[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket No. EERE-2014-BT-STD-0005]

RIN: 1904-AD15

Energy Conservation Program: Energy Conservation Standards for Residential Conventional Cooking Products

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

ACTION: Request for information (RFI) and notice of document availability.

SUMMARY: The U.S. Department of Energy (DOE) is initiating an effort to determine whether to amend the current energy conservation standards for residential conventional cooking products. According to the Energy Policy and Conservation Act's 6-year review requirement, DOE must publish a notice of proposed rulemaking to propose new standards for conventional electric cooking products or amended standards for conventional gas cooking products or a notice of determination that the existing standards do not need to be amended by February 26, 2015. This RFI seeks to solicit information from the public to help DOE determine whether new or amended standards for residential conventional cooking products would result in a significant amount of additional energy savings and whether those standards would be technologically feasible and economically justified.

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, comments may be submitted by any of the following methods:

- Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
- E-mail to the following address: ConventionalCookingProducts2014STD0005@ee.doe.gov. Include docket number EERE-2014-BT-STD-0005 and/or RIN 1904-AD15 in the subject line of the message. All comments should clearly identify the name, address, and, if appropriate, organization of the commenter.
- Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, Request for Information for Residential Conventional Cooking Products, Docket No. EERE-2014-BT-STD-0005 and/or RIN 1904-AD15, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Please submit one signed paper original.
- Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Sixth Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024. Please submit one signed paper original.

Instructions: All submissions received must include the agency name and docket number

and/or RIN for this rulemaking. No telefacsimiles (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-2014-BT-STD-0005. 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.

FOR FURTHER INFORMATION CONTACT: Direct requests for additional information may be sent to John Cymbalsky, 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) 287–1692. E-mail: kitchen_ranges_and_ovens@ee.doe.gov.

Mr. Ari Altman, U.S. Department of Energy, Office of the General Counsel, GC-71, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (202) 287-6307. E-mail: ari.altman@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 Office, Mailstop EE-5B, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-2945. E-mail: Brenda.Edwards@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Introduction

A. Authority and Background

Title III, Part B of the Energy Policy and Conservation Act of 1975 (EPCA or the Act), Pub. L. 94-163, (42 U.S.C. 6291-6309, as codified) sets forth a variety of provisions designed to improve energy efficiency and established the Energy Conservation Program for Consumer Products Other Than Automobiles, a program covering major household appliances (collectively referred to as "covered products"), including residential conventional cooking products. EPCA authorizes DOE to establish technologically feasible, economically justified energy conservation standards for covered products that would be likely to result in significant national energy savings. (42 U.S.C. 6295(o)(2)(B)(i)(I)-(VII))

The National Appliance Energy Conservation Act of 1987 (NAECA), Pub. L. No. 100-12, amended EPCA to establish prescriptive standards for gas cooking products, requiring gas ranges and ovens with an electrical supply cord that are manufactured on or after January 1, 1990, not to be equipped with a constant burning pilot light. NAECA also directed DOE to conduct two cycles of rulemakings to determine if more stringent or additional standards were justified for kitchen ranges and ovens. (42 U.S.C. 6295 (h)(1)-(2))

DOE undertook the first cycle of these rulemakings and published a final rule on September 8, 1998, which found that no standards were justified for conventional electric cooking products at that time. In addition, partially due to the difficulty of conclusively demonstrating that elimination of standing pilots for conventional gas cooking products without an electrical supply cord was economically justified, DOE did not include amended standards for

conventional gas cooking products in the final rule. 63 FR 48038. For the second cycle of rulemakings, DOE published a final rule on April 8, 2009 (hereafter the April 2009 Final Rule), amending the energy conservation standards for conventional cooking products to prohibit constant burning pilots for all gas cooking products (i.e., gas cooking products both with or without an electrical supply cord) manufactured on or after April 9, 2012. DOE decided to not adopt energy conservation standards pertaining to the cooking efficiency of conventional electric cooking products because it determined that such standards would not be technologically feasible and economically justified at that time. 74 FR 16040, 16041–16044.[1]

EPCA also requires that, not later than 6 years after the issuance of a final rule establishing or amending a standard, DOE publish a NOPR proposing new standards or a notice of determination that the existing standards do not need to be amended. (42 U.S.C. 6295(m)(1)) Based on this provision, DOE must publish by March 31, 2015 either a NOPR proposing new standards for conventional electric cooking products or amended standards for conventional gas cooking products[2] or a notice of determination that the existing standards do not need to be amended. Today's notice represents the initiation of the mandatory review process imposed by EPCA and seeks input from the public to assist DOE with its determination on whether new or amended standards pertaining to conventional cooking products are warranted. In making this determination, DOE must evaluate whether more new or amended standards would (1) yield a significant savings in energy use and (2) be both technologically feasible and economically

[1] As part of the April 2009 Final Rule, DOE decided not to adopt energy conservation standards pertaining to the cooking efficiency of microwave ovens. DOE also published a final rule on June 17, 2013 adopting energy conservation standards for microwave oven standby mode and off mode. 78 FR 36316. DOE is not considering energy conservation standards for microwave ovens as part of this rulemaking.

[2] As discussed in section 0.0, DOE is also tentatively planning to consider new energy conservation standards for commercial-style gas cooking products and residential-scale units with higher burner input rates, which were previously excluded from standards.

justified. (42 U.S.C. 6295(o)(3)(B))

B. Rulemaking Process

DOE must follow specific statutory criteria for prescribing new or amended standards for covered products. EPCA requires that any new or amended energy conservation standard be designed to achieve the maximum improvement in energy or water efficiency that is technologically feasible and economically justified. To determine whether a standard is economically justified, EPCA requires that DOE determine whether the benefits of the standard exceed its burdens by considering, to the greatest extent practicable, the following:

1. The economic impact of the standard on the manufacturers and consumers of the affected products;

2. The savings in operating costs throughout the estimated average life of the product compared to any increases in the initial cost, or maintenance expense;

3. The total projected amount of energy and water (if applicable) savings likely to result directly from the imposition of the standard;

4. Any lessening of the utility or the performance of the 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))

DOE fulfills these and other applicable requirements by conducting a series of analyses throughout the rulemaking process. Table I.1 shows the individual analyses that are performed to satisfy each of the requirements within EPCA.

Table I.1 EPCA Requirements and Corresponding DOE Analysis

EPCA Requirement	Corresponding DOE Analysis
Technological Feasibility	• Market and Technology Assessment • Screening Analysis • Engineering Analysis
Economic Justification:	
1. Economic impact on manufacturers and consumers	• Manufacturer Impact Analysis • Life-Cycle Cost and Payback Period Analysis • Life-Cycle Cost Subgroup Analysis • Shipments Analysis
2. Lifetime operating cost savings compared to increased cost for the product	• Markups for Product Price Determination • Energy and Water Use Determination • Life-Cycle Cost and Payback Period Analysis
3. Total projected energy savings	• Shipments Analysis • National Impact Analysis
4. Impact on utility or performance	• Screening Analysis • Engineering Analysis
5. Impact of any lessening of competition	• Manufacturer Impact Analysis
6. Need for national energy and water conservation	• Shipments Analysis • National Impact Analysis
7. Other factors the Secretary considers relevant	• Emissions Analysis • Utility Impact Analysis • Employment Impact Analysis • Monetization of Emission Reductions Benefits • Regulatory Impact Analysis

As detailed throughout this RFI, DOE is specifically publishing this notice as the first step in the analysis process and is specifically requesting input and data from interested parties to

aid in the development of the technical analyses.

