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DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket Number EERE-2015-BT-STD-0003]

RIN: 1904-AD49

Energy Conservation Program for Consumer Products: Energy Conservation Standards for Direct Heating Equipment and Pool Heaters

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

ACTION: Request for information (RFI).

SUMMARY: The U.S. Department of Energy (DOE) is initiating a rulemaking to consider amended energy conservation standards for direct heating equipment and pool heaters. Once completed, this rulemaking will fulfill DOE's statutory obligation to either propose amended energy conservation standards for these products or to determine that the existing standards do not need to be amended. This RFI seeks to solicit information to help DOE determine whether national standards more stringent than those that are currently in place would result in a significant amount of additional energy savings and whether such amended national standards would be technologically feasible and economically justified. In overview, this document

presents a brief description of the analysis DOE plans to perform for this rulemaking and requests comment on various issues relating to each of the analyses (*e.g.*, market assessment, engineering analysis, energy use analysis, life-cycle cost and payback period analysis, national impact analysis, and manufacturer impact analysis). Although this document contains several specific topics on which the Department is particularly interested in receiving written comment, DOE welcomes suggestions and information from the public on any subject within the scope of this rulemaking, including topics not raised in this RFI.

DATES: Written comments and information are requested on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Interested parties are encouraged to submit comments electronically. However, interested persons may submit comments, identified by docket number EERE-2015-BT-STD-0003 and/or regulatory identification number (RIN) 1904-AD49 by any of the following methods:

- Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
- E-mail: DHE2015STD0003@ee.doe.gov. Include docket number EERE-2015-BT-STD-0003 and/or RIN 1904-AD49 in the subject line of the message. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.
- Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE-2J, 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.

- Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., 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.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section III of this document (Public Participation).

FOR FURTHER INFORMATION CONTACT: Requests for additional information may be sent to Ms. Ashley Armstrong, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–5B, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586-6590. E-mail: direct_heating_equipment@ee.doe.gov.

Mr. Sarah Butler, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-1777. E-mail: Sarah.Butler@hq.doe.gov.

For information on how to submit or review public comments, contact Ms. Brenda Edwards, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Mailstop EE-2J, 1000 Independence Avenue, SW, Washington,

DC 20585-0121. Telephone: (202) 586-2945. E-mail: Brenda.Edwards@ee.doe.gov.

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I. Introduction

A. Background and Authority

Title III, Part B[1] of the Energy Policy and Conservation Act of 1975 ("EPCA" or "the Act"), Public Law 94-163 (*codified at* 42 U.S.C. 6291-6309) sets forth a variety of provisions designed to improve energy efficiency and establishes the Energy Conservation Program for Consumer Products Other Than Automobiles.[2] This program includes most major household appliances (collectively referred to as "covered products"), including the two covered products that are the subject of this rule: direct heating equipment (DHE) and pool heaters. (42 U.S.C.

[1] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated as Part A.
[2] All references to EPCA in this document refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012).

6292(a)(9) and (11)) Under EPCA, this energy conservation program generally consists of four parts: (1) testing; (2) labeling; (3) establishing Federal energy conservation standards; and (4) certification and enforcement procedures.

EPCA prescribes specific energy conservation standards for the pool heaters and gas-fired direct heating equipment. (42 U.S.C. 6295(e)(2), (3)) EPCA also directed DOE to conduct two cycles of rulemakings to determine whether to amend its standards for direct heating equipment and pool heaters. (42 U.S.C. 6295(e)(4)) The statute further requires DOE to publish a notice of proposed rulemaking including new proposed standards or a notice of determination that the standards for a product need not be amended no later than 6 years after issuance of any final rule establishing or amending standards for that product. (42 U.S.C. 6295(m)(1)) DOE last promulgated a final rule on April 16, 2010, amending its energy conservation standards for direct heating equipment and pool heaters, constituting the first of these two required rulemakings. 75 FR 20112. The current rulemaking satisfies the statutory requirements under EPCA to conduct a second round of review of the DHE and pool heater standards. (42 U.S.C. 6295(e)(4)(B)) Additionally, this rulemaking will satisfy the requirement for DOE to publish a notice of proposed rulemaking containing proposed standards or a notice of determination that the standards for direct heating equipment and pool heaters do not need to be amended by April 16, 2016. (42 U.S.C. 6295(m)(1)) If DOE were to publish a notice of proposed rulemaking containing proposed amendments to its standards for either direct heating equipment or pool heaters, DOE would be required to issue a final rule amending the standards no later than 2 years after issuance of the notice. (42 U.S.C. 6295(m)(3)(A))

EPCA also provides criteria for prescribing amended standards for covered products generally, including direct heating equipment and pool heaters. As indicated above, any such amended standard must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) Additionally, EPCA provides specific prohibitions on prescribing such standards. DOE may not prescribe an amended standard for any of its covered products for which it has not established a test procedure. (42 U.S.C. 6295(o)(3)(A)) Further, DOE may not prescribe a standard if DOE determines by rule that such standard would not result in "significant conservation of energy," or "is not technologically feasible or economically justified." (42 U.S.C. 6295(o)(3)(B)) EPCA also provides that in deciding whether a standard is economically justified for covered products, DOE must, after receiving comments on the proposed standard, determine whether the benefits of the standard exceed its burdens by considering, to the greatest extent practicable, the following seven factors:

1. The economic impact of the standard on manufacturers and consumers of the products subject to the standard;
2. The savings in operating costs throughout the estimated average life of the covered products in the type (or class) compared to any increase in the price, initial charges, or maintenance expenses for the covered products that are likely to result from the imposition of the standard;
3. The total projected amount of energy (or, as applicable, water) savings likely to result directly from the imposition of the standard;
4. Any lessening of the utility or the performance of the covered products likely to result

from the imposition of the standard;

