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[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket Number EERE–2014–BT–STD–0031]

RIN: 1904–AD20

Energy Conservation Program for Consumer Products: Energy Conservation Standards for Residential Furnaces

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of Data Availability.

SUMMARY: The U.S. Department of Energy (DOE) has completed a provisional analysis of the potential economic impacts and energy savings that could result from promulgating amended energy conservation standards for residential non-weatherized gas furnaces (NWGFs) that include two product classes defined by input capacity and has published the data on its webpage. DOE encourages stakeholders to provide any additional data or information that may improve the analysis.

DATES: DOE will accept comments, data, and information regarding this NODA no later than [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]. See section IV for details.

ADDRESSES: Any comments submitted must identify the NODA for Energy Conservation Standards for Residential Furnaces, and provide docket number EERE-2014–BT–STD–0031 and/or regulatory information number (RIN) number 1904–AD20. Comments may be submitted using any of the following methods:

1. Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
2. E-mail: ResFurnaces2014STD0031@ee.doe.gov. Include the docket number and/or RIN in the subject line of the message. Submit electronic comments in Word Perfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form on encryption.
3. Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
4. Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on the rulemaking process, see section IV of this document (Submission of Comments).

Docket: The docket, which includes Federal Register notices, comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.regulations.gov index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link for access to the docket webpage can be found at: https://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=62 . The www.regulations.gov webpage contains instructions on how to access all documents in the docket.

FOR FURTHER INFORMATION CONTACT:

Mr. John Cymbalsky, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1692. E-mail: residential_furnaces_and_boilers@ee.doe.gov.

Ms. Johanna Hariharan, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (202) 586-9507 or (202) 287-6307. E-mail: Johanna.Hariharan@hq.doe.gov.

For further information on how to review other public comments and the docket, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

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I. Background

On March 10, 2015, DOE published in the Federal Register a notice of proposed rulemaking (NOPR) and public meeting to amend energy conservation standards for residential non-weatherized gas furnaces (NWGF) and mobile home gas furnaces (MHGF). 80 FR 13119. The proposed standards, which are expressed as minimum

annual fuel utilization efficiencies (AFUE), are shown in Table I.1. These proposed standards, if adopted, would apply to all products listed in Table I.1 and manufactured in, or imported into, the United States on or after the date 5 years after the publication of the final rule for this rulemaking.

Table I.1 Proposed AFUE Energy Conservation Standards for Non-Weatherized Gas Furnaces and Mobile Home Gas Furnaces (TSL 3)

Product Class	AFUE %
Non-Weatherized Gas-Fired Furnaces	92
Mobile Home Gas-Fired Furnaces	92

A number of stakeholders objected to a national standard at 92 percent AFUE, which would effectively only be able to be met by using condensing technology. The objections raised by stakeholders covered a wide range of issues, but the negative impacts of the proposed standards on some furnace consumers were highlighted by many stakeholders.

A letter dated June 8, 2015, signed by 121 members of the U.S. House of Representatives, expressed concern that a nationwide energy efficiency standard that effectively precludes a consumer from choosing to install a non-condensing furnace would result in many homeowners either abandoning the use of natural gas to heat their homes or paying substantially more for the installation of a furnace that meets the new standard. It stated that many families will be faced with the difficult choice of having to replace their non-condensing furnace with either a condensing furnace with higher installation costs or electric heat and accompanying higher monthly energy bills. (United

States House of Representatives, No. 67 at p. 1) Comments from the Pennsylvania Chambers of Commerce, Business, and Industry, Meeks, Payne, Jr., Bishop, Jr., and Carrier make similar statements. (Pennsylvania Chambers of Commerce, Business, and Industry, No. 82 at p. 1; Meeks, No. 140 at p. 1; Payne, Jr., No. 75 at p. 1; Bishop, Jr., No. 76 at p. 1)

