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Energy Conservation Program: Energy Conservation Standards for Certain Consumer Products (Dishwashers, Dehumidifiers, Electric and Gas Kitchen Ranges and Ovens, and Microwave Ovens) and for Certain Commercial and Industrial Equipment (Commercial Clothes Washers); Test Procedure for Microwave Ovens; Proposed Rules

DEPARTMENT OF ENERGY

10 CFR Parts 430 and 431

[Docket Number EE–2006–STD–0127]

RIN: 1904–AB49

Energy Conservation Program: Energy Conservation Standards for Certain Consumer Products (Dishwashers, Dehumidifiers, Electric and Gas Kitchen Ranges and Ovens, and Microwave Ovens) and for Certain Commercial and Industrial Equipment (Commercial Clothes Washers)

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

ACTION: Notice of proposed rulemaking and notice of public meeting.

SUMMARY: The Energy Policy and Conservation Act (EPCA), as amended, prescribes energy conservation standards for various consumer products and commercial and industrial equipment, and requires the U.S. Department of Energy (DOE) to determine whether amended, more stringent, standards would be technologically feasible and economically justified, and would save a significant amount of energy. In this notice, DOE is proposing to amend the energy conservation standards for residential gas kitchen ranges and ovens and microwave ovens, as well as commercial clothes washers. DOE has tentatively determined that energy conservation standards for residential electric kitchen ranges and ovens are not technologically feasible or economically justified, and, therefore, is proposing a ''no-standard'' standard for these products. DOE had also initially considered amended energy conservation standards for residential dishwashers and dehumidifiers in this rulemaking; however, the Energy Independence and Security Act of 2007 (EISA 2007) subsequently prescribed standards for these products. Therefore, DOE is not proposing standards for dishwashers and dehumidifiers in this notice, but will instead codify the statutory standards in a final rule. Finally, today's notice is announcing a public meeting on the proposed standards.

DATES: DOE will accept comments, data, and information regarding this notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than December 16, 2008. See section VII, ''Public Participation,'' of this notice for details.

DOE will hold a public meeting on Thursday, November 13, 2008, from 9 a.m. to 4 p.m., in Washington, DC. DOE must receive requests to speak at the public meeting before 4 p.m., Thursday, October 30, 2008. DOE must receive a signed original and an electronic copy of statements to be given at the public meeting before 4 p.m., Thursday, November 6, 2008.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E–089, 1000 Independence Avenue, SW., Washington, DC 20585. (Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures. If you are a foreign national and wish to participate in the workshop, please inform DOE of this fact as soon as possible by contacting Ms. Brenda Edwards at (202) 586–2945 so that the necessary procedures can be completed.)

Any comments submitted must identify the NOPR for Energy Conservation Standards for Home Appliance Products, and provide the docket number EE–2006–STD–0127 and/or regulatory information number (RIN) 1904–AB49. Comments may be submitted using any of the following methods:

1. *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.

2. *E-mail: home_appliance.rulemaking@ee.doe.gov.* Include docket number EE–2006–STD–0127 and/or RIN number 1904–AB49 in the subject line of the message.

3. *Postal Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW., Washington, DC, 20585–0121. Please submit one signed paper original.

4. *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC 20024. Telephone: (202) 586–2945. Please submit one signed paper original.

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

Docket: For access to the docket to read background documents or comments received, visit the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information regarding visiting the Resource Room.

FOR FURTHER INFORMATION CONTACT: Mr. Stephen Witkowski, Project Manager, Energy Conservation Standards for Home Appliance Products, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–7463. E-mail: *Stephen.Witkowski@ee.doe.gov.*

Ms. Francine Pinto, Mr. Eric Stas, or Mr. Michael Kido, U.S. Department of Energy, Office of the General Counsel, GC–72, 1000 Independence Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 586–9507. E-mail: *Francine.Pinto@hq.doe.gov*, *Eric.Stas@hq.doe.gov*, or *Michael.Kido@hq.doe.gov.*

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I. Summary of the Proposed Rule

The Energy Policy and Conservation Act [1] (EPCA or the Act), as amended, provides that any amended energy conservation standard DOE prescribes, including ones for cooking products [2] and commercial clothes washers (collectively referred to in this notice of proposed rulemaking (NOPR) as ''the two appliance products''), shall be designed to ''achieve the maximum improvement in energy efficiency * * * which the Secretary determines is technologically feasible and economically justified.'' (42 U.S.C. 6295(o)(2)(A) and 6316(a).) Furthermore, any new or amended standard must ''result in significant conservation of energy.'' (42 U.S.C. 6295(o)(3)(B) and 6316(a).) In accordance with these and other statutory criteria discussed in this notice, DOE proposes to amend the energy conservation standards for the two appliance products and raise efficiency levels as shown in Table I.1. The standards would apply to all products listed in Table I.1 that are manufactured in, or imported into, the United States three years after the publication of the final rule in the **Federal Register**.