5. The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard;
6. The need for national energy and water conservation; and
7. Other factors the Secretary of Energy (Secretary) considers relevant. (42 U.S.C. 6295(o)(2)(B)(i)(I) through (VII))

In addition, EPCA, as amended, establishes a rebuttable presumption that any standard for covered products is economically justified if the Secretary finds that "the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy (and as applicable, water) savings during the first year that the consumer will receive as a result of the standard," as calculated under the test procedure in place for that standard. (42 U.S.C. 6295(o)(2)(B)(iii))

EPCA also contains what is commonly known as an "anti-backsliding'' provision. (42 U.S.C. 6295(o)(1)) This provision mandates that the Secretary not prescribe any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. EPCA further provides that the Secretary may not prescribe an amended standard if interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States of any product type (or class) with performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding. (42 U.S.C. 6295(o)(4)) Under 42 U.S.C. 6295(q)(1),

EPCA specifies requirements applicable to promulgating standards for any type or class of covered product that has two or more subcategories. Under this provision, DOE must specify a different standard level than that which applies generally to such type or class of product that has the same function or intended use, if DOE determines that the products within such group: (A) consume a different kind of energy from that consumed by other covered products within such type (or class); or (B) have a capacity or other performance-related feature which other products within such type (or class) do not have and such feature justifies a higher or lower standard" than applies or will apply to the other products. (42 U.S.C. 6295(q)(1)) In determining whether a performance-related feature justifies such a different standard for a group of products, DOE must consider "such factors as the utility to the consumer of such a feature" and other factors the Secretary deems appropriate. Id. Any rule prescribing such a standard must include an explanation of the basis on which DOE established such higher or lower level. (42 U.S.C. 6295(q)(2))

Section 310(3) of the Energy Independence and Security Act of 2007 (EISA 2007; Pub. L. 110–140) amended EPCA to prospectively require that energy conservation standards address standby mode and off mode energy use. Specifically, when DOE adopts new or amended standards for a covered product after July 1, 2010, the final rule must, if justified by the criteria for adoption of standards in section 325(o) of EPCA, incorporate standby mode and off mode energy use into a single standard if feasible, or otherwise adopt a separate standard for such energy use for that product. (42 U.S.C. 6295(gg)(3)) On December 17, 2012 DOE promulgated a final rule amending its test procedures for vented direct heating equipment and pool heaters to incorporate standby and off-mode energy consumption (see section II.A below for further detail).

77 FR 74559. The amendments related to standby and off-mode energy consumption were not required for purposes of compliance until the compliance date of the next standards final rule for those products. Id. This rulemaking, if amended standards are ultimately adopted, would serve as the next energy conservation standards rulemaking subsequent to these test procedure amendments, and therefore this rulemaking will take into account standby and off-mode energy consumption.

Finally, Federal energy conservation requirements for covered products generally supersede State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a) through (c)) DOE can, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of section 327(d) of the Act. (42 U.S.C.6297(d))

B. Rulemaking Process

In addition to the specific statutory criteria discussed in section I.A that DOE must follow for prescribing amended standards for covered products, DOE uses a specific process to assess the appropriateness of amending the standards that are currently in place for a given type of product. For direct heating equipment and pool heaters, DOE plans to conduct in-depth technical analyses of the costs and benefits of the potential amended standards to determine whether more stringent standards are technologically feasible and would lead to significant energy savings, and whether such amended standards would be economically justified. The analyses would include the following: (1) engineering; (2) energy use; (3) markups; (4) life-cycle cost and payback period; and (5) national impacts. DOE will also conduct downstream analyses including an

analysis of: (1) manufacturer impacts; (2) emission impacts; (3) utility impacts; (4) employment impacts; and (5) regulatory impacts. DOE will also conduct several other analyses that support those previously listed, including the market and technology assessment, the screening analysis (which contributes to the engineering analysis), and the shipments analysis (which contributes to the national impact analysis). As detailed throughout this RFI, DOE is publishing this notice as the first step in the analytical process and is requesting input and data from interested parties to aid in the development of the technical analyses.

Subsequently, DOE may conduct a preliminary analysis for some or all products, particularly heat pump pool heaters since no prior rulemaking record for these products exists. Alternatively, DOE may elect to proceed directly to a NOPR (or determination that standards need not be amended) for some or all products..

II. Planned Rulemaking Analyses

In this section, DOE summarizes the rulemaking analyses and identifies a number of issues on which it seeks input and data in order to aid in the development of the technical and economic analyses to determine whether amended energy conservation standards may be warranted for direct heating equipment and/or pool heaters. In addition, DOE welcomes comments on other issues relevant to the conduct of this rulemaking that may not specifically be identified in this RFI.

A. Test Procedures

The test procedure for vented home heating equipment is located at 10 CFR 430.23(o)

and 10 CFR part 430, subpart B, appendix O (Appendix O) for vented home heating equipment ("vented heater"). The vented heater test procedure includes provisions for determining energy efficiency (annual fuel utilization efficiency (AFUE)), as well as annual energy consumption. DOE's test procedure for pool heaters is found at 10 CFR 430.23(p) and 10 CFR part 430, subpart B, appendix P (Appendix P). The test procedure includes provisions for determining two energy efficiency descriptors (i.e., thermal efficiency and integrated thermal efficiency), as well as annual energy consumption.

EISA 2007 amended EPCA to require DOE to amend its test procedures for all covered products to include measurement of standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) DOE published a final rule adopting standby mode and off mode provisions for direct heating equipment and pool heaters in the **Federal Register** on December 17, 2012 (hereafter referred to as the December 2012 test procedure final rule). 77 FR 74559. Additionally, DOE published a final rule regarding its DHE and pool heater test procedures on January 6, 2015 adopting, among other things, provisions for testing vented home heaters that use condensing technology, updated industry standards incorporated by reference, and provisions for testing electric resistance and electric heat pump pool heaters, and which clarified the applicability of the test procedure to oil-fired pool heaters (hereafter referred to as the January 2015 test procedure final rule). 80 FR 792. DOE will use the most current version of the test procedures as the basis for any amended energy conservation standards.