The American Gas Association (AGA), Goodman, and American Energy Alliance (AEA et al.) stated that even assuming DOE's analysis is correct, many consumers could incur costs under the proposed standard. They stated that, according to DOE's analysis, 20 percent of households nationwide would face higher life-cycle costs under the proposed standard, and in the replacement market, one-quarter of all households replacing their natural gas furnaces would see a life-cycle cost increase. (AGA, No. 118 at p. 27; AEA et al., No. 69 at p. 1; Goodman, No. 135 at p. 2) AGA, Goodman, and Southern Gas Association (SGA) added that consumers in the South and low-income families would be disproportionately impacted. (AGA, No. 118 at p. 27; Goodman, No. 135 at p. 2; SGA, No. 145 at p. 1)

The Air-Conditioning, Heating, and Refrigeration Institute (AHRI), Carrier, Rheem, and Ingersoll Rand expressed concern that the proposed standards will result in 10-20 percent of homes switching from gas furnaces to electric heat pumps because venting of a condensing gas furnace is difficult to impossible. (AHRI, No. 159 at p. 3; Carrier, No. 116 at p. 2; Rheem, No. 142 at p. 3; Ingersoll Rand, No. 156 at p. 2) AGA expressed a similar concern, and asserted that the resulting adverse energy and

environmental impacts of this fuel switching are very substantial. (AGA, No. 118 at p. 28)

Several stakeholders, who expressed general support for the proposed standards and suggested more stringent standards could be justified, provided a recommendation for reducing negative impacts on some furnace consumers while maintaining the overall economic and environmental benefits of the standards. The American Council for an Energy-Efficient Economy (ACEEE) recommended that DOE establish a separate product class for small furnaces (tentatively those with an input capacity of 50,000 Btu/hour or less) and leave the standard level for these units at 80-percent AFUE, while adopting a higher standard level of 95-percent AFUE for larger furnaces. (ACEEE, No. 113 at p. 1) The Alliance to Save Energy made a similar recommendation, but referred to an input capacity of no more than 50,000 to 65,000 Btu/hour for smaller furnaces. (Alliance to Save Energy, No. 115 at p. 1) The Natural Resources Defense Council (NRDC) urged DOE to adopt an 80-percent AFUE standard level for furnaces below a specified maximum capacity threshold, and set the capacity threshold low enough that the national energy, economic, and environmental benefits are largely preserved while allowing consumers in small and moderately-sized, well insulated and weatherized homes in moderate and warm climates to have a non-condensing option. (NRDC, No. 134 at p. 2) AGLR stated that DOE should establish a separate product class for small furnaces with an input capacity of less than 45,000 Btu/hour, citing section 305(f) of EPCA as authority for DOE to establish separate product classes based on product capacity. (AGLR, No. 112 at pp. 15-16)

ACEEE also stated that creating two product classes based on furnace size would reduce the number of households that would experience net costs under the proposed standard (many of whom are in the south). ACEEE stated that many of the consumers who would experience net costs will have small furnaces and recommended that DOE specifically examine this issue and estimate the economics of separate standard levels as a function of furnace input capacity. ACEEE noted that a size threshold provides another option for some households with very high installation costs – if they weatherize their home and get the needed capacity below 50,000 Btu/h, they can avoid the extra installation cost of a condensing furnace. ACEEE added that a size threshold would not present the potential enforcement challenges associated with regional standards. (ACEEE, No. 113 at p. 3)

Although DOE believes that the standards proposed in the March 2015 NOPR meet the statutory criteria for amended standards, given the concerns and suggestions described above, DOE undertook an analysis of the consumer economics and national impacts of establishing separate standard levels for large and small residential furnaces. In so doing, it examined the effect of alternative size thresholds for a small furnace. Because the issues raised by stakeholders primarily concern NWGFs, DOE only considered that product in its analysis and did not examine mobile home gas furnaces. The analysis is described in section II of this NODA; section III provides the results of the analysis.