[1] 42 U.S.C. 6291 *et seq.*

[2] The term ''cooking products,'' as used in this notice, refers to residential electric and gas kitchen ranges and ovens, including microwave ovens.

TABLE I.1—PROPOSED ENERGY CONSERVATION STANDARDS FOR COOKING PRODUCTS AND COMMERCIAL CLOTHES WASHERS

Product class	Proposed energy conservation standards
Conventional Cooking Products:	
Gas cooktops/conventional burners	No constant burning pilot lights.
Electric cooktops/low or high wattage open (coil) elements	No standard.
Electric cooktops/smooth elements	No standard.
Gas ovens/standard oven	No constant burning pilot lights.
Gas ovens/self-clean oven	No change to existing standard.
Electric ovens	No standard.
Microwave ovens	Maximum standby power = 1.0 watt.
Commercial clothes washers:	
Top-loading commercial clothes washers	1.76 Modified Energy Factor/8.3 Water Factor.
Front-loading commercial clothes washers	2.00 Modified Energy Factor/5.5 Water Factor.

In addition, DOE is proposing prescriptive standards that require elimination of constant-burning pilots for gas cooktops and gas standard ovens and standby power limits for microwave ovens. Furthermore, DOE has tentatively concluded that standards for conventional electric cooking products (*i.e.*, non-microwave oven products) and amended standards for gas self-cleaning ovens are not technologically feasible and economically justified. Therefore, DOE is proposing a ''no-standard'' standard for conventional electric cooking products. In addition, since standards already exist for gas self-cleaning ovens (*i.e.*, a ban on standing pilot lights), DOE is not proposing amendments to the existing standards.

DOE notes that in the November 15, 2007, advance notice of proposed rulemaking (ANOPR; referred to as the ''November 2007 ANOPR''), DOE announced it was considering amended standards for residential dishwashers and dehumidifiers. 72 FR 64432. However, section 311 of the Energy Independence and Security Act of 2007 (EISA 2007; Pub. L. 110–140) amended EPCA to establish revised energy conservation standards for residential dishwashers and dehumidifiers. (42 U.S.C. 6295(g)(9) and 6295(cc)) These EISA 2007 amendments set energy efficiency standards for these products; therefore, DOE will codify these statutory standards for residential dishwashers and dehumidifiers in a separate final rule.

EISA 2007, through section 310, also amended EPCA to require that any final rule establishing or revising a standard for a covered product, which includes residential dishwashers, dehumidifiers, ranges and ovens, and microwave ovens, adopted after July 1, 2010, shall incorporate standby mode and off mode energy use into a single amended or new standard, if feasible. If not feasible, the Secretary shall prescribe within the final rule a separate standard for standby mode and off mode energy consumption, if justified. (42 U.S.C. 6295(gg)(3)(A)–(B)) Although EISA 2007 will ultimately require test procedures for all covered residential products to measure standby mode and off mode energy consumption, it set specific deadlines for amendments to the test procedures for certain products, including the following products relevant to this rulemaking: residential dishwashers, ranges and ovens, microwave ovens, and dehumidifiers (all due by March 31, 2011). (42 U.S.C. 6295(gg)(2))

DOE's preliminary analyses suggested that there could be a significant energy savings potential associated with microwave oven standby power, so DOE decided to accelerate its test procedure rulemaking for microwaves. DOE is publishing a test procedure NOPR for microwave ovens in the **Federal Register**. Having such a test procedure in place is a prerequisite for implementing an energy conservation standard that takes into account standby mode and off mode energy consumption. For the reasons stated in this notice, DOE does not currently have sufficient data at this time to allow it to consider a single standard incorporating standby mode and off mode for cooking products other than microwave ovens, so DOE is therefore proposing a separate standby power limit for microwave ovens only. Standby and off mode power for conventional cooking products, dishwashers, and dehumidifiers will be considered in separate rulemakings which will meet the March 31, 2011, EISA 2007 deadline.