For DHE, the December 2012 test procedure final rule included additional measurements and calculations in the test procedure to determine the annual electrical consumption in standby

and off-mode separate from the AFUE metric. 77 FR 74559, 74571-74572. The standby and off-mode fossil fuel consumption for DHE was previously incorporated in the AFUE in the form of the pilot light usage and off-cycle flue and stack losses. For gas-fired pool heaters, the December 2012 test procedure final rule included measurements and calculations that incorporate electrical and fossil fuel consumption in standby and off-mode into an integrated thermal efficiency metric. Id. at 74572-74573. The provisions for testing electric resistance and electric heat pump pool heaters added in the January 2015 test procedure final rule also integrate the standby and off-mode electrical consumption into an integrated thermal efficiency metric. 80 FR 792, 813-815.

For both DHE and pool heaters, the December 2012 test procedure amendments were not required for testing in determining compliance with the current energy conservation standards until the next energy conservation standard final rule. 77 FR 74559. This rulemaking is the subsequent standards rulemaking to the December 2012 test procedure amendments; therefore, DOE plans to consider energy conservation standards as part of this rulemaking that incorporate standby and off-mode energy use as measured by the amended test procedures.

In the case of vented home heating equipment, while the pilot light and off-cycle flue and stack losses are integrated into the AFUE, the measurements and calculations for standby and off-mode electrical consumption are not. Should DOE consider standby and off-mode electrical consumption of vented home heating equipment separate analyses would be conducted in order to propose energy conservation standards for standby and off-mode electrical consumption. In order to make such a determination, DOE is seeking data, information, and comment on the

electrical consumption of vented home heating equipment in standby and off-mode.

Issue 1: DOE seeks data, information, and comment on the electrical consumption of all product classes of DHE in standby and off-mode.

In the case of pool heaters, the amendments contained in the December 2012 test procedure final rule integrated the standby and off-mode electrical consumption for gas-fired pool heaters into an integrated thermal efficiency metric. Likewise, the January 2015 test procedure final rule added provisions for determining the integrated thermal efficiency of electric resistance and electric heat pump pool heaters. Since the current pool heater rating metric (thermal efficiency) and energy conservation standards do not incorporate standby and off-mode energy consumption, DOE would need to develop a method to convert from the existing thermal efficiency ratings (which does not include standby and off mode energy consumption) to ratings under the new integrated thermal efficiency metric (which includes standby and off mode energy consumption). DOE plans to develop a method of converting ratings from those under the current metrics to those under the new metrics that include standby and off-mode energy consumption. To that end, DOE is requesting information regarding typical standby and off-mode fossil fuel and electricity consumption for DHE and pool heaters.

Issue 2: DOE requests data and information regarding typical energy use (fossil fuel and electricity) in standby and off-modes for all pool heater types (i.e. gas-fired, electric resistance, and electric heat pump). DOE also requests data and information regarding the impacts on efficiency ratings of including the standby mode and off mode energy consumption in the

integrated thermal efficiency (pool heaters).

B. Market and Technology Assessment

The market and technology assessment provides information about the direct heating equipment and pool heater industries that will be used throughout the rulemaking process. For example, this information will be used to determine whether the existing product class structure requires modification based on the statutory criteria for setting such classes and to explore the potential for technological improvements in the design of such products. The Department uses qualitative and quantitative information to assess the past and present industry structure and market characteristics. DOE will use existing market materials and literature from a variety of sources, including industry publications, trade journals, government agencies, and trade organizations. DOE will also consider conducting interviews with manufacturers to assess the overall market for both direct heating equipment and for pool heaters.

The current product classes as established in the Code of Federal Regulations for direct heating equipment are characterized by product type (i.e., wall fan, wall gravity, floor furnace, and room heater), and size (i.e., input capacity rating). As a starting point, DOE plans to use the existing product class structure for products manufactured after April 16, 2013, which divides direct heating equipment into the equipment classes as shown in the table in 10 CFR 430.32(i) and summarized below in Table II.1.

Table II.1 Product Classes for Direct Heating Equipment

Product Type
Gas wall fan type up to 42,000 Btu/h
Gas wall fan type over 42,000 Btu/h
Gas wall gravity type up to 27,000 Btu/h
Gas wall gravity type over 27,000 Btu/h up to 46,000 Btu/h
Gas wall gravity type over 46,000 Btu/h
Gas floor up to 37,000 Btu/h
Gas floor over 37,000 Btu/h
Gas room up to 20,000 Btu/h
Gas room over 20,000 Btu/h up to 27,000 Btu/h
Gas room over 27,000 Btu/h up to 46,000 Btu/h
Gas room over 46,000 Btu/h

DOE's energy conservation standards for pool heaters currently regulate only one type of pool heater – gas-fired pool heaters. In analyzing standards for electric (including both resistance and heat pump), DOE will consider creating separate product classes for pool heaters based on fuel type, capacity, or other performance related features that may affect efficiency and justify the establishment of different energy conservation standards.

Issue 3: DOE requests feedback on the current product classes for direct heating equipment and seeks information regarding other product classes it should consider for inclusion in its analysis.

Issue 4: DOE seeks comment on whether product classes should be established for pool heaters and seeks information regarding product classes it should consider for inclusion in its analysis.

Issue 5: DOE seeks data, information, and comment on electric resistance pool heaters,

specifically on their capacities and applications. DOE also requests data, information, and comment on whether heat pump technology is a viable design for those applications in which electric resistance pool heaters are typically found.