DOE notes that this NODA does not propose any energy conservation standards for residential furnaces. DOE may revise the analyses presented in today's NODA based on any new or updated information or data it obtains during the course of the rulemaking. DOE encourages stakeholders to provide any additional data or information that may improve the analysis.

II. Summary of the Analyses Performed by DOE

DOE conducted an analysis of the consumer impacts (life-cycle cost and payback period) and national impacts (national energy savings and net present value of national benefits) of potential standard levels for the considered NWGF product classes. The tools used in preparing these analyses and their respective results are available at: https://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=62 . Each individual spreadsheet includes an introduction that provides an overview of the contents of the spreadsheet. These spreadsheets present the various inputs and outputs to the analysis and, where necessary, instructions. Brief descriptions of the analyses and of the supporting spreadsheet tools are provided below.

If DOE were to consider adopting energy conservation standards for residential furnaces that set separate levels based on input capacity, it would do so in a future supplemental NOPR (SNOPR). DOE would also publish a technical support document (TSD) containing a detailed written account of the analyses performed in support of the SNOPR, which will include updates to the analyses made available in this NODA.

The analysis conducted for this NODA used the same analytical framework as the March 2015 NOPR.[1] Key aspects of the present analysis and DOE's updates to the NOPR analysis are described in the sections below.

A. Introduction

The analysis conducted for this NODA estimated impacts for the potential standard level combinations shown in Table II.1. The key aspect of this analysis is that only large furnaces would need to use condensing technology to meet the standard. Thus, households installing a small furnace would not need to incur the costs associated with installing a condensing furnace.

Table II.1. Potential Standard Level Combinations Analyzed for Large and Small Furnaces

Furnace Size	**Annual Fuel Utilization Efficiency (%)**			
Large	90	92	95	98
Small	80	80	80	80

This NODA analysis used the same sample of residential furnace consumers as the March 2015 NOPR. Each sample household was assigned a furnace size (in terms of input capacity) based on a number of features, as discussed in section II.C. The share of households that would install a small furnace depends on how "small furnace" is defined in terms of input capacity. For this analysis, DOE considered the following small furnace definitions: ≤ 45 kBtu/hour, ≤ 50 kBtu/hour, ≤ 55 kBtu/hour, ≤ 60 kBtu/hour, and ≤ 65

[1] Please see the March 2015 NOPR and the accompanying TSD for details, which are available at http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=62.

kBtu/hour. In each case, large furnaces would be defined as all sizes above the given thresholds. The share of households that would install a furnace meeting a small furnace standard rises as the size cutoff in the small furnace definition increases, as illustrated in Table II.2.[2]

Table II.2. Share of Sample Households by Furnace Size (percent)

Furnace Size	Small Furnace Definition				
	≤ 45 kBtu/hour	**≤ 50 kBtu/hour**	**≤ 55 kBtu/hour**	**≤ 60 kBtu/hour**	**≤ 65 kBtu/hour**
Large	92	86	85	68	62
Small	8	14	15	32	38
Total	100	100	100	100	100

B. Engineering Analysis

The engineering analysis establishes the relationship between the manufacturer production cost (MPC) and energy efficiency for residential furnaces. This relationship between MPC and energy efficiency serves as the basis for calculations performed in the other analysis tools to estimate the costs and benefits to individual consumers, manufacturers, and the nation. For each NWGF efficiency level that was analyzed, the MPC was estimated for four furnace capacities (60 kBtu/hour, 80 kBtu/hour, 100 kBtu/hour, and 120 kBtu/hour). For the NODA analysis, DOE updated the MPCs from

[2] The shares in Table II.2 reflect the likelihood that some consumers would down-size a new furnace to meet the "small furnace" definition. See section II.C for discussion.

the NOPR to incorporate the most recent available data for material,[3] component, labor, and overhead costs, and also updated the MPCs to 2014$.