II. Request for Information and Comments

In the next section, DOE has identified a variety of questions that DOE would like to receive input on to aid in the development of the technical and economic analyses regarding whether new standards for conventional electric cooking products or amended standards for conventional gas cooking products[3] may be warranted. In addition, DOE welcomes comments on other issues relevant to the conduct of this RFI that may not specifically be identified in this notice.

A. Products Covered by This RFI

DOE defines "cooking products" as consumer products that are used as the major household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing one or more surface units and/or one or more heating compartments. They must be one of the following classes: conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, microwave/conventional ranges and other cooking products. (10 CFR 430.2) As part of this RFI, DOE intends to address energy conservation standards for all conventional cooking products.

As part of the most recent standards rulemaking for conventional cooking products, DOE decided to exclude commercial-style residential gas cooking products from consideration of

[3] As discussed in section 0.0, DOE is also tentatively planning to consider new energy conservation standards for commercial-style gas cooking products and residential-scale units with higher burner input rates, which were previously excluded from standards.

energy conservation standards due to a lack of available data for determining efficiency characteristics of those products. DOE considered commercial-style gas cooking tops to be those products that incorporate cooking tops with higher input rate burners (i.e., greater than 14,000 British thermal units (Btu)/hour (h)) and heavy-duty grates that provide faster cooking and the ability to cook larger quantities of food in larger cooking vessels. DOE also stated that the burners are optimized for the larger-scale cookware to maintain high cooking performance. Similarly, DOE considered commercial-style gas ovens to have higher input rates (i.e., greater than 22,500 Btu/h) and dimensions to accommodate larger cooking utensils or greater quantity of food items, as well as features to optimize cooking performance. 74 FR 16040, 16054 (Apr. 8, 2009); 72 FR 64432, 64444, 64445 (Nov. 15, 2007). As discussed in section II.B, DOE also stated in the previous standards rulemaking that the current DOE cooking products test procedures may not adequately measure performance of commercial-style gas cooking tops and ovens. 72 FR 64432, 64444, 64445 (Nov. 15, 2007).

Based on DOE's review of residential gas cooking products available on the market, DOE noted that there are a significant number of models advertised as commercial-style (or in some cases "professional-style") with the features described above.[4] In particular, DOE noted that commercial-style gas cooking tops and ranges have multiple surface burners rated above 14,000 Btu/h and the "heavy-duty" grates are consistently made of cast iron. DOE also noted that the number of burners ranged from four to eight for commercial-style gas cooking tops and ranges versus four to five burners for residential-scale products. Additionally, these commercial-

[4] DOE noted one manufacturer offers electric cooking products advertised as professional-style. However, the cooking elements have similar wattages and diameters to other residential cooking products not advertised as commercial-style. As a result, DOE is not considering a separate classification for conventional electric cooking tops or ovens. DOE considers commercial-style products to be commercial-style gas cooking products or the gas component of a dual-fuel-range.

style gas cooking tops and ranges may be reconfigurable, for example with the option to replace burners with griddles or grills.

DOE does note that a number of residential gas cooking products that manufacturers do not advertise as commercial-style have a single surface burner rated above 14,000 Btu/h, which may be labeled in product literature as specifically intended for rapid boiling. Products with only one high-Btu/h burner also have cast-iron grates, suggesting that "heavy-duty grates" are related to the input rate of the burner but are not a feature unique to products advertised as commercial-style.

DOE also observed differences in oven capacity during a review of residential cooking products. According to DOE's research, the oven capacity in typical residential ovens and ranges varies from 2.5 cubic feet to 5.0 cubic feet, while commercial-style gas ovens and ranges typically have oven capacities ranging from 3.0 cubic feet to 6.0 cubic feet. Of the reviewed commercial-style ranges, most had gas oven capacities between 5.0 and 6.0 cubic feet.

As part of this RFI, DOE tentatively plans to consider energy conservation standards for all residential conventional cooking products, including commercial-style gas cooking products and residential-scale units with higher burner input rates. As discussed in the sections below, DOE may consider developing test procedures for these products and determine whether separate product classes are warranted.

DOE notes that the test procedures for conventional ranges, cooking tops, and ovens

found at 10 CFR part 430, subpart B, appendix I, do not address all possible types of combined cooking products (i.e., products that combine a conventional cooking product with other appliance functionality, which may or may not include another cooking product), such as microwave/conventional ovens or any other products that may combine a conventional cooking product with other appliance functionality that is not a conventional cooking product. Because test procedures are not available addressing products that combine a conventional cooking product with other appliance functionality that is not a conventional cooking product (e.g., microwave/conventional ovens), DOE is not considering energy conservation standards for such products at this time.

Issue A.1 DOE requests comment on the consideration of energy conservation standards for all residential conventional cooking products, including gas cooking products with higher input rates. DOE requests comment on a potential definition of commercial-style gas cooking products, in particular with respect to burner input rates, cooking top grate materials, cavity volume, or any other characteristics that may be specific to commercial-style gas cooking products. DOE also requests comment on the tentative determination to not consider energy conservation standards for combined cooking products that may combine a conventional cooking product with other appliance functionality that is not a conventional cooking product.

B. Test Procedure

DOE's test procedures for conventional ranges, cooking tops, and ovens are found at 10 CFR part 430, subpart B, appendix I. DOE first established the test procedures included in appendix I in a final rule published in the Federal Register on May 10, 1978. 43 FR 20108,

20120–20128. DOE revised its test procedure for cooking products to more accurately measure their efficiency and energy use, and published the revisions as a final rule in 1997. 62 FR 51976 (Oct. 3, 1997). These test procedure amendments included: (1) a reduction in the annual useful cooking energy;[5] (2) a reduction in the number of self-cleaning oven cycles per year; and (3) incorporation of portions of the International Electrotechnical Commission's (IEC) Standard 705–1988, "Methods for measuring the performance of microwave ovens for household and similar purposes," and Amendment 2–1993 (IEC Standard 705) for the testing of microwave ovens. Id. The test procedure for conventional cooking products establishes provisions for determining estimated annual energy use, cooking efficiency (defined as the ratio of cooking energy output to cooking energy input), and energy factor (EF) (defined as the ratio of annual useful cooking energy output to total annual energy input). 10 CFR 430.23(i); 10 CFR part 430, subpart B, appendix I.

DOE published a final rule on October 31, 2012, amending the test procedures for conventional cooking products (hereafter referred to as the October 2012 TP Final Rule), to incorporate by reference provisions from IEC Standard 62301 "Household electrical appliances—Measurement of standby power" (Second Edition) for the measurement of energy use in standby mode and off mode, and methodology for the measurement of fan-only mode energy use in the energy efficiency metrics. 77 FR 65942.