As discussed in section II.A, DOE published a final rule on January 6, 2015 regarding its test procedures for DHE and pool heaters in which it was clarified that the test procedure applies to oil-fired pool heaters. 80 FR 792 However, in reviewing the pool heater market, DOE found only one model of oil-fired pool heater available. DOE therefore has tentatively determined that the energy savings potential for oil-fired pool heaters is *de minimis*, and that accordingly energy conservation standards need not be proposed.

Issue 6: DOE seeks comment on its tentative conclusion that energy conservation standards for oil-fired pool heaters would result in *de minimis* energy savings.

C. Technology Options for Consideration

DOE uses information about existing and past technology options and prototype designs to help identify technologies that manufacturers could use to meet and/or exceed energy conservation standards. In consultation with interested parties, DOE intends to develop a list of technologies to consider in its analysis. Initially, this list will include all those technologies considered to be technologically feasible and will serve to establish the maximum technologically feasible design. For DHE, DOE will initially consider the specific technologies and design options listed below, along with any other technologies identified during the rulemaking analysis.

- Improved insulation[3]
- Power and direct venting
- Condensing heat exchanger technology
- Electronic ignition systems
- Improved controls[4]
- Improved burners[5]
- Flue or stack damper[6]
- Improved heat exchanger design[7]

For gas-fired pool heaters, DOE will consider the specific technologies and design options listed below.

- Improved insulation[3]
- Improved controls[4]
- Improved heat exchanger design[7]
- Condensing heat exchanger technology
- Electronic ignition systems

For electric pool heaters, if included in the scope of this rulemaking, DOE would initially

[3] This includes increasing jacket insulation, advanced insulation types, foam insulation, and pipe and fitting insulation. For DHE, this applies only to floor furnaces, since heat lost through the jacket does not enter the occupied space.
[4] This includes incorporating timer controls, modulating controls, and intelligent and wireless controls and communication.
[5] This includes incorporating variable firing-rate burners, low-stage firing burners, and modulating burners.
[6] Thermal or electro-mechanical.
[7] Including material and surface area.

consider the specific technologies and design options listed below.

- Improved insulation[3]
- Improved controls[4]
- Heat pump (as opposed to electric resistance element)[8]
- Increased evaporator surface area (heat pump pool heaters)
- Increased condenser surface area (heat pump pool heaters)
- Improved compressor efficiency (heat pump pool heaters)

Issue 7: DOE seeks information related to these or other efficiency-improving technologies for DHE or pool heaters. Specifically, DOE is interested in comments regarding their costs, applicability to the current market, and how these technologies improve efficiency of DHE and pool heaters.

D. Engineering Analysis

The engineering analysis estimates the cost-efficiency relationship of products at different levels of increased energy efficiency. This relationship serves as the basis for the cost-benefit calculations for consumers, manufacturers, and the nation. In determining the cost-efficiency relationship, DOE will estimate the increase in manufacturer cost associated with increasing the efficiency of products above the baseline up to the maximum technologically feasible ("max-tech") efficiency level for each product class. The baseline model is used as a reference point for each product class in the engineering analysis and the life-cycle cost and

[8] Should electric pool heaters be considered one product class, heat pump technology may be considered a technology option for increasing the efficiency of electric pool heaters.

payback-period analyses. DOE considers products that just meet the current minimum energy conservation standard as baseline products. For products that do not have an existing minimum energy conservation standard, DOE considers the least efficient products on the market as baseline equipment. DOE will establish a baseline for each DHE product class using the AFUE, and a separate baseline in terms of standby and off-mode electrical consumption since this is not integrated in the AFUE metric. For each gas-fired pool heater product class, DOE would use the thermal efficiency standards converted to integrated thermal efficiency in order to set a baseline. Energy conservation standards do not currently exist for electric resistance and electric heat pump pool heaters, and so DOE would select the least efficient products on the market for baseline models using the integrated thermal efficiency metric.

Issue 8: DOE requests comment on approaches that it should consider when determining a baseline for product classes of DHE and pool heaters, including information regarding the merits and/or deficiencies of such approaches.

Issue 9: DOE requests information on max-tech efficiency levels achievable in the current market and associated technologies for both DHE and pool heaters.

In order to create the cost-efficiency relationship, DOE anticipates that it will structure its engineering analysis using both a reverse-engineering (or cost-assessment) approach and a catalog teardown approach. A cost-assessment approach relies on a teardown analysis of representative units at the baseline efficiency level and higher efficiency levels up to the maximum technologically feasible designs. A teardown analysis (or physical teardown)

determines the production cost of a product by disassembling the product "piece-by-piece" and estimating the material and labor cost of each component. A catalog teardown approach uses published manufacturer catalogs and supplementary component data to estimate the major physical differences between a piece of equipment that has been physically disassembled and another similar product. These two methods would be used together to help DOE estimate the manufacturer production cost of products at various efficiency levels.

Issue 10: DOE requests feedback on the planned approach for the engineering analysis and on the appropriate representative capacities and characteristics for each DHE product class and for pool heaters of all types.

E. Markups Analysis

To carry out the life-cycle cost (LCC) and payback period (PBP) calculations, DOE needs to determine the cost to the consumer of baseline products that satisfy the currently applicable standards, and the cost of the more efficient unit the customer would purchase under potential amended standards. This is done by applying a markup multiplier to the manufacturer's selling price to estimate the consumer's price.

Markups depend on the distribution channels for a product (i.e., how the product passes from the manufacturer to the consumer). For both direct heating equipment and pool heaters, DOE characterized two distribution channels to describe how the equipment pass from the manufacturer to consumer: (1) replacement market, and (2) new construction market.