C. Life-Cycle Cost and Payback Period Analyses

The life-cycle cost (LCC) and payback period (PBP) analyses determine the economic impact of potential standards on individual consumers who purchase a furnace in the expected compliance year (assumed to be 2021 for this analysis). The LCC is the total cost of purchasing, installing and operating a residential furnace over the course of its lifetime. DOE determines the LCC by considering: (1) the total installed cost to the consumer (which consists of manufacturer selling price, distribution channel markups, sales taxes, and installation costs); (2) the annual energy consumption (natural gas or LPG and electricity) of residential furnaces as they are used in the field; (3) the operating cost of residential furnaces (i.e., energy cost and maintenance and repair cost); (4) equipment lifetime; and (5) a discount rate that reflects the consumer cost of capital and puts the LCC in present-value terms. The PBP represents the number of years needed to recover the increase in purchase price of higher-efficiency residential furnaces through savings in the operating cost.

For each considered standards case, DOE measures the change in LCC relative to a no-new-standards case, which reflects the market in the absence of amended energy

[3] DOE uses 5-year averages for metal materials and current prices for all other materials.

conservation standards, including market trends for equipment that exceeds the current energy conservation standards.

In the March 2015 NOPR and in today's NODA, DOE developed nationally-representative household samples for residential furnaces from the 2009 Residential Energy Consumption Survey (RECS).[4] DOE analyzed the net effect of potential amended residential furnace standards on consumers by calculating the LCC savings and PBP for each household by efficiency level.

DOE performed the LCC and PBP analyses using a spreadsheet model combined with Crystal Ball[5] to account for uncertainty and variability among the input variables. Each Monte Carlo simulation consists of 10,000 LCC and PBP calculations using input values that are either sampled from probability distributions and household samples or characterized with single point values. The analytical results include a distribution of 10,000 data points showing the range of LCC savings for a given efficiency level relative to the no-new-standards case efficiency distribution. In performing an iteration of the Monte Carlo simulation for a given consumer, product efficiency is chosen based on its probability. If the chosen product efficiency is greater than or equal to the efficiency of the standard level under consideration, the LCC and PBP calculation reveals that a

[4] U.S. Department of Energy: Energy Information Administration, Residential Energy Consumption Survey: 2009 RECS Survey Data (2013), available at: http://www.eia.gov/consumption/residential/data/2009/ (last accessed July 29, 2015).

[5] Crystal Ball is a commercial software program developed by Oracle and used to conduct stochastic analysis using Monte Carlo simulation. A Monte Carlo simulation uses random sampling over many iterations of the simulation to obtain a probability distribution of results. Certain key inputs to the analysis are defined as probability distributions rather than single-point values.

consumer is not impacted by the standard level. By accounting for consumers who already purchase more-efficient products, DOE avoids overstating the potential benefits from increasing product efficiency.

1. Furnace Size Assignment

For the March 2015 NOPR, DOE assigned an input capacity for the existing furnace of each housing unit based on an algorithm that correlates the heating square footage and the outdoor design temperature for heating (i.e., the temperature that is exceeded by the 30-year minimum average temperature 1 percent of the time) with the distribution of input capacity of furnaces.[6] (- DOE assumed that, for the new furnace installation, the input capacity would remain the same. DOE's analysis accounted for the typical over-sizing of furnace capacity (i.e., the furnace is larger than it needs to be to fulfill the building heating load).

If there is a separate standard for small furnaces, DOE expects that some consumers who would otherwise install a typically-oversized furnace would choose to down-size in order to be able to purchase a non-condensing furnace. For the NODA analysis, DOE identified those sample households that might down-size at the considered small furnace definitions. DOE first determined if a household would install a non-

[6] The distribution of input capacity is based on shipments data by input capacity bins for the year 2000 provided by AHRI (AHRI (formerly GAMA). Furnace and Boiler Shipments data provided to DOE for Furnace and Boiler ANOPR. January 23, 2002). AHRI data was further disaggregated into 5-kBtu/h bins using the reduced models dataset from the NOPR analysis. Appendix 7B of the NOPR TSD provides details about furnace sizingmethod.

condensing furnace with an input capacity greater than the small furnace size limit without amended standards. In the standards case, DOE assumed that a fraction of such consumers would down-size to the input capacity limit for small furnaces.