DOE also published a NOPR on January 30, 2013 (hereafter referred to as the January 2013 Induction TP NOPR), in which it proposed amendments to the cooking products test

[5] The annual useful cooking energy is the energy input to a cooking product that is transferred to the load being cooked and is used to related the efficiency (energy factor) of the cooking product to the annual energy consumption.

procedure to allow for testing the active mode energy consumption of induction cooking products; i.e., conventional cooking tops and ranges equipped with induction heating technology for one or more surface units on the cooking top. The proposed test procedure would replace the aluminum test blocks currently specified for conventional cooking top testing with hybrid test blocks comprising two separate stacked pieces: a stainless steel alloy 430 base, which is compatible with the induction technology, and an aluminum body. The proposed hybrid test blocks would have the same outer diameters and heat capacities as the existing aluminum test blocks and would be used for testing all cooking tops being considered in this standards rulemaking, including both conventional and induction cooking tops. 78 FR 6232. This test procedure rulemaking is still in progress.

As discussed in section II., DOE tentatively plans to consider energy conservation standards for all residential conventional cooking products, including commercial-style gas cooking products and residential-scale gas cooking products with higher burner input rates. As part of the previous energy conservation standards rulemaking, DOE noted that the test procedure for gas cooking tops is currently based on measuring temperature rise in an aluminum block with a single diameter for all burner input rates. DOE stated that the diameter of the test block is sufficient to measure higher-output residential-scale burners. For commercial-style burners that may have larger diameter burner rings to accomplish complete combustion, however, DOE noted that this test block diameter may be too small to achieve proper heat transfer and may not be representative of the dimensions of suitable cookware. DOE further stated that it was not aware of any data to determine the measurement of energy efficiency or energy efficiency characteristics for those products. 72 FR 64432, 64444 (Nov. 15, 2007). DOE

also noted that the test procedure may not adequately measure performance of commercial-style gas ovens. DOE stated that the single test block may not adequately measure the temperature distribution that is inherent with the larger cavity volumes and higher input rates typically found in these products. DOE stated that it was not aware of any data upon which to determine the measurement of energy efficiency or energy efficiency characteristics for commercial-style gas ovens, so it therefore decided to exclude commercial-style gas cooking products from consideration of energy conservation standards. 72 FR 64432, 64445 (Nov. 15, 2007). Because DOE is tentatively planning to consider energy conservation standards for commercial-style gas cooking products and residential-scale units with higher burner input rates for this rulemaking, DOE may consider amending the cooking products test procedure in 10 CFR part 430, subpart B, appendix I to include methods for measuring the energy use of commercial-style gas cooking products and residential-scale gas cooking products with higher burner input rates.

DOE plans to consider the test procedure amendments adopted in the October 2012 TP Final Rule and the proposed amendments in the January 2013 Induction TP NOPR as part of this rulemaking. DOE also plans to consider any additional test procedure amendments developed for commercial-style gas cooking products and residential-scale gas cooking products with higher burner input rates.

Issue B.1 DOE requests comment on appropriate test methods for measuring the energy consumption of commercial-style gas cooking products and residential-scale gas cooking products with higher burner input rates. In particular, DOE requests comment and data on the size of test blocks that would be representative of typical consumer use for these products.

C. Market Assessment

The market and technology assessment provides information about the residential conventional cooking products industry 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 and manufacturing of such products. The Department uses qualitative and quantitative information to characterize the structure of the residential cooking products industry and market. DOE will identify and characterize the manufacturers of cooking products, estimate market shares and trends, address regulatory and non-regulatory initiatives intended to improve energy efficiency or reduce energy consumption, and explore the potential for technological improvements in the design and manufacturing of cooking products. DOE will also review product literature, industry publications, and company websites. Additionally, DOE will consider conducting interviews with manufacturers to assess the overall market for residential conventional cooking products.

Product Classes

The general criteria for separation into different classes include (1) type of energy used; (2) capacity; or (3) other performance-related features that justify the establishment of a separate energy conservation standard, considering the utility of the feature to the consumer and other factors deemed appropriate by the Secretary. (42 U.S.C. 6295(q))

During the previous energy conservation standards rulemaking for cooking products,

DOE evaluated product classes for conventional cooking products based on energy source (i.e., gas or electric) and the type of cooking (i.e., cooking tops and ovens). These distinctions initially yielded four conventional cooking product classes: (1) gas cooking tops; (2) electric cooking tops; (3) gas ovens; and (4) electric ovens. For electric cooking tops, DOE determined that the ease of cleaning smooth elements provides enhanced consumer utility over coil elements. Because smooth elements typically use more energy than coil elements, DOE defined two separate product classes for electric cooking tops. For both electric and gas ovens, DOE determined that the type of oven-cleaning system is a utility feature that affects performance. DOE found that standard ovens and ovens using a catalytic continuous-cleaning process use roughly the same amount of energy. On the other hand, self-cleaning ovens use a pyrolytic process that provides enhanced consumer utility with lower overall energy consumption as compared to either standard or catalytically lined ovens. DOE defined the following product classes in the technical support document (TSD) for the April 2009 Final Rule (2009 TSD)[6] for the previous cooking products standards rulemaking:

- Gas cooking tops – conventional burners;
- Electric cooking tops – low or high wattage open (coil) elements;
- Electric cooking tops – smooth elements;
- Electric ovens – standard oven with or without a catalytic line;
- Electric ovens – self-clean oven;
- Gas ovens – standard oven with or without a catalytic line; and
- Gas ovens – self-clean oven.

[6] Technical support document from the previous residential cooking products standards rulemaking is available at: http://www.regulations.gov/#!documentDetail;D=EERE-2006-STD-0127-0097.

For this rulemaking, DOE tentatively plans to maintain the product classes for conventional cooking products from the previous standards rulemaking, as presented above. As discussed below, DOE tentatively plans to consider induction heating as a technology option for electric smooth cooking tops rather than as a separate product class. DOE notes that induction heating provides the same basic function of cooking or heating food as heating by gas flame or electric resistance, and that the installation options available to consumers are also the same for both cooking products with induction and electric resistance heating. As discussed in section II.A, DOE is also planning to consider commercial-style gas cooking products and residential-scale gas cooking products with higher burner input rates as part of this rulemaking. As a result, DOE may consider whether separate product classes are warranted for these latter products.

Issue C.1 DOE requests feedback on the proposed product classes and seeks information regarding other product classes it should consider for inclusion in its analysis. In particular, DOE requests comment on the determination to consider induction heating as a technology option rather than as a separate product class. In addition, DOE requests comment and data on whether commercial-style gas cooking products or residential-scale gas cooking products with higher burner input rates warrant product classes separate from residential-scale gas cooking products with lower burner input rates. If commenters believe that separate product classes are warranted, DOE requests comment as to how those classes should be configured, i.e., gas burner input rates, number of high input rate burners, cooking top grate materials, oven cavity volume, or some other criteria.

Technology Assessment

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 a subset of the technology options considered during the most recent residential cooking products standards rulemaking that are considered to be technologically feasible. Based on a preliminary review of the cooking products market and information published in recent trade publications, technical reports, and manufacturer literature, DOE has observed that the results of the technology screening analysis performed during the previous rulemaking remain largely relevant for this rulemaking.

Based on the technologies identified in the previous standards rulemaking, DOE considered the technologies listed in Table II.1 for gas cooking tops. As part of the previous standards rulemaking, DOE considered electronic ignition as a technology option. However, because the previous standards rulemaking adopted standards to prohibit constant burning pilots for all gas cooking products manufactured on or after April 9, 2012 (74 FR 16040, 16041–44 (Apr. 8, 2009)), DOE considers electronic ignition part of the baseline design. As a result, DOE is not considering electronic ignition as a technology option for improving efficiency for this rulemaking. In addition, DOE's review of gas cooking tops suggests that all such products currently use electromechanical controls that do not consume power in a standby mode or off mode. As a result, DOE did not consider technology options for reducing standby mode or off mode energy consumption.