In the replacement market for direct heating equipment, most sales go through wholesalers to mechanical contractors, and then to consumers. In new construction market, most sales go through wholesaler to mechanical contractors hired by the general contractors. Thus, DOE defined two distribution channels for the purposes of estimating markups for direct heating equipment, and the distribution channel for replacement market is characterized as follows:

Manufacturer → Wholesaler → Mechanical Contractor → Consumer

In the case of new construction, DOE plans to characterize the distribution channel as follows:

Manufacturer → Wholesaler → Mechanical Contractor → General Contractor → Consumer

To determine distribution channels for pool heaters, DOE used information from a consultant report.[9] For the replacement market, most sales go through wholesalers to pool service companies. In most new construction market, the pool builder purchases the product from a wholesaler, and there is no contractor involved. Thus, DOE defined two distribution channels for the purposes of estimating markups for pool heaters.

For replacement pool heaters, DOE plans to characterize the distribution channel as

[9] Hamos, R., *Consultant Report - Pool Heater Distribution Channels*, 2007.

follows:

Manufacturer → Wholesaler → Service Company → Consumer

For the new construction market, DOE plans to characterize the distribution channel for pool heaters as follows:

Manufacturer → Wholesaler → Pool Builder → Consumer

Issue 11: DOE seeks input from stakeholders on whether the distribution channels described above are appropriate for direct heating equipment and pool heaters and are sufficient to describe the distribution markets.

Issue 12: DOE seeks input on the percentage of products being distributed through the different distribution channels, and whether the share of products through each channel varies based on product class, capacity, or other feature.

To develop markups for the parties involved in the distribution of direct heating equipment and pool heaters, DOE would utilize several sources including: (1) the Heating, Air-Conditioning & Refrigeration Distributors International (HARDI) 2013 Profit Report[10] to develop wholesaler markups, (2) the 2005 Air Conditioning Contractors of America's (ACCA)

[10] Heating, Air Conditioning & Refrigeration Distributors International 2013 Profit Report, <http://www.hardinet.org/Profit-Report>

financial analysis for the heating, ventilation, air-conditioning, and refrigeration (HVACR) contracting industry[11] and U.S. Census Bureau's 2007 Economic Census data for the plumbing and HVAC contractors industry[12] to develop mechanical contractor markups, (3) RS Means Electrical Cost Data[13] to develop pool service company markup, and (4) U.S. Census Bureau's 2007 Economic Census data for the residential building construction industry[14] to develop general contractor and pool builder markups.

In addition to the markups, DOE would derive State and local taxes from data provided by the Sales Tax Clearinghouse.[15] These data represent weighted-average taxes that include county and city rates. DOE would derive shipment-weighted-average tax values for each region considered in the analysis.

Issue 13: DOE seeks updated data, if available, and recommendations regarding data sources to establish the markups for the parties involved with the distribution of covered equipment.

[11] Air Conditioning Contractors of America (ACCA), Financial Analysis for the HVACR Contracting Industry: 2005, 2005. <https://www.acca.org/store/product.php?pid=142>
[12] U.S. Census Bureau, Data set for Sector 23, EC0723A1: 238220 (Plumbing, Heating and Air-Conditioning Contractors), Construction: Geographic Area Series, Detailed Statistics for Establishments, 2007. <http://www.census.gov/econ/>
[13] RS Means Company Inc., *Mechanical Cost Data - 31th Annual Edition*. 2013. ed. M. Mossman. Kingston, MA.
[14] U.S. Census Bureau, Construction: Industry Series: Preliminary Detailed Statistics for Establishments: 2007. New Single-Family General Contractors, New Multifamily Housing Construction (Except Operative Builders), New Housing Operative Builders Resi, 2007. <http://www.census.gov/econ/>
[15] Sales Tax Clearinghouse Inc., *State Sales Tax Rates Along with Combined Average City and County Rates,* 2010. <http://thestc.com/STrates.stm>

F. Energy Use Analysis

The purpose of the energy use analysis is to assess the energy requirements of direct heating equipment and pool heaters described in the engineering analysis for a representative sample of households that utilize the product, and to assess the energy-savings potential of increased product efficiencies. DOE uses the annual energy consumption and energy-savings potential in the LCC and PBP analysis to establish the operating costs savings at various product efficiency levels. DOE will estimate the annual energy consumption of direct heating equipment at specified energy efficiency levels across a range of applications, household types, and climate zones. The annual energy consumption includes use of natural gas, liquefied petroleum gas (LPG), and electricity.

DOE intends to base the energy use analysis on household characteristics from the Energy Information Administration's (EIA) 2009 Residential Energy Consumption Survey (RECS)[16] for the households in RECS that use direct heating equipment and pool heaters covered by this standard. In addition, DOE may supplement the use of RECS with less detailed but more recent data sources, such as the American Housing Survey.

The RECS survey data include information on the physical characteristics of homes, space heating equipment used, fuels used, energy consumption and expenditures, and other building characteristics. RECS data also reports energy consumption for pool heating in households that use them. Based on these data, DOE will develop a representative population of

[16] Energy Information Administration (EIA). 2009 Residential Energy Consumption Survey (RECS). (Available at: http://www.eia.gov/consumption/residential/) (Last accessed April 10, 2013).

households for each direct heating equipment and pool heater class.

Issue 14: DOE requests comment on the overall method to determine energy use of direct heating equipment and pool heaters and if other factors should be considered in developing the energy use or energy use methodology.

Issue 15: DOE seeks input on the current distribution of product efficiencies in the market for different product types and classes.

G. Life-Cycle Cost and Payback Period Analysis

The purpose of the LCC and PBP analysis is to analyze the effects of potential amended energy conservation standards on consumers of direct heating equipment and pool heaters by determining how a potential amended standard affects their operating expenses (usually decreased) and their total installed costs (usually increased).