2. Energy Prices

For this NODA, DOE updated current energy prices and also the projection of future energy prices. Current average and marginal monthly energy prices are based on the latest data (2013 energy prices) from EIA (Form 861 data[7] to calculate commercial electricity prices, Natural Gas Navigator[8] to calculate commercial natural gas prices, and State Energy Data System[9] to calculate LPG prices). The update to 2013 energy prices had a very small impact on the LCC and PBP results.[10] Future energy prices are based on the projection of average annual percent change in national-average residential natural gas and electricity prices in the Annual Energy Outlook 2015 (AEO 2015).

3. Other Updates

For this NODA, DOE updated the efficiency distribution in the no-new-standards case to reflect AHRI shipments data from 2010 to 2014.[11] The update resulted in decreased fraction of consumers being impacted by an efficiency standard requiring

[7] Energy Information Administration (EIA), Survey form EIA-861 -- Annual Electric Power Industry Report (Available at: http://www.eia.gov/electricity/data/eia861/index.html) (Last accessed July 15, 2015).
[8] Energy Information Administration (EIA), Natural Gas Navigator (Available at: http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm) (Last accessed July 15, 2015).
[9] Energy Information Administration (EIA), State Energy Data System (SEDS) (Available at: http://www.eia.gov/state/seds/) (Last accessed July 15, 2015).
[10] For the NOPR, 2012 energy prices from the same sources were used.
[11] Air-Conditioning, Heating, and Refrigeration Institute. Personal communication. May 12, 2015. http://www.regulations.gov/#!documentDetail;D=EERE-2014-BT-STD-0031-0052.

efficiencies of 90-percent AFUE and above.[12] DOE also made minor updates to the markups, product price trend, and the building shell efficiency and climate indexes used to adjust energy use. These are described in the LCC spreadsheet.

D. National Impact Analysis

The national impacts analysis (NIA) estimates the national energy savings (NES) and the net present value (NPV) of total consumer costs and savings expected to result from potential new standards. DOE calculated NES and NPV as the difference between a case without amended standards and each standards case.

DOE calculated the annual energy consumption for each case using the appropriate per-unit annual energy use data multiplied by the projected residential furnaces shipments for each year. To estimate impacts of separate standards for small and large furnaces, DOE needed to disaggregate NWGF shipments by input capacity. To do so, DOE assumed that the shares of each size category in NWGF shipments are the same as the shares estimated for the household sample. The shares were assumed to remain constant over time.

[12] For the NOPR, the AHRI shipments data was not available and DOE instead relied on shipments data from the ENERGY STAR program to derive its estimates. Based on the AHRI shipments data, DOE's estimate of the condensing furnace market share in 2021 increased from 47-percent in the NOPR to 53-percent in the NODA.

Cumulative energy savings are the sum of the annual NES determined for the lifetime of furnaces shipped during a 30-year period assumed to start in the expected compliance year. Energy savings include the full-fuel cycle energy savings (i.e., the energy needed to extract, process, and deliver primary fuel sources such as coal and natural gas, and the conversion and distribution losses of generating electricity from those fuel sources).

To develop the national NPV of consumer benefits from potential energy conservation standards, DOE calculated projected annual operating costs (energy costs and repair and maintenance costs) and annual installation costs for the no-new-standards case and the standards cases. DOE calculated annual energy expenditures from annual energy consumption using forecasted energy prices in each year. DOE calculated annual product expenditures by multiplying the price per unit times the projected shipments in each year.

