efficient overall, would impose significantly higher energy costs, and would require building occupants to settle for an entirely different (and for many less satisfactory) form of heat than that to which they had become accustomed.

Affiant sayeth further not:



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George L. Welsch

**VERIFICATION**

STATE OF Missouri )

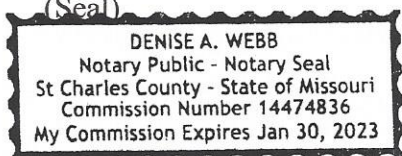
COUNTY OF St. Charles )

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Signed and sworn (or affirmed) before me on 2/22/2019 (date) by

George L. Welsch (name of person making statement)

(Seal)



Denise A Webb  
NOTARY PUBLIC

Printed Name: Denise A. Webb

My Commission Expires:

1/30/2023