Table II.1 Technology options for gas cooking tops

1. Catalytic burners
2. Insulation
3. Radiant gas burners
4. Reduced excess air at burner
5. Reflective surfaces
6. Sealed burners
7. Thermostatically controlled burners

For open (coil) element electric cooking tops, DOE considered the technologies listed in Table II.2. DOE noted in the 2009 TSD that reflective surfaces and insulation yield very low energy savings. As with gas cooking tops, DOE's review of open (coil) element electric cooking tops suggests that all such products use electromechanical controls. As a result, DOE did not consider technology options for reducing standby mode or off mode energy consumption for electric cooking tops with open coils.

Table II.2 Technology options for open (coil) element electric cooking tops

1. Electronic controls
2. Improved contact conductance
3. Insulation
4. Reflective surfaces

For smooth element electric cooking tops, DOE considered the technologies listed in Table II.3. In the 2009 TSD, DOE noted that it did not evaluate induction elements because the existing DOE test procedure cannot measure the possible energy savings from this technology. As discussed in section II.B, DOE published the January 2013 Induction TP NOPR to propose amendments to the cooking products test procedure to provide test methods for induction cooking products. As a result, DOE tentatively plans to consider induction elements as a technology option for smooth element electric cooking tops for this rulemaking.

Table II.3 Technology options for smooth element electric cooking tops

1. Electronic controls
2. Halogen elements
3. Induction elements
4. Low-standby-loss electronic controls

For gas and electric ovens, DOE considered the technologies listed in Table II.4 based on the previous standards rulemaking analysis. Because DOE's current energy conservation standards prohibit standing pilot lights for all gas cooking products, DOE did not consider pilotless ignition as a technology option. In the previous rulemaking, DOE considered electronic spark ignition as a technology option to replace electric glo-bar ignition for conventional gas standard ovens, but not for conventional gas self-clean ovens. For this RFI, DOE reviewed products available on the market, but did not observe any conventional gas self-clean ovens with electronic spark ignition. However, DOE is unaware of any design constraints that would prohibit the use of electronic spark ignition in conventional gas self-clean ovens. As a result, DOE is tentatively planning to consider electronic spark ignition for all conventional gas ovens.

Table II.4 Technology options for gas and electric ovens

1. Bi-radiant oven (electric only)
2. Electronic Spark Ignition (gas only)
3. Forced convection
4. Halogen lamp oven (electric only)
5. Improved and added insulation
6. Improved door seals
7. No oven-door window
8. Oven separator
9. Radiant burner (gas only)
10. Reduced conduction losses
11. Reduced thermal mass
12. Reduced vent rate
13. Reflective surfaces
14. Steam cooking
15. Low-standby-loss electronic controls

Issue C.2 DOE seeks information related to the efficiency improving technologies listed in Table II.4 or other unlisted technologies as to their applicability to the current market and how these technologies improve efficiency of residential conventional cooking products as measured according to the DOE test procedure. Additionally, DOE requests comment on the effects of the gas cooking products technology options on efficiency for commercial-style gas cooking products and gas cooking products with higher burner input rates.

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 estimates the increase in manufacturer cost associated with increasing the efficiency of products above the baseline 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 payback-period analyses.

Baseline Models

For each established product class, DOE selects a baseline model as a reference point against which any changes resulting from energy conservation standards can be measured. The baseline model in each product class represents the characteristics of common or typical products in that class. Typically, a baseline model is one that meets the current minimum energy conservation standards.

In developing the baseline efficiency levels, DOE initially considered the current standards for conventional gas cooking products and the baseline efficiency levels for conventional electric cooking products from the previous standards rulemaking analysis. Since the last standards rulemaking, as discussed in section II.B, DOE amended the cooking products test procedures as part of the October 2012 TP Final Rule to include methods for measuring standby mode and off mode energy consumption and fan-only mode energy consumption for conventional cooking products. In addition, as part of the January 2013 Induction TP NOPR, DOE is proposing to amend the active mode test procedures for conventional cooking tops. DOE has developed tentative baseline efficiency levels considering these proposed and amended test procedures based on the integrated annual energy use metric combining active mode, standby mode, and off mode energy use.

For this RFI, DOE developed tentative baseline efficiency levels for gas and electric cooking tops considering energy use in different operating modes (i.e., active mode, standby mode, and off mode) using the following methodology. DOE first considered the baseline active mode efficiency levels from the previous standards rulemaking analysis in the 2009 TSD. For gas cooking tops, DOE notes that the previous standards rulemaking adopted standards to prohibit constant burning pilots for products manufactured on or after April 9, 2012. 74 FR 16040, 16041–44 (Apr. 8, 2009). As a result, DOE considered the baseline efficiency level for gas cooking tops as the efficiency level corresponding to electronic ignition. Because DOE is proposing to amend the cooking products test procedure to replace the aluminum test blocks currently specified for conventional cooking top testing with hybrid test blocks (a stainless steel alloy 430 base and an aluminum body), DOE also considered the effects of these proposed test procedure amendments on the baseline active mode efficiency levels. Based on testing conducted for the January 2013 Induction TP NOPR[7], the measured cooking efficiency using the proposed test block was on average 8.5 percent lower than the cooking efficiency using the current test block. 78 FR 6232, 6236, 6239 (Jan. 30, 2013). Based on this data, DOE scaled the active mode cooking efficiency in this rulemaking for all three cooking top product classes to account for the proposed test procedure amendments in the January 2013 Induction TP NOPR.

As discussed in section II.B, the October 2012 TP Final Rule amended the cooking products test procedure to provide methods for measuring conventional cooking product standby mode and off mode energy use, and created an integrated annual energy consumption (IAEC) metric combining standby mode and off mode energy consumption with the active mode energy

[7] As part of the induction cooking products test procedure rulemaking, DOE conducted testing with both the current and proposed test blocks for 3 different cooking tops with a total of 6 different surface heating elements.

consumption. 77 FR 65942. As a result, DOE considered the baseline energy use associated with standby mode and off mode for this RFI. DOE reviewed the gas cooking tops and electric open (coil) element cooking tops available on the market, noting that all of these products used electromechanical controls. As a result, DOE did not consider any additional energy consumption in standby mode or off mode for these two product classes. DOE observed that a large number of electric smooth element cooking tops on the market were equipped with electronic controls. DOE reviewed the cooking top standby test data presented in the microwave oven test procedure supplemental NOPR (SNOPR) that published on May 16, 2012 (77 FR 28805, 28811)[8], noting that the standby power for 4 models tested ranged from 0.6 watts (W) to 3.0 W, with an average of 1.9 W. DOE is considering the baseline standby power that was the highest standby power that DOE observed while providing full consumer utility, in this case 3.0 W, as part of the IAEC.

DOE is tentatively considering that it analyze the baseline IAEC levels for gas and electric cooking tops presented in Table II.5.