DOE is not proposing energy conservation standards at this time for standby and off mode power in dishwashers, dehumidifiers, and commercial clothes washers (CCWs) for the following reasons: (1) Standby mode power in dishwashers is already accounted for in the energy conservation standards, specified in terms of annual energy consumption, established by EISA 2007 (42 U.S.C. 6295(g)(10)(A)); (2) DOE has insufficient information on dehumidifier usage patterns to conduct an analysis of standby and off mode performance; and (3) EISA 2007 does not include CCWs as a covered product for the purposes of prescribing standards for standby and off mode energy consumption. DOE notes that EPCA directs DOE to use the residential clothes washer (RCW) test procedure for CCWs. (42 U.S.C. 6314(a)(8)) In this test procedure, measurements for modified energy factor (MEF) and water factor (WF) are provided. This test procedure is also the subject of a rulemaking proposing amendments to incorporate standby and off mode power into energy consumption metrics, as required by EISA 2007 by June 30, 2009. However, since the proposed amendments would create a new metric (*i.e.*, integrated modified energy factor (IMEF), incorporating standby mode and off mode power into MEF) but would retain MEF and not change its calculation under the test procedure, there will be no impact of these proposed amendments on CCWs.

DOE estimates that the energy conservation standards proposed today would save a significant amount of energy-an estimated 0.75 quadrillion British thermal units (Btu), or quads, of cumulative energy over 30 years (2012–2042). This amount is equivalent to 15.8 days of U.S. gasoline use. Breaking these figures down by product type, the national energy savings of the proposed standards for conventional gas cooking products is estimated to be 0.14 quads. For microwave ovens, it is estimated that the proposed standby power standard would result in national energy savings of 0.45 quads. For CCWs, the national energy savings resulting from the proposed standards is

estimated to be 0.15 quads.[3] In addition, the proposed standards for CCWs save over 190 billion gallons of cumulative water consumption over 30 years (2012–2042).

The cumulative national net present value (NPV) of total consumer costs and savings of the proposed standards from 2012 to 2042, in 2006 dollars (2006$), ranges from $2.2 billion (seven-percent discount rate) to $5.3 billion (three-percent discount rate). Again, breaking these figures down by product type, the NPV of the proposed standards for conventional gas cooking products ranges from $0.2 billion (seven-percent discount rate) to $0.6 billion (three-percent discount rate). DOE estimates the industry net present value (INPV) of gas cooktops to be approximately $287 million and $466 million for gas ovens in 2006$. If DOE adopts the proposed standards, it estimates U.S. gas cooktop manufacturers will lose between 1.74 percent and 4.12 percent of the INPV, which is approximately $5 to $12 million. For gas ovens, DOE estimates U.S. manufacturers will lose between 1.57 percent and 2.10 percent of the INPV, which is approximately $7 to $10 million.

For microwave ovens, the NPV of the proposed standards ranges from $1.6 billion (seven-percent discount rate) to $3.5 billion (three-percent discount rate). DOE estimates the INPV to be approximately $1.45 billion in 2006$. If DOE adopts the proposed standards, it estimates U.S. manufacturers will lose between 2.52 percent and 4.92 percent of the INPV, which is approximately $37 to $71 million.

For CCWs, the NPV of the proposed standards ranges from $0.5 billion (seven-percent discount rate) to $1.2 billion (three-percent discount rate). This is the estimated total value of future operating-cost savings minus the estimated increased equipment costs, discounted to 2007 in 2006 dollars (2006$). DOE estimates the INPV to be approximately $56 million in 2006$. If DOE adopts the proposed standards, it expects manufacturers will lose between 26.50 percent and 31.09 percent of the INPV, which is approximately $15 million to $17 million. However, the NPV for consumers (at the seven-percent discount rate) would exceed industry losses due to energy efficiency standards by at least 29.4 times.

DOE believes the impacts of standards on consumers would be positive for each type of covered product addressed in this rulemaking, even though that standard may increase some initial costs. For example, DOE estimates that the proposed standards for conventional gas cooking products would increase the consumer retail price by $18 for gas cooktops and $22 for gas standard ovens. In addition, DOE believes that over 50 percent of consumers purchasing gas cooking products with constant burning or standing pilot lights would need to install an electrical outlet at a cost of $235 to accommodate a product that requires electricity to operate. But even with these additional costs, DOE estimates that the savings in reduced energy costs outweigh these costs; in other words, the average life-cycle cost (LCC) savings are positive. For microwave ovens, DOE estimates that limiting standby power consumption to 1.0 watt (W) would decrease energy costs but increase the consumer retail price by only $2, resulting in positive economic impacts to consumers. Although DOE estimates that the proposed MEF and WF standards for CCWs would increase the retail price by over $229 per unit for top-loading washers and $21 for front-loading washers, the operating cost savings outweigh these price increases, resulting in positive economic impacts to CCW consumers.