DOE intends to analyze the potential for variability by performing the LCC and PBP calculations on a representative sample of individual households. DOE plans to utilize the sample of households developed for the energy use analysis and the corresponding simulations results. Within a given household, one or more direct heating equipment units may serve the building's space heating needs, depending on the space heating requirements of the building. As a result, the Department intends to express the LCC and PBP results for each of the individual direct heating equipment units installed in the building. DOE plans to model variability in many of the inputs to the LCC and PBP analysis using Monte Carlo simulation and probability

distributions. As a result, the LCC and PBP results will be displayed as distributions of impacts compared to the base case (without amended standards) conditions. DOE also intends to utilize the sample of households developed for energy use analysis of pool heaters. DOE plans to model variability in many of the inputs to the pool heater LCC and PBP analysis using Monte Carlo simulation and probability distributions.

Issue 16: DOE requests comment on the overall method that it intends on using to conduct the LCC and PBP analysis for direct heating equipment and pool heaters.

Inputs to the LCC and PBP analysis are categorized as: (1) inputs for establishing the purchase expense, otherwise known as the total installed cost, and (2) inputs for calculating the operating expense.

The primary inputs for establishing the total installed cost are the baseline consumer price, standard-level consumer price increases, and installation costs. Baseline consumer prices and standard-level consumer price increases will be determined by applying markups to manufacturer selling price estimates. The installation cost is added to the consumer price to arrive at a total installed cost. DOE intends to develop installation costs using the most recent RS Means data available.

Issue 17: DOE seeks input on the approach and data sources it intends to use to develop installation costs, specifically, its intention to use the most recent RS Means Mechanical Cost

Data.[17]

The primary inputs for calculating the operating costs are product energy consumption, product efficiency, energy prices and forecasts, maintenance and repair costs, product lifetime, and discount rates. Both product lifetime and discount rates are used to calculate the present value of future operating expenses.

The product energy consumption is the site energy use associated with providing space heating to the room of a building (DHE) or water heating to a pool or spa (pool heaters). DOE intends to utilize the energy use calculation methodology described in Section II.F to establish product energy use.

DOE will identify an approach to account for the gas, liquefied petroleum gas (LPG) and electricity prices paid by consumers for the purposes of calculating operating costs, savings, net present value, and payback period. DOE intends to consider determining gas, LPG, and electricity prices based on geographically available fuel cost data such as state level data, with consideration for the variation in energy costs paid by different building types. This approach calculates energy expenses based on actual energy prices that customers are paying in different geographical areas of the country. As a potential additional source, DOE may consider data to compare provided in EIA's Form 826 data[18] to calculate commercial electricity prices, EIA's

[17] RS Means. 2014 Mechanical Cost Data. (Available at: http://rsmeans.reedconstructiondata.com/60023.aspx) (Last accessed April 10, 2014).

18 Energy Information Administration (EIA), Survey form EIA-826 – Monthly Electric Utility Sales and Revenue Report with State Distributions-- (Available at: http://www.eia.gov/electricity/data/eia826/index.html)

Natural Gas Navigator[19] to calculate commercial natural gas prices, and EIA's State Energy Data Systems (SEDS)[20] to calculate liquefied petroleum gas (LPG) prices. Future energy prices will likely be projected using trends from EIA's most recently published *Annual Energy Outlook* (*AEO*).[21]

Issue 18: DOE seeks comment and sources on its approach for developing gas, LPG, and electricity prices.

Maintenance costs are expenses associated with ensuring continued operation of the covered products over time. DOE intends to develop maintenance costs for its analysis using the most recent RS Means data available.[22] DOE plans also to consider the cases when the equipment is covered by service and/or maintenance agreements.

Issue 19: DOE seeks input on the approach and data sources it intends to use to develop maintenance costs for DHE and pool heaters, specifically, its intention to use the most recent RS Means Facilities Maintenance & Repair Cost Data, as well as to consider the cost of service and/or maintenance agreements.

19 Energy Information Administration (EIA), Natural Gas Navigator. (Available at: http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_nus_m.htm).
20 Energy Information Administration (EIA), State Energy Data System (SEDS). (Available at: http://www.eia.gov/state/seds/).
21 Energy Information Administration (EIA). Annual Energy Outlook (AEO) Full Version. (Available at: http://www.eia.gov/forecasts/aeo/).
22 RS Means. 2013 Facilities Maintenance & Repair Cost Data. (Available at: http://rsmeans.reedconstructiondata.com/60303.aspx).

Repair costs are expenses associated with repairing or replacing components of the covered products that have failed. DOE intends to assess whether repair costs vary with product efficiency as part of its analysis. Likewise, DOE intends to assess whether maintenance costs vary with product efficiency as part of its analysis.

Issue 20: DOE seeks comment as to whether repair costs vary as a function of product efficiency for either DHE or pool heaters. DOE also requests any data or information on developing repair costs for these products.

Product lifetime is the age at which a unit of covered equipment is retired from service. The average equipment lifetimes for DHE and gas-fired pool heaters are estimated by various sources to be between 3 and 20 years based on application and equipment type.[23] Based on these data, DOE plans to determine the average lifetimes for each DHE and pool heater product class as the primary inputs for developing a Weibull probability distribution to characterize DHE and pool heater lifetimes.