The aggregate difference each year between operating cost savings and increased installation costs is the net savings or net costs. DOE multiplies the net savings in future years by a discount factor to determine their present value. DOE estimates the NPV of consumer benefits using both a 3-percent and a 7-percent real discount rate, in accordance with guidance provided by the Office of Management and Budget (OMB) to Federal agencies on the development of regulatory analysis.[13]

[13] Office of Management and Budget, OMB Circular A-4, section E, Identifying and Measuring Benefits and Costs (2003), available at http://www.whitehouse.gov/omb/memoranda/m03-21.html.

For the NODA analysis, DOE updated energy price trends and several other inputs with data from AEO 2015, as described in the NIA spreadsheet.

III. Results of the Analysis

A. Economic Impacts on Consumers

As mentioned in section II.C, for each considered standards case, DOE measures the change in LCC relative to a no-new-standards case. For example, in the case of a separate standard of 90-percent AFUE for large furnaces and 80-percent AFUE for small furnaces, the analysis reflects the likelihood that some consumers would purchase a furnace at or above those efficiency levels without standards, and thus would not be affected by the standards. The average LCC savings in Table III.1 only include those consumers who would be affected at a given standard level.

Table III.2 shows the percentage of consumers that would experience a net cost under each considered standards case, and Table III.3 shows the percentage of consumers in the South that would experience a net cost.[14] For these consumers, the LCC would increase under the standard compared to the furnace they would purchase in no-new-standards case. As expected, the percentage of consumers that would experience a net cost declines as the definition of small furnace expands to include more furnaces.

[14] The analysis used the same definition of the South region as the March 2015 NOPR.

Table III.1. Average LCC Savings for Alternative Furnace Standard Level Combinations (2014$)

Minimum AFUE (%)		Average LCC Savings (2014$)*				
		Small Furnace Definition (kBtu/hour)				
Large	**Small**	**≤ 45**	**≤ 50**	**≤ 55**	**≤ 60**	**≤ 65**
90	80	$383	$400	$400	$492	$484
92	80	$463	$478	$479	$553	$525
95	80	$439	$447	$449	$479	$437
98	80	$365	$372	$374	$388	$347

* The average LCC savings only include those consumers who would be affected at a given standard level.

Table III.2. Share of All Consumers Experiencing a Net Cost for Alternative Furnace Standard Level Combinations

Minimum AFUE (%)		% of Consumers Experiencing a Net Cost				
		Small Furnace Definition (kBtu/hour)				
Large	**Small**	**≤ 45**	**≤ 50**	**≤ 55**	**≤ 60**	**≤ 65**
90	80	19%	15%	13%	11%	7%
92	80	17%	13%	12%	10%	6%
95	80	21%	17%	15%	12%	9%
98	80	35%	34%	33%	26%	23%

Table III.3. Share of Consumers in the South Experiencing a Net Cost for Alternative Furnace Standard Level Combinations

Minimum AFUE (%)		% of Consumers in the South Experiencing a Net Cost				
		Small Furnace Definition (kBtu/hour)				
Large	**Small**	**≤ 45**	**≤ 50**	**≤ 55**	**≤ 60**	**≤ 65**
90	80	27%	20%	19%	13%	7%
92	80	25%	18%	17%	11%	7%
95	80	28%	22%	21%	14%	10%
98	80	35%	31%	30%	20%	14%

Table III.4 compares the key consumer economic impacts of a single standard for all furnaces to a separate standard for large and small furnaces.[15] Under a separate standard for large and small furnaces, the average LCC savings increase somewhat but

[15] The results for a single standard for all furnaces differ slightly from the results in the March 2015 NOPR because of the input revisions discussed in section II. DOE believes that showing a direct comparison with the NOPR results would not serve the purpose of the NODA analysis.

the share of consumers with a net cost declines considerably. The impacts of a separate standard for large and small furnaces would vary depending on the small furnace definition. For example, if the definition was ≤ 60 kBtu/hour instead of ≤ 55 kBtu/hour, the difference between the single standard for all furnaces and separate standards for large and small furnaces would be greater than shown.