DOE's analyses indicate that the energy savings resulting from the proposed standards would have benefits to utilities and to the environment. The energy saved is in the form of electricity and natural gas, and DOE expects the energy savings from the proposed standards to eliminate the need for approximately 404 megawatts (MW) of generating capacity by 2042. Breaking this figure down by product type: the proposed standards for conventional gas cooking products eliminate the need for approximately 56 MW of generating capacity; the proposed standards for microwave ovens eliminate the need for 320 MW of generating capacity, and the proposed standards for CCWs eliminate the need for 28 MW of generating capacity. These results reflect DOE's use of energy price projections from the U.S. Energy Information Administration (EIA)'s *Annual Energy Outlook 2008* (*AEO 2008*).[4]

In addition, the proposed standards would have environmental benefits, which would be estimated to result in cumulative (undiscounted) greenhouse gas emission reductions of 76 million tons (Mt) of carbon dioxide (CO_2) from 2012 to 2042. Specifically, the proposed standards for conventional gas cooking products would reduce CO_2 emissions by 14.6 Mt; the proposed standards for microwave ovens would reduce CO_2 emissions by 50.5 Mt; and the proposed standards for CCWs reduce CO_2 emissions by 11.5 Mt.

The standards for gas cooking products and CCWs would also result in 10.1 kilotons (kt) of nitrogen oxides (NO_X) emissions reductions, at the sites where appliances are used, from 2012 to 2042. In addition, gas cooking product and CCW standards would result in power plant NO_X emissions reductions of 0.5 kt to 11.9 kt from 2012 to 2042. Moreover, the standards for microwave ovens would result in power plant emission reductions of 2.7 kt to 66.0 kt of NO_X from 2012 to 2042, attributable to these appliances.

The standards for gas cooking products, microwave ovens, and CCWs would also possibly result in power plant mercury (Hg) emissions reductions. For cooking products, Hg emissions could be reduced by up to 0.2 tons (t) from 2012 to 2042. For CCWs, up to 0.2 t of Hg emissions reductions could be realized over 2012 to 2042. For microwave ovens, Hg emissions could be reduced by up to 1.1 t from 2012 to 2042.

In sum, the proposed standards represent the maximum improvement in energy and water efficiency that is technologically feasible and economically justified. DOE found that the benefits to the Nation of the proposed standards (energy and water savings, consumer average LCC savings, national NPV increase, and emission reductions) outweigh the costs (loss of INPV, and LCC increases for some consumers). DOE has concluded that the proposed standards are economically justified and technologically feasible, particularly since units achieving these standard levels already are commercially available. DOE notes that it considered higher efficiency levels as trial standard levels (TSLs), and is still considering them in this rulemaking; however, DOE tentatively believes that the burdens of the higher efficiency levels (loss of INPV and LCC increases for some consumers) outweigh the benefits (energy savings, LCC savings for some consumers, national NPV increase, and emission reductions). After reviewing public comments on this NOPR, DOE may ultimately decide to adopt one of its other TSLs or another value in between.

Finally, although DOE has proposed a ''no-standard'' standard for several of the conventional cooking product classes, Federal energy conservation requirements, including a ''no-

[3] The energy savings by product type may not sum to the total quads due to rounding of individual values.

[4] DOE intends to use the most recently available version of EIA's *Annual Energy Outlook* to generate the results for the final rule. Available online at *http://www.eia.doe.gov/oiaf/aeo/*.

standard'' standard, generally supersede State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a)–(c)) DOE can, however, grant waivers of such preemption for particular State laws or regulations, in accordance with the procedures and other provisions of section 327(d) of EPCA, as amended. (42 U.S.C. 6297(d))

II. Introduction

A. Consumer Overview

DOE is proposing energy conservation standard levels for residential cooking products and CCWs as shown in Table I.1. The proposed standards would apply to products manufactured or imported three years after the date the final rule is published in the **Federal Register**.[5]

Residential and commercial consumers will see benefits from the proposed standards. Although DOE expects the purchase price of the high efficiency cooking products and CCWs to be higher (ranging from 1 to 26 percent for cooking products and 2 to 31 percent for CCWs) than the average price of this equipment today, the energy efficiency gains will result in lower energy costs, saving consumers $1 to $63 per year on their energy bills, again depending on the product. When these savings are summed over the lifetime of the product, consumers are expected to save an average of $6 to $252, depending on the product. DOE estimates that the payback period for the more-efficient, higher-priced product will range from 0.3 to 9 years, depending on the product. In contrast, residential consumers will see no impact in terms of the standard for electric kitchen ranges and ovens, because it was determined that amended standards were not justified under the existing statutory criteria.