Table II.5 Conventional cooking tops baseline efficiency levels

Product Class	2009 Standards Rulemaking		Proposed Test Procedure Cooking Efficiency	Proposed IAEC
	Cooking Efficiency	EF		
Gas Cooking Tops	0.399	0.399	0.365	1445.0 kBtu
Electric Cooking Tops – Low or High Wattage Open (Coil) Elements	0.737	0.737	0.674	256.7 kilowatt-hours (kWh)
Electric Cooking Tops – Smooth Elements	0.742	0.742	0.679	280.6 kWh

For this RFI, DOE developed tentative baseline efficiency levels for gas and electric

[8] In the May 2012 microwave oven test procedure SNOPR, DOE considered test procedure amendments for measuring the standby mode and off mode energy consumption of combined cooking products and, as a result, presented standby power data for microwave ovens, conventional cooking tops, and conventional ovens.

ovens considering energy use in different operating modes (i.e., active mode, standby/off mode, and fan-only mode) using the following methodology. DOE first considered the baseline active mode efficiency from the previous standards rulemaking analysis in the 2009 TSD. As discussed above, the previous standards rulemaking adopted standards to prohibit constant burning pilots for all gas standard (i.e., non-self-cleaning) ovens manufactured on or after April 9, 2012. As a result, DOE considered the baseline active mode efficiency level for gas standard ovens as the efficiency level corresponding to electronic ignition.

As discussed in section II.B, DOE amended the cooking products test procedure to include provisions for measuring standby mode and off mode energy consumption for conventional ovens. As a result, DOE considered the baseline energy use associated with standby mode and off mode for this RFI. Based on DOE's review of products available on the market, DOE observed a large number of ovens in all product classes that were equipped with electronic controls. DOE also notes that the units equipped with only electromechanical controls likely consume little to no energy in standby mode or off mode. For standby mode, DOE reviewed the test data presented in the May 2012 microwave oven test procedure SNOPR, noting that the standby power for 11 conventional oven models tested ranged from 1.1 W to 10.7 W, with an average of 3.4 W. 77 FR 28805, 28811 (May 16, 2012). DOE is tentatively considering the baseline standby power that was the highest standby power that DOE observed while providing full consumer utility, in this case 10.7 W.

In addition, as discussed in section II.B, DOE amended the cooking products test procedure to include provisions for measuring fan-only mode energy consumption for

conventional ovens. Based on DOE's testing for the October 2012 TP Final Rule, DOE observed that ovens are normally capable of operating in fan-only mode. As a result, DOE considered the additional annual energy consumption in fan-only mode to develop the baseline efficiency levels. For fan-only mode, DOE presented data in a separate SNOPR for the conventional cooking products test procedure published on May 25, 2012 showing that the fan power ranged from 16 W to 50 W and that the duration of fan-only mode ranged from 10 minutes to 3.5 hours. 77 FR 31444, 31448. Using the highest fan-only mode power and duration that DOE observed, DOE estimated for this rulemaking a baseline per-cycle fan-only mode energy consumption of 0.175 kilowatt-hours (kWh) per cycle. DOE accounted for the fan-only mode energy consumption in the IAEC for each product class based on the per-cycle energy consumption and the number of annual cooking cycles.

DOE is tentatively considering that it analyze the baseline IAEC levels for conventional gas and electric ovens presented in Table II.6.

Table II.6 Conventional ovens baseline efficiency levels

Product Class	2009 Standards Rulemaking		Proposed IAEC
	EF	Annual Energy Consumption[9]	
Gas Oven – Standard Oven with or without a Catalytic Line	0.0536	1656.7 kBtu	2076.5 kBtu
Gas Oven – Self-Clean Oven	0.0540	1644.4 kBtu	1965.0 kBtu
Electric Oven – Standard Oven with or without a Catalytic Line	0.1066	274.9 kWh	370.0 kWh
Electric Oven – Self-Clean Oven	0.1099	266.6 kWh	360.0 kWh

Issue D.1 DOE requests comment on approaches that it should consider when determining the baseline efficiency levels for each product class, including information regarding

[9] DOE notes that the previous conventional cooking products test procedure in appendix I included the clock energy consumption. As a result, DOE subtracted the clock energy consumption before adding the standby and off mode energy consumption when considering integrated efficiency levels for this standards rulemaking.

the merits and/or limitations of such approaches.

Issue D.2 DOE also requests additional test data to characterize the baseline efficiency levels for each product class. In particular, DOE requests additional standby mode and off mode data for each product class to characterize the baseline standby/off mode power levels. DOE also requests additional test data for conventional ovens regarding the energy use in fan-only mode. DOE requests additional test data for conventional cooking tops showing the difference in measured efficiency using the current test procedure and the test procedure proposed in the January 2013 Induction TP NOPR.

Higher Efficiency Levels

DOE will analyze each product class to determine the relevant trial standard levels (TSLs) and to develop incremental manufacturing cost data at each higher efficiency level. DOE tentatively plans to analyze the proposed efficiency levels based on the IAEC metric that accounts for the test procedure amendments adopted in the October 2012 TP Final Rule and the amendments proposed in the January 2013 Induction TP NOPR.

For gas and electric cooking tops, DOE plans to use the efficiency levels presented in the 2009 TSD, adjusted to account for the proposed and amended test procedures. DOE plans to consider an additional efficiency level for electric smooth cooking tops associated with changing conventional linear power supplies to switch-mode power supplies. DOE also notes that the Commission of the European Communities published Commission Regulation 1275/2008 on December 17, 2008 implementing Ecodesign requirements for standby and off mode electric

power consumption for a specified list of energy using products, which includes the cooking products covered by this rulemaking. The Ecodesign regulation requires that any of these products manufactured after December 17, 2012, have a maximum standby power of 1 W. As a result, DOE considered an additional efficiency levels for electric smooth cooking tops associated with a 1-W standby power level. In addition, DOE considered an efficiency level for electric smooth cooking tops associated with induction technology. DOE based this efficiency level on the testing results presented in the January 2013 Induction TP NOPR that showed a 9.8 percent increase in cooking efficiency for induction cooking tops compared to conventional electric smooth cooking tops. 78 FR 6232, 6239 (Jan. 30, 2013). DOE ordered the efficiency levels based on the cost-effectiveness of the design options using data from the 2009 TSD and preliminary estimates for standby power design options. Table II.7 through Table II.9 present the proposed efficiency levels for gas and electric cooking tops. DOE may consider revisions to the order of efficiency levels as additional cost-efficiency data is made available.