Table III.4. Comparison of Consumer Impacts of Single Standard vs. Separate Standard for Large and Small Furnaces*

Single Standard for All Furnaces			Separate Standard for Large and Small Furnaces		
AFUE (%)	**Avg. LCC Savings (2014$)**	**Share of Consumers with Net Cost**	**AFUE (%) Large/Small**	**Avg. LCC Savings (2014$)**	**Share of Consumers with Net Cost**
90	$347	20%	90/80	$400	13%
92	$425	18%	92/80	$479	12%
95	$420	22%	95/80	$449	15%
98	$343	41%	98/80	$374	33%

* Using small furnace definition of ≤ 55 kBtu/hour.

Table III.5 and Table III.6 show a similar comparison for consumers in the south and low-income consumers, with similar results.[16]

[16] The results in Table III.6 overstate the percentage of low-income households that would actually be negatively impacted by proposed higher-efficiency furnace standards. Close to 60 percent of low-income households in RECS 2009 are either renters or residents of public housing. In these cases, the furnace would be purchased by the property owner, and the cost of a higher-efficiency furnace might be passed on over time in the rent (or perhaps not all in the case of public housing). DOE's current analysis assumes that in cases where the property owner does not pay for energy, the cost of a higher-efficiency furnace is passed on immediately, which would tend to overstate any negative impact.

Table III.5. Comparison of Impacts for Consumers in the South of Single Standard vs. Separate Standard for Large and Small Furnaces*

Single Standard for All Furnaces			Separate Standard for Large and Small Furnaces		
AFUE (%)	**Avg. LCC Savings (2014$)**	**Share of Consumers with Net Cost**	**AFUE (%) Large/Small**	**Avg. LCC Savings (2014$)**	**Share of Consumers with Net Cost**
90	$291	31%	90/80	$335	19%
92	$357	28%	92/80	$405	17%
95	$357	33%	95/80	$379	21%
98	$319	44%	98/80	$368	30%

* Using small furnace definition of ≤ 55 kBtu/hour.

Table III.6. Comparison of Impacts for Low-Income Consumers of Single Standard vs. Separate Standard for Large and Small Furnaces*

Single Standard for All Furnaces			Separate Standard for Large and Small Furnaces		
AFUE (%)	**Avg. LCC Savings (2014$)**	**Share of Consumers with Net Cost**	**AFUE (%) Large/Small**	**Avg. LCC Savings (2014$)**	**Share of Consumers with Net Cost**
90	$210	22%	90/80	$274	12%
92	$301	20%	92/80	$379	11%
95	$363	24%	95/80	$423	13%
98	$356	44%	98/80	$447	31%

* Using small furnace definition of ≤ 55 kBtu/hour.

In the NOPR analysis, DOE estimated that some consumers faced with significant costs to install a condensing furnace would instead choose to switch to electric heating with a heat pump or electric furnace. If there were a separate, lower standard level for small furnaces, fewer consumers would be faced with installing a condensing furnace, and there would be less switching. Table III.7 shows this outcome.

Table III.7. Comparison of Fuel Switching Impacts of Single Standard vs. Separate Standard for Large and Small Furnaces*

Single Standard for All Furnaces			Separate Standard for Large and Small Furnaces		
AFUE (%)	**Switch to Heat Pump (% of consumers)**	**Switch to Electric Furnace (% of consumers)**	**AFUE (%) Large/Small**	**Switch to Heat Pump (% of consumers)**	**Switch to Electric Furnace (% of consumers)**
90	6.7	3.0	90/80	2.9	1.8
92	6.9	3.1	92/80	3.0	1.9
95	8.3	3.5	95/80	3.9	2.3
98	11.7	4.2	98/80	6.5	2.8

* Using small furnace definition of ≤ 55 kBtu/hour.

B. National Impacts

The estimated national energy savings (full-fuel-cycle) of the considered combinations of minimum AFUE for large and small furnaces are shown in Table III.8.