B. Authority

Title III of EPCA sets forth a variety of provisions designed to improve energy efficiency. Part A of Title III (42 U.S.C. 6291–6309) provides for the ''Energy Conservation Program for Consumer Products Other Than Automobiles.'' The program covers consumer products (all of which are referred to hereafter as ''covered products''), including residential dishwashers, dehumidifiers, and cooking products. (42 U.S.C. 6292, 6295) Part A–1 of Title III (42 U.S.C. 6311–6317) establishes a similar program for ''Certain Industrial Equipment,'' which deals with a variety of commercial and industrial equipment (referred to hereafter as ''covered equipment'') including CCWs. (42 U.S.C. 6312; 6313(e)) EPCA sets both energy and water efficiency standards for CCWs, and authorizes DOE to amend both. (42 U.S.C. 6313(e))

Specifically, for dishwashers, the National Appliance Energy Conservation Act of 1987 (NAECA), Public Law 100–12, amended EPCA to establish prescriptive standards, requiring that dishwashers be equipped with an option to dry without heat, and further requiring that DOE conduct two cycles of rulemakings to determine if more stringent standards are justified. (42 U.S.C. 6295(g)(1) and (4)) Section 311(a)(2) of EISA 2007 subsequently established maximum energy and water use levels for residential dishwashers manufactured on or after January 1, 2010.[6] (42 U.S.C. 6295(g)(10))

Section 135(c)(4) of the Energy Policy Act of 2005 (EPACT 2005; Pub. L. 109–58) added dehumidifiers as products covered under EPCA and established standards for them that became effective on October 1, 2007. (42 U.S.C. 6295(cc)) These amendments to EPCA also require that DOE issue a final rule by October 1, 2009, to determine whether these standards should be amended. (42 U.S.C. 6295(cc)) If amended standards are justified, they must become effective by October 1, 2012. (*Id.*) In the event that DOE fails to publish such a final rule, EPACT 2005 specifies a new set of amended standards with an effective date of October 1, 2012. (*Id.*) EISA 2007 subsequently amended section 325(cc) of EPCA by replacing the requirement for a rulemaking to amend the dehumidifier standards with prescriptive minimum efficiency levels for dehumidifiers manufactured on or after October 1, 2012.[7] (EISA 2007, section 311(a)(1); 42 U.S.C. 6295(cc))

Product capacity (pints/day)	Minimum EF (liters/kWh)
Up to 35.00	1.35
35.01–45.00	1.50
45.01–54.00	1.60
54.01–75.00	1.70
75.00 or more	2.5

As with dishwashers, NAECA amended EPCA to establish prescriptive standards for 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, and requiring DOE to conduct two cycles of rulemakings for ranges and ovens to determine if the standards established should be amended. (42 U.S.C. 6295 (h)(1)–(2))

Similar to dehumidifiers, EPACT 2005 included amendments to EPCA that added CCWs as covered equipment, and it also established standards for such equipment that is manufactured on or after January 1, 2007.[8] (EPACT 2005, section 136(a) and (e); 42 U.S.C. 6311(1) and 6313(e)) EPACT 2005 also requires that DOE issue a final rule by January 1, 2010, to determine whether these standards should be amended. (EPACT 2005, section 136(e); 42 U.S.C. 6313(e))

It is pursuant to the authority set forth above that DOE is conducting the present rulemaking for cooking products and CCWs and will codify the statutory standards for dishwashers and dehumidifiers. The following discusses some of the key provisions of EPCA relevant to this standards-setting rulemaking.

Under EPCA, the overall program consists of the following core elements: (1) Testing; (2) labeling; and (3) Federal energy conservation standards. The Federal Trade Commission (FTC) is responsible for labeling products covered by part A, and DOE implements the remainder of the program. Under 42 U.S.C. 6293 and 6314, EPCA authorizes DOE, subject to certain criteria and conditions, to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of covered products and equipment. The test procedures for the appliance products subject to today's notice appear at Title 10 of the Code of Federal Regulations (CFR) part 430, subpart B—dishwashers in appendix C, dehumidifiers in appendix X, cooking products in appendix I, and CCWs in appendix J1 (the latter pursuant to 10 CFR 431.154.)

EPCA provides criteria for prescribing new or amended standards for covered products and equipment.[9] As indicated

[5] At this time, DOE anticipates that publishing a final rule in March 2009, pursuant to the requirements of a Federal court consent decree, which would make the amended standards effective in March 2012.

[6] Under the statute, a standard size dishwasher shall not exceed 355 kWh/year and 6.5 gallons per cycle, and a compact size dishwasher shall not exceed 260 kWh/year and 4.5 gallons per cycle.