Table II.7 Efficiency levels under consideration for gas cooking tops

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed Test Procedure Cooking Efficiency	Proposed IAEC (*kBtu*)
		Cooking Efficiency	EF		
Baseline	2009 TSD (Electronic Ignition)	0.399	0.399	0.365	1445.0
1	2009 TSD Max-Tech (Sealed Burners)	0.420	0.420	0.384	1372.7

Table II.8 Efficiency levels under consideration for open (coil) element electric cooking tops

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed Test Procedure Cooking Efficiency	Proposed IAEC (*kWh*)
		Cooking Efficiency	EF		
Baseline	2009 TSD (Baseline)	0.737	0.737	0.674	256.7
1	2009 TSD (Improved Contact Conductance)	0.769	0.769	0.704	246.0

Table II.9 Efficiency levels under consideration for smooth element electric cooking tops

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed Test Procedure Cooking Efficiency	Proposed IAEC (*kWh*)
		Cooking Efficiency	EF		
Baseline	2009 TSD (Baseline)	0.742	0.742	0.679	280.6
1	Baseline + Switch-Mode Power Supply (SMPS)	0.742	0.742	0.679	268.6
2	Baseline + 1 W Standby	0.742	0.742	0.679	263.5
3	2009 TSD (Halogen Lamp Element) + 1 W Standby	0.753	0.753	0.689	259.8
4	Induction + SMPS	-	-	0.746	245.9
5	Induction + 1 W Standby	-	-	0.746	240.7

For gas and electric ovens, DOE again plans to use the efficiency levels presented in the 2009 TSD, adjusted to account for the proposed and amended test procedures. DOE plans to consider an additional efficiency level for all conventional oven product classes associated with changing the conventional linear power supplies to switch-mode power supplies. DOE also plans to consider an additional efficiency level for all conventional oven product classes based on the 1-W Ecodesign standby requirement discussed above. For gas self-clean ovens, DOE is also considering an additional efficiency level associated with changing the baseline electric glo-bar ignition to electronic spark ignition. DOE ordered the efficiency levels based on the cost-effectiveness of the design options using data from the 2009 TSD and preliminary estimates for standby power design options. Table II.10 through Table II.13 present the proposed efficiency levels for gas and electric ovens.

Table II.10 Efficiency levels under consideration for gas ovens – standard ovens with or without a catalytic line

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed IAEC (*kBtu*)
		EF	Annual Energy Consumption (*kBtu*)	
Baseline	2009 TSD (Electric Glo-bar Ignition)	0.0536	1656.7	2076.5
1	2009 TSD (Electric Glo-bar Ignition) + SMPS	0.0536	1656.7	1932.0
2	2009 TSD (Improved Insulation) + SMPS	0.0566	1568.9	1844.2
3	2009 TSD (2 + Electronic Spark Ignition) + SMPS	0.0616	1442.4	1717.7
4	2009 TSD (3 + Improved Door Seals) + SMPS	0.0622	1427.3	1702.6
5	2009 TSD (4 + Reduced Vent Rate) + SMPS	0.0625	1420.1	1695.4
6	2009 TSD (5 + Reduced Conduction Losses) + SMPS	0.0630	1410.6	1685.9
7	2009 TSD (6 + Forced Convection) + SMPS	0.0653	1360.7	1636.0
8	2009 TSD (7) + 1W Standby	0.0653	1360.7	1499.1

Table II.11 Efficiency levels under consideration for gas ovens – self-clean ovens

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed IAEC (*kBtu*)
		EF	Annual Energy Consumption (*kBtu*)	
Baseline	2009 TSD (Baseline)	0.0540	1644.4	1965.0
1	2009 TSD (Baseline) + SMPS	0.0540	1644.4	1820.5
2	2009 TSD (Forced Convection) + SMPS	0.0625	1420.8	1596.9
3	2009 TSD (2) + Electronic Spark Ignition + SMPS	0.0680	1306.3	1482.3
4	2009 TSD (3 + Improved Door Seals) + SMPS	0.0685	1295.9	1472.0
5	2009 TSD (4 + Reduced Conduction Losses) + SMPS	0.0687	1291.8	1467.8
6	2009 TSD (5) + 1 W Standby	0.0687	1291.8	1330.9

Table II.12 Efficiency levels under consideration for electric ovens – standards ovens with or without a catalytic line

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed IAEC (*kWh*)
		EF	Annual Energy Consumption (*kWh*)	
Baseline	2009 TSD (Baseline)	0.1066	274.9	370.0
1	2009 TSD (Baseline) + SMPS	0.1066	274.9	327.7
2	2009 TSD (Reduced Vent Rate) + SMPS	0.1113	263.3	316.1
3	2009 TSD (2 + Improved Insulation) + SMPS	0.1163	251.9	304.8
4	2009 TSD (3 + Improved Door Seals) + SMPS	0.1181	248.1	300.9
5	2009 TSD (4 + Reduced Conduction Losses) + SMPS	0.1184	247.5	300.3
6	2009 TSD (5 + Forced Convection) + SMPS	0.1209	242.3	295.2
7	2009 TSD (6) + 1 W Standby	0.1209	242.3	255.0

Table II.13 Efficiency levels under consideration for electric ovens – self-clean ovens

Level	Efficiency Level Source	2009 Standards Rulemaking		Proposed IAEC (*kWh*)
		EF	Annual Energy Consumption (*kWh*)	
Baseline	2009 TSD (Baseline)	0.1099	266.6	360.0
1	2009 TSD (Baseline) + SMPS	0.1099	266.6	317.7
2	2009 TSD (Reduced Conduction Losses) + SMPS	0.1102	265.9	317.0
3	2009 TSD (2 + Forced Convection) + SMPS	0.1123	260.9	312.0
4	2009 TSD (3) + 1 W Standby	0.1123	260.9	271.9

Issue D.3 DOE seeks input concerning the efficiency levels it tentatively plans to use for each product class for collecting incremental cost data from manufacturers of residential cooking products. DOE also seeks input on appropriate maximum technologically feasible efficiency levels and the basis for why those levels should be selected.

Issue D.4 DOE requests data on how the relative changes in efficiencies presented above for residential-scale gas cooking products would differ for commercial-style gas cooking products and gas cooking products with higher burner input rates.

Approach for Determining the Cost-Efficiency Relationship

In order to create the cost-efficiency relationship, DOE intends to use a design-option approach, using reverse engineering (physical teardowns and testing of existing products in the market) to identify the incremental cost and efficiency improvement associated with each design option or design option combination.

DOE will analyze technologies and associated costs representative of baseline units as part of the reverse-engineering process. DOE intends to perform reverse engineering for each product class being analyzed. Whenever possible, DOE will attempt to reverse engineer test units that share similar platforms to better identify the efficiency benefits and costs of design options. As units are torn down, all design options used in them are noted and reviewed. Prior to tear down, DOE also plans to conduct limited testing to establish what control strategies are being used by manufacturers in conjunction with design options and platform design. Unit testing may include the measurement of disaggregated energy consumption to identify the relationship between particular components and control strategies taken by manufacturers to achieve higher efficiency levels. As part of the reverse-engineering process, DOE will attempt to generate a cost-efficiency relationship for each design option identified. In support of this design-option approach, DOE will consider cost-efficiency data from the 2009 TSD. DOE also requests incremental cost data for each cooking product design option. DOE intends the data to represent the average industry-wide incremental production cost for each technology.

To be useful in the manufacturer impact analysis, manufacturer cost information should

reflect the variability in baseline models, design strategies, and cost structures that can exist among manufacturers. This information allows DOE to better understand the industry and its associated cost structure, and, thus, it helps predict the most likely impact that new energy efficiency regulations would have. For example, the reverse-engineering methodology allows DOE to estimate the "green-field" costs of building new facilities, yet the majority of plants in any given industry are comprised of a mix of assets in different stages of depreciation. Interviews with manufacturers not only help DOE refine its capital expenditure estimates, but they also allow DOE to refine depreciation and other financial parameters.

DOE will refine the cost-efficiency data it generates through the reverse-engineering activities with information obtained through follow-up manufacturer interviews and, as necessary, information contained in the market and technology assessment and further review of publicly available cost and performance information.

Issue D.5 DOE requests feedback on using a design option approach supplemented with reverse engineering to determine the relationship between manufacturer cost and energy efficiency for residential cooking products.