Table III.9 and Table III.10 show the national NPV of benefits for alternative furnace standard level combinations at 7-percent and 3-percent discount rates, respectively. The national energy savings decrease as the small furnace definition expands.

Table III.8. National Energy Savings for Alternative Furnace Standard Level Combinations (quads)

Minimum AFUE (%)		Small Furnace Definition (kBtu/hour)				
Large	**Small**	**≤45**	**≤50**	**≤55**	**≤60**	**≤65**
92	80	2.9	2.9	2.9	2.3	1.8
95	80	4.2	4.2	4.1	3.4	2.8
98	80	5.8	5.7	5.7	4.9	4.2

Table III.9. National Net Present Value of Benefits for Alternative Furnace Standard Level Combinations at 7-percent Discount Rate (billion 2014$)

Minimum AFUE (%)		Small Furnace Definition (kBtu/hour)				
Large	**Small**	**≤45**	**≤50**	**≤55**	**≤60**	**≤65**
92	80	3.1	3.5	3.5	3.0	2.4
95	80	4.2	4.6	4.6	4.2	3.6
98	80	3.8	4.4	4.4	4.6	4.0

Table III.10. National Net Present Value of Benefits for Alternative Furnace Standard Level Combinations at 3-percent Discount Rate (billion 2014$)

Minimum AFUE (%)		Small Furnace Definition (kBtu/hour)				
Large	**Small**	**≤45**	**≤50**	**≤55**	**≤60**	**≤65**
92	80	14.7	14.8	14.8	11.8	9.1
95	80	20.2	20.1	20.0	16.9	13.9
98	80	23.9	24.0	23.9	21.3	18.4

Table III.11 compares the national energy savings and NPV of a single standard for all furnaces vs. a separate standard for large and small furnaces. The national energy savings are higher in the case of a separate standard for large and small furnaces mainly because there is less switching from gas to electric heating.[17] The NPV is higher in the case of a separate standard for large and small furnaces mainly because the LCC savings are higher. The impacts of a separate standard for large and small furnaces would vary depending on the small furnace definition.

[17] In terms of FFC energy, switching from gas to electricity increases energy use considerably because of the losses in thermal electricity generation.

Table III.11. Comparison of National Impacts of Single Standard vs. Separate Standard for Large and Small Furnaces*

Single Standard for All Furnaces			Separate Standard for Large and Small Furnaces		
AFUE (%)	**National Energy Savings (quads)**	**National Net Present Value, 7% (billion 2014$)**	**AFUE (%) Large/Small**	**National Energy Savings (quads)**	**National Net Present Value, 7% (billion 2014$)**
92	2.6	2.2	92/80	2.9	3.5
95	3.9	3.3	95/80	4.1	4.6
98	5.4	2.6	98/80	5.7	4.4

* Using small furnace definition of ≤ 55 kBtu/hour.

IV. Submission of Comments

DOE will accept comments, data, and information regarding this analysis before or after the public meeting, but no later than the date provided in the **DATES** section at the beginning of this notice. Interested parties may submit comments, data, and other information using any of the methods described in the **ADDRESSES** section at the beginning of this notice.

Submitting comments via www.regulations.gov. The www.regulations.gov webpage will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information

to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment itself or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Otherwise, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to www.regulations.gov information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (CBI)). Comments submitted through www.regulations.gov cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section below.

DOE processes submissions made through www.regulations.gov before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that www.regulations.gov provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery/courier, or mail. Comments and documents submitted via email, hand delivery/courier, or mail also will be posted to www.regulations.gov. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information in a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No telefacsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, that are written in English, and that are free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery/courier two well-

marked copies: one copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) A description of the items; (2) whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally known by or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person that would result from public disclosure; (6) when such information might lose its confidential character due to the passage of time; and (7) why disclosure of the information would be contrary to the public interest.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

Issued in Washington, DC, on September 4, 2015.

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Energy Efficiency and Renewable Energy