[7] Under the statute, such dehumidifiers shall have an Energy Factor (EF) that meets or exceeds the following values: (See above table.)

[8] Under the statute, a CCW must have a modified energy factor (MEF) of at least 1.26 and a water factor (WF) of not more than 9.5.

[9] The EPCA provisions discussed in the remainder of this subsection directly apply to covered products, and also apply to certain covered equipment, such as commercial clothes washers, by virtue of 42 U.S.C. 6316(a). Note that the term ''product'' is used generally to refer to consumer appliances, while ''equipment'' is used generally to refer to commercial units.

above, any new or amended standard for either of the two appliance products 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, DOE may not prescribe a standard for some types of products if: (1) No test procedure has been established for that product; or (2) DOE determines by rule that the standard is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)(A)–(B)) The statute also provides that, in deciding whether a standard is economically justified, 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 or equipment subject to the standard;

(2) The savings in operating costs throughout the estimated average life of the covered products or equipment 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 or equipment 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 considers relevant.

(42 U.S.C. 6295(o)(2)(B)(i))

Furthermore, EPCA contains what is commonly known as an ''anti-backsliding'' provision. (42 U.S.C. 6295(o)(1)) This provision prohibits the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product or equipment. Also, the Secretary may not prescribe an amended or a new standard if the Secretary finds that 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, features, sizes, capacities, and volume 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))

In addition, EPCA, as amended (42 U.S.C. 6295(o)(2)(B)(iii)), establishes a rebuttable presumption that a standard 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. This approach provides an alternative path in establishing economic justification under the EPCA factors. (42 U.S.C. 6295(o)(2)(B)(iii)) DOE considered this test, but believes that the criterion it applies (*i.e.*, a limited payback period) is not sufficient for determining economic justification. Instead, DOE has considered a full range of impacts, including those to the consumer, manufacturer, Nation, and environment.

In promulgating a standard for a type or class of covered product that has two or more subcategories, DOE must specify a different standard level than that which applies generally to such type or class of products ''for any group of covered products which have the same function or intended use, if * * * 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 DOE deems appropriate. *Id.* Any rule prescribing such a standard must include an explanation of the basis on which such higher or lower level was established. (42 U.S.C. 6295(q)(2))

Federal energy conservation requirements generally supersede State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a)–(c)) DOE can, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA found in 42 U.S.C. 6297(d). Specifically, States that regulate an energy conservation standard for a type of covered product for which there is a Federal energy conservation standard may petition the Secretary for a DOE rule that allows the State regulation to become effective with respect to such covered product. (42 U.S.C. 6297(d)(1)(A)) DOE must prescribe a rule granting the petition if the Secretary finds that the State has established by a preponderance of the evidence that its regulation is needed to meet ''unusual and compelling State or local energy * * * interests.'' (42 U.S.C. 6297(d)(1)(B))

C. Background

1. Current Standards

a. Dishwashers

DOE established the current energy conservation standards for dishwashers manufactured on or after May 14, 1994 in a final rule on May 14, 1991 (56 FR 22250), which consist of a requirement that the energy factor (EF) of a standard size dishwasher must not be less than 0.46 cycles per kilowatt-hour (kWh) and that the EF of a compact size dishwasher must not be less than 0.62 cycles per kWh. (10 CFR 430.32(f))

b. Dehumidifiers

EPCA, as amended by EPACT 2005, prescribes the current energy conservation standard for dehumidifiers, as shown in Table II.1. (42 U.S.C. 6295(cc)(1); 10 CFR 430.32(v))

TABLE II.1—EPACT 2005 STANDARDS FOR RESIDENTIAL DEHUMIDIFIERS

Dehumidifier capacity	Standards effective October 1, 2007 EF (liters/kWh)
25.00 pints/day or less	1.00
25.01–35.00 pints/day	1.20
35.01–54.00 pints/day	1.30
54.01–74.99 pints/day	1.50
75.00 pints/day or more	2.25

c. Cooking Products

EPCA prescribes the current energy conservation standard for cooking products, which consists of a requirement that gas ranges and ovens with an electrical supply cord that are manufactured on or after January 1, 1990, not be equipped with a constant burning pilot. (42 U.S.C. 6295(h)(1); 10 CFR 430.32(j))

d. Commercial Clothes Washers

EPCA, as amended by EPACT 2005, also prescribes standards for CCWs

manufactured on or after January 1, 2007. (42 U.S.C. 6313(e)) These standards require that CCWs have an MEF of at least 1.26 and a WF of not more than 9.5. (*Id.*; 10 CFR 431.156)

2. History of Standards Rulemaking for Residential Dishwashers, Dehumidifiers, and Cooking Products; and Commercial Clothes Washers