Issue 21: DOE seeks comment on its approach of using a Weibull probability distribution

[23] *See* S. Department of Energy-Office of Codes and Standards, *Technical Support Document: Energy Efficiency Standards for Consumer Products: Room Air Conditioners, Water Heaters, Direct Heating Equipment, Mobile Home Furnaces, Kitchen Ranges and Ovens, Pool Heaters, Fluorescent Lamp Ballasts & Television Sets*, 1993. Washington, DC Vol. 1 of 3. Report No. DOE/EE-0009. National Renewable Energy Laboratory (NREL). U.S. Department of Energy Commercial Reference Building Models of the National Building Stock. February 2011. Pg. 38. (Available at: http://www.nrel.gov/docs/fy11osti/46861.pdf); Empire Comfort System, *Surround Yourself With Comfort*, 2006. (Available at: http://dev.obatadesign.com/clients/Empire/faq/faq.asp); U.S. Department of Energy: Energy Efficiency and Renewable Energy, Gas Swimming Pool Heaters, 2005; Illinois Propane Gas Association, Swimming, 2006 (Available at: http://www.ilpga.org/homebuilder_swimming.cfm); Pool Quest, *Heating-Frequently Asked Questions,* 2005.) (Available at: http://www.poolquest.com/heaters.aspx)
The Spa Specialist Inc., *Spa Buyer's Questions and Answers*, 2006. (Available at: http://www.spaspecialist.com/qa.html); and Hamos, R., *Consultant Report - Pool Heaters*, 2009.

to characterize product lifetimes. DOE also requests DHE and pool heater product lifetime data and information on whether product lifetime varies based on product characteristics, fuel type, product application, or efficiency level considerations.

Issue 22: DOE seeks data, information, and comment on the product lifetimes of electric resistance and electric heat pump pool heaters.

The discount rate is the rate at which future expenditures are discounted to establish their present value. DOE intends to derive the discount rates by estimating the finance cost to consumers direct heating equipment and pool heaters. For replacement purchasers, the estimated cost of financing of this equipment is estimated from a portfolio of consumer debts. For new construction purchases, financing costs are related to mortgage interest rates.

DOE's analysis includes measures of LCC and PBP impacts of potential standard levels relative to a base case, which reflects the likely market in the absence of amended standards. DOE plans to develop market-share efficiency data (*i.e.*, the distribution of product shipments by efficiency) for the product classes DOE is considering, for the year in which compliance with any amended standards would be required.

DOE also plans to assess the applicability of the "rebound effect" in the energy consumption for DHE and for pool heaters. A rebound effect occurs when a product that is made more efficient is used more intensively, so that the expected energy savings from the efficiency improvement may not fully materialize. However, at this time, DOE is not aware of any

information about the rebound effect for these product types.

Issue 23: DOE requests data on current efficiency market shares (of shipments) by product class for DHE and pool heaters, and also input on similar historic data. DOE also requests comment on market segmentation based on capacity, application and fuel type, as well as trends in fuel switching.

Issue 24: DOE also requests information on expected future trends in efficiency for DHE product classes and for all pool heater types, including the relative market share of condensing versus non-condensing products in the market in the absence of new efficiency standards.

Issue 25: DOE seeks comments and data on any rebound effect that may be associated with more efficient DHE and pool heaters.

H. Shipment Analysis

DOE uses shipment projections by product class to calculate the national impacts of standards on energy consumption, net present value (NPV) of customer benefits, and future manufacturer cash flows.

DOE intends to develop a shipments models for DHE and gas-fired pool heaters based on historical shipments data obtained during the rulemaking process. DOE currently does not have any historical shipments information for electric resistance or electric heat pump pool heaters. DOE will also examine unit shipments and value of shipments for direct heating equipment, and

pool heaters using publicly available data from the U.S. Census Bureau's Annual Survey of Manufacturers (ASM) and Current Industrial Reports (CIR), and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

Issue 26: DOE seeks historical shipments data for DHE and pool heaters, particularly for electric resistance and electric heat pump pool heaters.

Issue 27: DOE seeks data, information, and comment on expected future trends for shipments of all product classes of DHE and all types of pool heaters, including the relative share of sales to new construction vs. existing households.

DOE intends to utilize the U.S. Census Bureau data[24] to establish historical new construction floor space, as well as historical stock floor space. The *Annual Energy Outlook* will be used to forecast both new construction and stock floor space. Using these and historical equipment saturation data from RECS, DOE will estimate shipments to the three market segments identified above.

Issue 28: DOE seeks input on the approach and data sources it intends to use in developing the shipments model and shipments forecasts for this analysis, including main drivers and trends toward consumer switching between fuel types.

[24] U.S. Census Bureau. Statistical Abstract of the United States: 2011, Table No 933 - Construction Contracts-Value of Construction and Floor Space of Buildings by Class of Construction. (Available at: https://www.census.gov/compendia/statab/2011/cats/construction_housing/construction_indices_and_value.html)

I. National Impact Analysis

The purpose of the national impact analysis (NIA) is to estimate aggregate impacts of potential energy conservation standards at the national level. Impacts that DOE reports include the national energy savings (NES) from potential standards and the net present value (NPV) of the total customer benefits.

To develop the NES, DOE calculates annual energy consumption for the base case and the standards cases. DOE calculates the annual energy consumption using per-unit annual energy use data multiplied by projected shipments.

To develop the NPV of customer benefits from potential energy conservation standards, DOE calculates annual energy expenditures and annual product expenditures for the base case and the standards cases. DOE calculates annual energy expenditures from annual energy consumption by incorporating projected energy prices. DOE calculates annual product expenditures by multiplying the price per unit times the projected shipments. The difference each year between energy bill savings, increased maintenance and repair costs, and increased product expenditures is the net savings or net costs.

A key component of DOE's estimates of NES and NPV are the product energy efficiencies forecasted over time for the base case and for each of the standards cases. For the base case trend, DOE will consider whether historical data show any trend and whether any trend can be reasonably extrapolated beyond current efficiency levels. In particular, DOE is interested

in historical and future shipments of products with step changes in efficiency, such as condensing gas-fired DHE or heat pump pool heaters.