Issue D.6 DOE also requests incremental cost data for each cooking product design option. DOE intends the data to represent the average industry-wide incremental production cost for each technology. DOE also welcomes comment and data on how the incremental costs for residential-scale gas cooking products compare to those for commercial-style gas cooking products and gas cooking products with higher burner input rates.

EPCA also requires DOE to consider any lessening of the utility or the performance of a covered product likely to result from the imposition of a new standard. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) As part of its analysis of higher efficiency levels, DOE will consider whether new standards may impact the utility of residential cooking products.

Issue D.7 DOE seeks comment on whether any new standards may impact the utility of cooking products. If such impacts exist, can the effects be quantified? If so, how?

E. Markups Analysis

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

For the April 2009 Final Rule, DOE based the distribution channels on data from the Association of Home Appliance Manufacturers (AHAM). The *2005 Fact Book* (the latest available version from AHAM) shows that more than 93 percent of residential cooking products are sold through retail outlets. Because an overwhelming majority of products are sold through retail outlets, DOE assumed that all of the residential products are purchased by consumers from retail outlets. Thus, DOE analyzed a manufacturer-to-consumer distribution channel consisting

of three parties: (1) the manufacturers producing the products; (2) the retailers purchasing the products from manufacturers and selling them to consumers; and (3) the consumers who purchase the products. DOE plans to use the same approach in the current rulemaking.

As was done in the last rulemaking and consistent with the approach followed for other energy consuming products, DOE will determine an average manufacturer markup by examining the annual Securities and Exchange Commission (SEC) 10-K reports filed by publicly traded manufacturers of appliances whose product range includes cooking products. DOE will determine an average retailer markup by analyzing both economic census data from the U.S. Census Bureau and the annual SEC 10-K reports filed by publicly traded retailers.

In addition to developing manufacturer and retailer markups, DOE will develop and include sales taxes to calculate appliance retail prices. DOE will use an Internet source, the Sales Tax Clearinghouse, to calculate applicable sales taxes.

Issue E.1 DOE seeks input from stakeholders on whether the distribution channels described above are still relevant for kitchen ranges and ovens being considered in this rulemaking. DOE also welcomes comments concerning its proposed approach to developing estimates of markups reflecting future residential cooking products retail prices.

F. Energy Use Analysis

The purpose of the energy analysis is to assess the energy-savings potential of different product efficiencies. DOE uses the annual energy consumption and energy-savings potential in

the LCC and PBP analyses to establish the savings in consumer operating costs at various product efficiency levels. As part of the energy use analysis, certain assumptions may be required regarding product application, including how the product is operated and under what conditions.

DOE's energy use analysis estimates the range of energy use of cooking products in the field, i.e., as they are actually used by consumers. Because energy use by residential cooking products varies greatly based on consumer usage patterns, the Department will establish a range of energy use. The Energy Information Administration (EIA)'s Residential Energy Consumption Survey (RECS) is one source for estimating the range of energy use for cooking products. DOE will use data from RECS 2009 for the current rulemaking.[10] From RECS, DOE will develop household samples for each product class. Although RECS does not provide the annual energy consumption of the cooking product, it does provide the frequency of cooking use. Thus, DOE can utilize the range in frequency of use to define the variability of the annual energy consumption.

For the April 2009 Final Rule, DOE utilized the 2004 California Residential Appliance Saturation Study (CA RASS)[11] and a Florida Solar Energy Center (FSEC) study[12] to establish representative annual energy use values for cooking products. The CA RASS and FSEC studies

[10] *RECS 2009* is based on a sample of 12,083 households statistically selected to represent 113.6 million housing units in the United States. *RECS 2009* data are available for 27 geographical areas (including 16 large States) (Available at: www.eia.gov/consumption/residential/).

[11] California Energy Commission. *California Statewide Residential Appliance Saturation Study*, June 2004. Prepared for the California Energy Commission by KEMA-XENERGY, Itron, and RoperASW. Contract No. 400-04-009.

[12] Parker, D. S. "Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate." Proceeding of International Symposium on Highly Efficient Use of Energy and Reduction of its Environmental Impact, January 2002. Japan Society for the Promotion of Science Research for the Future Program, Osaka, Japan. JPS-RFTF97P01002: pp. 108-116. Also published as FSEC-PF369-02, Florida Solar Energy Center, Cocoa, FL.

confirmed that annual cooking energy use has been consistently declining since the late 1970s. In the last rulemaking, DOE determined the average annual energy consumption for the various product classes as shown in Table II.14. DOE plans to update these values on the basis of most recent studies.

Table II.14 Average Annual Energy Consumption by Product Class

Product Class	EF	Annual Energy Consumption (*kWh/yr*)
Electric Open (Coil) Element Cooking Tops	0.737	128.2
Electric Smooth Element Cooking Tops	0.742	128.2
Gas Cooking Tops	0.399	0.72 (MMBtu/yr)
Electric Ovens – Standard Ovens with or without a Catalytic Line	0.1066	166.5
Electric Ovens – Self-Clean	0.1099	171.0
Gas Ovens – Standard Ovens with or without a Catalytic Line	0.0536	21.1* (and 0.84 MMBtu/yr)
Gas Ovens – Self-Clean	0.0625	55.1* (and 0.73 MMBtu/yr)

*Represents electrical energy use associated primarily with the ignition system.

DOE requests comment or seeks input from stakeholders on the following issues pertaining to the energy use analysis:

Issue F.1 Approaches for specifying the typical annual energy consumption;

Issue F.2 Data sources that DOE can use to characterize the variability in annual energy consumption for cooking products.

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 cooking products 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 and uncertainty by performing the LCC and PBP calculations on a representative sample of households from RECS for the considered product classes using Monte Carlo simulation and probability distributions. The analysis results are a distribution of 10,000 data points showing the range of LCC savings and PBPs for a given efficiency level relative to the baseline level. DOE intends to conduct the analysis for all seven product classes of residential cooking products – Gas Cooking tops with conventional burners, Electric Cooking tops (Open coil and Smooth elements), Electric Ovens (Standard with or without a catalytic line and self-clean), and Gas Ovens (Standard with or without a catalytic line and self-clean).

DOE expects to use single point values to characterize most components of the total installed cost, including the manufacturer markup and retailer markup. If, however, the manufacturer cost estimates developed in the engineering analysis are characterized using uncertainty or variability, DOE will use probability distributions to capture this uncertainty and variability..

DOE measures savings of potential standards relative to a base case that reflects conditions without new or amended standards. DOE will use efficiency market shares to characterize the base-case product mix. By accounting for consumers who already purchase

more efficient products, DOE avoids overstating the potential benefits from potential standards.

Issue G.1 DOE seeks stakeholder input on its proposed approach of using probability distributions and Monte Carlo simulation to conduct the LCC and PBP analysis.

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 price estimates. The installation cost is added to the consumer price to arrive at a total installed cost. With regard to installation costs, unless the increased efficiency levels considered for this rulemaking result in significantly larger, heavier or functionally different products, DOE expects that more efficient cooking products will incur no increased installation costs.

Issue G.2 DOE seeks input on whether it is correct to assume that changes in installation costs will be negligible for more-efficient products.

The primary inputs for calculating the operating costs are product energy consumption, product efficiency, electricity and gas 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.