For dishwashers, NAECA amended EPCA to establish prescriptive standards, requiring that dishwashers be equipped with an option to dry without heat, and further requiring that DOE conduct two cycles of rulemakings to determine if more stringent standards are justified. (42 U.S.C. 6295(g)(1) and (4)) On May 14, 1991, DOE published a final rule establishing the first set of performance standards for dishwashers (56 FR 22250); these new standards discussed became effective on May 14, 1994 (10 CFR 430.32(f)). DOE initiated a second standards rulemaking for dishwashers by publishing an ANOPR on November 14, 1994 (59 FR 56423). However, as a result of the priority-setting process outlined in its *Procedures, Interpretations and Policies for Consideration of New or Revised Energy Conservation Standards for Consumer Products* (the ''Process Rule'') (61 FR 36974 (July 15, 1996); 10 CFR part 430, subpart C, appendix A), DOE suspended the standards rulemaking for dishwashers.

Section 135(c)(4) of EPACT 2005 added dehumidifiers as products covered under EPCA and established standards for them that became effective on October 1, 2007. (42 U.S.C. 6295(cc)) DOE has incorporated these standards into its regulations (70 FR 60407, 60414 (Oct. 18, 2005); 10 CFR 430.32(v)).

The November 2007 ANOPR addressed standards for residential dishwashers and dehumidifiers, in addition to cooking products and CCWs. On December 19, 2007, however, Congress enacted EISA 2007, which, among other things, established minimum efficiency levels for dehumidifiers manufactured on or after October 1, 2012. (EISA 2007, section 311(a)(1); 42 U.S.C. 6295(cc)) In addition, section 311(a)(2) of EISA 2007 established maximum energy and water use levels for residential dishwashers manufactured on or after January 1, 2010. (42 U.S.C. 6295(g)(10)) Because EISA 2007 established standards for residential dishwashers and dehumidifiers, DOE will codify the statutory standards for these products in a separate final rule.[10] DOE will not entertain comment on these standard levels set under EISA 2007, because the Department does not have discretion to modify such statutory levels. As a result, DOE will limit its analysis in the balance of this NOPR to cooking products and commercial clothes washers.

The existing prescriptive standard for cooking products, described above, was added to EPCA by amendments contained in the NAECA. As set forth in greater detail in the November 2007 ANOPR, these amendments required DOE to conduct two cycles of rulemakings to determine whether to revise the standard. DOE undertook the first cycle of these rulemakings and issued a final rule on September 8, 1998 (63 FR 48038), which found that no standards were justified for electric cooking products. Partially due to the difficulty of conclusively demonstrating that elimination of standing pilots was economically justified, DOE did not adopt a standard for gas cooking products. 72 FR 64432, 64438 (Nov. 15, 2007). DOE is currently in the second cycle of rulemakings required by the NAECA amendments to EPCA. (42 U.S.C. 6295(h)(2))

EPACT 2005 included amendments to EPCA that added CCWs as covered equipment and established the current standards for such equipment. (EPACT 2005, section 136(a) and (e); 42 U.S.C. 6311(1)(G) and 6313(e)) DOE has incorporated these standards into its regulations (70 FR 60407, 60416 (Oct. 18, 2005); 10 CFR 431.156). The EPACT 2005 amendments also require that DOE conduct two cycles of rulemakings to determine whether these standards should be amended. (EPACT 2005, section 136(e); 42 U.S.C. 6313(e)(2)) The first of these rules must be published by January 1, 2010, and any amended standard in the rule would apply to products manufactured three years after the rule is published. *Id.*

To initiate the current rulemaking to consider energy conservation standards, on March 15, 2006, DOE published on its Web site a document titled, *Rulemaking Framework for Commercial Clothes Washers and Residential Dishwashers, Dehumidifiers, and Cooking Products* (Framework Document).[11] 71 FR 15059 (March 27, 2006). The Framework Document described the procedural and analytical approaches that DOE anticipated using to evaluate energy conservation standards for these products, and identified various issues to be resolved in conducting the rulemaking. DOE held a public meeting on April 27, 2006, to present the Framework Document, to describe the analyses it planned to conduct during the rulemaking, to receive comments from stakeholders, and to inform and facilitate stakeholders' involvement in the rulemaking. DOE received 11 written comments in response to the Framework Document after the public meeting.