Issue 29: DOE requests comment and any available data on historical, current, and future market share of equipment with step changes in efficiency, such as gas-fired vented home heaters that use condensing technology and electric heat pump pool heaters, as compared to less efficient products, such as non-condensing gas-fired DHE and electric resistance pool heaters, respectively, for each product class.

For the various standards cases, to estimate the impact that amended energy conservation standards may have in the year compliance becomes required, DOE would likely use a "roll-up" scenario. Under the "roll-up" scenario, DOE assumes: (1) product efficiencies in the base case that do not meet the new or amended standard level under consideration would "roll up" to meet that standard level; and (2) product shipments at efficiencies above the standard level under consideration would not be affected. After DOE establishes the efficiency distribution for the assumed compliance date of a standard, it may consider future projected efficiency growth using available trend data.

As described in section II.F, DOE intends to determine whether there is a rebound effect associated with more efficient DHE or pool heaters. If data indicate that there is a rebound effect, DOE will account for the rebound effect in its calculation of NES.

DOE has historically presented NES in terms of primary energy savings. On August 18,

2011, DOE announced its intention to use full-fuel-cycle (FFC) measures of energy use and greenhouse gas and other emissions in the national impact analyses and emissions analyses included in future energy conservation standards rulemakings. 76 FR 51282. While DOE stated in that notice that it intended to use the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model to conduct the analysis, it also said it would review alternative methods, including the use of NEMS. After evaluating both models and the approaches discussed in the August 18, 2011 notice, DOE determined NEMS is a more appropriate tool for this purpose. 77 FR 49701 (Aug. 17, 2012). Therefore, DOE is using NEMS to conduct FFC analyses. The method used to derive the FFC multipliers will be described in the TSD.

J. Manufacturer Impact Analysis

The purpose of the manufacturer impact analysis (MIA) is to estimate the financial impacts of potential energy conservation standards on manufacturers of direct heating equipment and pool heaters, and to evaluate the potential impact of such standards on direct employment and manufacturing capacity. The MIA includes both quantitative and qualitative aspects. The quantitative part of the MIA primarily relies on the Government Regulatory Impact Model (GRIM), an industry cash-flow model used to estimate a range of potential impacts on manufacturer profitability. The qualitative part of the MIA addresses a proposed standard's potential impacts on manufacturing capacity and industry competition, as well as factors such as product characteristics, impacts on particular subgroups of firms, and important market and product trends.

As part of the MIA, DOE also analyzes impacts of potential energy conservation standards on small business manufacturers of covered products. DOE uses the Small Business Administration's (SBA) small business size standards to determine whether manufacturers qualify as small businesses. The size standards are listed by North American Industry Classification System (NAICS) code and industry description.[25] Manufacturing of direct heating equipment and pool heaters is classified under NAICS 333414, "Heating Equipment (except Warm Air Furnaces) Manufacturing." The SBA sets a threshold of 500 employees or fewer for an entity to be considered as a small business in this category. The 500-employee threshold includes all employees in a business's parent company and any other subsidiaries.

DOE has initially identified four manufacturers of direct heating equipment and 16 manufacturers of pool heaters. The table below lists all identified manufacturers. Domestic small businesses are designated with an asterisk.

Direct Heating Equipment Manufacturers	Pool Heater Manufacturers
• Empire Comfort Systems* • Louisville Tin and Stove Co.* • Rinnai • Williams Furnace Co.	• AquaCal Autopilot, Inc.* • AquaComfort Technologies* • AquaPro Systems* • Built Right Pool Heaters* • Coates Heater Company, Inc.* • EcoSmart US, LLC* • G&F Manufacturing* • Hayward Industries, Inc.

[25] Available at: http://www.sba.gov/idc/groups/public/documents/sba_homepage/serv_sstd_tablepdf.pdf

	• Hydroquip, Inc.* • Lochinvar LLC • Pentair • Rheem • Thermeau Industries, Inc. (Canadian) • Titan Systems (Canadian) • United States ThermoAmp, Inc.* • Zodiac Pool Systems Inc.

*Domestic small businesses

Issue 30: DOE requests comment on the completeness of the manufacturer list presented, including names of any additional manufacturers that may belong on this list.

III. Public Participation

DOE will accept comments, data, and information regarding this RFI and other matters relevant to DOE's consideration of amended energy conservations standard for DHE and pool heaters no later than the date provided in the **DATES** section at the beginning of this RFI. Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this RFI. After the close of the comment period, DOE will begin collecting data, conducting the analyses, and reviewing the public comments. These actions will be taken to aid in the development of a NOPR for energy conservation standards for DHE and pool heaters, should DOE decide to amend the standards for DHE and pool heaters.

Instructions: All submissions received must include the agency name and docket number and/or RIN for this rulemaking. No telefacsimilies (faxes) will be accepted.

Docket: The docket is available for review at www.regulations.gov, including Federal Register notices, public meeting attendees' lists and transcripts, comments, and other supporting documents/materials. 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 to the docket webpage can be found at: http://www.regulations.gov/#!docketDetail;D=EERE-2015-BT-STD-0003. This webpage contains a link to the docket for this notice on the www.regulations.gov website. The www.regulations.gov webpage contains simple instructions on how to access all documents, including public comments, in the docket.

For information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact Ms. Brenda Edwards at (202) 586-2945 or by e-mail: Brenda.Edwards@ee.doe.gov.

DOE considers public participation to be a very important part of the process for developing test procedures. DOE actively encourages the participation and interaction of the public during the comment period in each stage of the rulemaking process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the rulemaking process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this rulemaking should contact Ms. Brenda Edwards at (202) 586–2945, or via e-mail at Brenda.Edwards@ee.doe.gov.

Issued in Washington, DC, on March 17, 2015.

Kathleen B. Hogan,
Deputy Assistant Secretary for Energy Efficiency,
Energy Efficiency and Renewable Energy.

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