Electricity and gas prices are used to calculate the annual cost savings at different efficiency levels. DOE plans to derive average monthly natural gas, and electricity prices for the 27 geographic areas used in RECS 2009 by using the latest data from EIA and monthly energy price factors. DOE will develop the 27 regional energy prices based on the household population in each region. DOE will assign an appropriate price to each household in the RECS sample, depending on its location. To calculate annual electricity prices for residential consumers in each of the geographic areas, DOE will use information provided by electric utilities as summarized in the most recent EIA Form 861 data. To calculate annual natural gas prices, DOE will use data from EIA's Natural Gas Navigator, which includes monthly natural gas prices by State for residential consumers.

DOE will use projections of national average energy prices to residential consumers to estimate future energy prices. DOE will use the most recent available edition of EIA's Annual Energy Outlook (AEO) as the default source of projections for future energy prices.

Issue G.3 DOE seeks stakeholder input on the proposed approaches for estimating current and future energy prices.

Maintenance costs are costs associated with maintaining the operation of the product. DOE will consider any expected changes to maintenance and repair costs for cooking products

subject to new standards. Typically, small incremental changes in product efficiency incur little or no change in repair and maintenance costs over baseline products. Products having efficiencies that are significantly higher than the baseline are more likely to incur increased repair and maintenance costs, because such products are more likely to incorporate technologies that are not widely available. DOE will use input from manufacturers and other stakeholders to develop appropriate repair and maintenance cost estimates. DOE's current understanding is that changes in maintenance and repair costs will be negligible for more-efficient products.

Issue G.4 DOE seeks stakeholder input on whether it is correct to assume that changes in maintenance and repair costs will be negligible for more-efficient products.

The product lifetime is the age at which a product is retired from service. In the past, DOE used information from various literature sources, such as *Appliance Magazine*, and input from manufacturers and other stakeholders to determine a range for the lifetime of residential cooking products. In the last rulemaking, DOE estimated an average product lifetime of 19 years for conventional gas and electric cooking products. DOE characterized the cooking top, and oven lifetimes with Weibull distributions.

For this rulemaking, DOE plans to use an approach that more accurately accounts for cooking product lifetimes in the field. It is based on an analysis of lifetime in the field using a combination of shipments data, the stock of appliances, and RECS data on the age of the appliances in the homes.[13] The method will allow DOE to estimate a survival function, which

[13] Lutz, et al. "Using National Survey Data to Estimate Lifetimes of Residential Appliances." October 2011. HVAC&R Research. (*www.tandfonline.com/doi/abs/10.1080/10789669.2011.558166#preview*)

also provides an average and a median appliance lifetime. DOE plans to use recent data from RECS 2009, American Housing Survey for 2009 and 2011, and updated historical shipment data to develop product lifetimes.

Issue G.5 DOE seeks stakeholder comments on the methodology proposed to determine product lifetimes for cooking products.

DOE uses a discount rate to determine the present value of lifetime operating expenses. For residential consumers of cooking products, DOE plans to estimate discount rates as the "finance cost" to purchase residential products. The finance cost of raising funds to purchase products can be interpreted as (1) the financial cost of any debt incurred to purchase products (principally interest charges on debt), or (2) the opportunity cost of funds used to purchase products (principally interest earnings on household equity). Much of the data required for determining the cost of debt and equity comes from the Federal Reserve Board's triennial Survey of Consumer Finances.[14]

DOE measures LCC and PBP impacts of potential standard levels relative to a base case that 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 or new standards would be required.

Issue G.6 DOE requests data on current efficiency market shares (of shipments) by

[14] Available at www.federalreserve.gov/econresdata/scf/scfindex.htm.

product class, and also similar historic data, and expected trends in cooking products efficiency.

H. Shipments Analysis

DOE uses shipment projections by product class in its analysis of national impacts of potential standards as well as in the manufacturer impact analysis.

For the April 2009 Final Rule, DOE developed a shipments model for cooking products driven by historical shipments data. The historical shipments data are used not only to build up a product stock but also to calibrate the shipments model.

In the last rulemaking DOE utilized historical shipments information for cooking tops and ovens from three sources: (1) data provided by AHAM for the period 2003–-2005, (2) data from the AHAM 2000 Fact Book for the period 1989–-2002[15], and (3) data from *Appliance Magazine*.[16] For this rulemaking, DOE requests data on shipments from manufacturers. Additionally, DOE will also consider using other public sources of data, such as data from the NPD Group.

Issue H.1 DOE seeks historical shipments data broken down by product class for cooking tops and ovens.

DOE plans to determine annual shipments in the base case by accounting for: (1) replacements due to failure; and (2) cooking products purchases due to new home construction.

[15] Association of Home Appliance Manufacturers, *AHAM 2000 Fact Book*, 2000. Washington. DC.
[16] Available for purchase at: www.appliancemagazine.com.

In the last rulemaking, DOE included a third market segment for early replacements in order to calibrate the model. DOE will examine the applicability of this market segment in the shipments model for the current rulemaking. DOE plans to use new housing starts from the latest available edition of EIA's AEO in conjunction with appliance saturations to determine shipments to new construction. To determine replacement shipments, DOE will use the same product lifetimes and retirement functions that it generates for the LCC and PBP analyses.

Issue H.2 DOE requests comment on the approach it intends on using to develop the shipments model and shipments forecasts for this rulemaking.

I. National Impact Analysis

The purpose of the national impact analysis (NIA) is to estimate aggregate impacts of potential efficiency standards at the national level. Impacts that DOE reports include the national energy savings (NES) from potential standards and the national NPV of the total consumer benefits. The NIA considers lifetime impacts of potential standards on products shipped in a 30-year period that begins with the expected compliance date for new or amended standards.

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

To develop the national NPV of consumer benefits from potential standards, DOE calculates annual energy expenditures and annual product expenditures for the base case and the

standards cases. DOE calculates total annual energy expenditures using data on annual energy consumption in each case, forecasted average annual energy prices, and shipment projections. The difference each year between energy bill savings and increased product expenditures is the net savings or net costs.

A key component of DOE's estimates of NES and NPV is the product energy efficiency forecasted over time for the base case and for each of the standards cases. To project a base-case shipment-weighted efficiency (SWEF) trend for each product class, DOE will consider recent trends in efficiency and input from stakeholders. To estimate the impact that standards have in the year compliance becomes required, in the April 2009 Final Rule, DOE used a "roll-up" scenario which assumes that product efficiencies in the base case that do not meet the standard level under consideration would "roll up" to meet the new standard level and product shipments at efficiencies above the standard level under consideration are not affected. DOE intends to use the same method for conducting the NIA for this rulemaking.

Issue I.1 DOE seeks historical SWEF data for cooking products by product class. DOE also seeks historical market share data showing the percentages of product shipments by efficiency level.

J. Submission of Comments

DOE invites all interested parties to submit in writing by **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**], comments and information on matters addressed in this notice and on other matters relevant to DOE's

consideration of new or amended energy conservations standards for residential conventional cooking products. After the close of the comment period, DOE will begin collecting data, conducting the analyses, and reviewing the public comments, as needed. These actions will be taken to aid in the development of a NOPR for residential conventional cooking products if DOE decides to amend the standards for such products.

DOE considers public participation to be a very important part of the process for developing test procedures and energy conservation standards. 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.

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Energy Efficiency and Renewable Energy

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