On December 4, 2006, DOE posted two spreadsheet tools for this rulemaking on its Web site.[12] The first tool calculates LCC and payback periods (PBPs) and included spreadsheets for: (1) Dishwashers; (2) dehumidifiers; (3) cooktops; (4) ovens; (5) microwave ovens; and (6) CCWs. The second tool—the national impact analysis (NIA) spreadsheet—calculates the impacts on shipments and the national energy savings (NES) and NPV at various candidate standard levels. The NIA spreadsheets include one each for: (1) Dishwashers; (2) dehumidifiers; (3) cooktops and ovens; (4) microwave ovens; and (5) CCWs.

DOE published the ANOPR for this rulemaking on November 15, 2007, and held a public meeting on December 13, 2007, to present and seek comment on the November 2007 ANOPR analytical methodology and results. 72 FR 64432. In the November 2007 ANOPR, DOE described and sought further comment on the analytical framework, models, and tools (*e.g.*, LCC and NIA spreadsheets) it was using to analyze the impacts of energy conservation standards for these products. In conjunction with the November 2007 ANOPR, DOE also posted on its Web site the complete November 2007 ANOPR technical support document (TSD). The TSD included the results of a number of DOE's preliminary analyses, including: (1) The market and technology assessment; (2) screening analysis; (3) engineering analysis; (4) energy and water use determination; (5) markups analysis to determine equipment price; (6) LCC and PBP analyses; (7) shipments analysis; (8) NES and national impact analyses; and (9) manufacturer impact analysis (MIA). In the November 2007 ANOPR and at the public meeting, DOE invited comment in particular on the following issues concerning cooking products and CCWs: (1) Microwave oven standby power; (2) product classes; (3) CCW horizontal-axis designs; (4) microwave

[10] DOE intends to codify all prescriptive energy conservation standards established under EISA 2007 for various products and equipment into its regulations in a separate **Federal Register** notice.

[11] This document is available on the DOE Web site at: *http://www.eere.energy.gov/buildings/appliance_standards/residential/dehumidifiers.html.*

[12] These spreadsheets are available on the DOE Web site at: *http://www.eere.energy.gov/buildings/appliance_standards/residential_products.html.*

oven design options; (5) technologies unable to be analyzed and exempted product classes, including potential limitations of existing test procedures; (6) CCW per-cycle energy consumption; (7) CCW consumer prices; (8) repair and maintenance costs; (9) efficiency distributions in the base case; (10) CCW shipments forecasts; (11) base-case and standards-case forecasted efficiencies; and (12) TSLs. 72 FR 64432, 64512–14 (Nov. 15, 2007).

The November 2007 ANOPR also included background information, in addition to that set forth above, on the history and conduct of this rulemaking and on DOE's use in this rulemaking of its Process Rule. 72 FR 64432, 64438–39 (Nov. 15, 2007). DOE held a public meeting in Washington, DC, on December 13, 2007, to present the methodologies and results for the November 2007 ANOPR analyses, along with a summary of supplemental analysis DOE conducted for microwave ovens (referred to as the ''December 2007 public meeting''). At the December 2007 public meeting, stakeholders commented that they had come to an agreement regarding what they believed to be appropriate levels for energy conservation standards for dehumidifiers and dishwashers and would offer draft legislation that would reflect such agreement. (Association of Home Appliance Manufacturers (AHAM), Public Meeting Transcript, No. 23.7 at pp. 20 and 24; [13] Appliance Standards Awareness Project (ASAP), Public Meeting Transcript, No. 23.7 at p. 24) These stakeholders' suggested energy conservation standard levels were subsequently incorporated into the EISA 2007 amendments to EPCA, as discussed previously in this section.

DOE expects to issue a final rule in this rulemaking in March 2009. Based on this schedule, the effective date of any new energy efficiency standards for these products would be March 2012, three years after the final rule is published in the **Federal Register**.

III. General Discussion

A. Standby Power for Cooking Products

Section 310 of the EISA 2007 amends section 325 of the EPCA to require DOE to regulate standby mode and off mode energy consumption for all covered products, including residential ranges and ovens and microwave ovens, as part of energy conservation standards for which a final rule is adopted after July 10, 2010. In addition, EISA 2007 amended section 325 of EPCA to specifically require that test procedures for ranges and ovens and microwave ovens be amended by March 31, 2011 to include measurement of standby mode and off mode energy consumption, taking into consideration the most current versions of International Electrotechnical Commission's (IEC) Standard 62301 *Household electrical appliances—Measurement of standby power* [14] (IEC 62301) and IEC Standard 62087 *Methods of measurement for the power consumption of audio, video and related equipment* (IEC 62087).[15] (42 U.S.C. 6295(gg)) Because the final rule for this rulemaking is scheduled to be published in the **Federal Register** by March 31, 2009, an energy conservation standard for cooking products set forth by this rulemaking is not required to incorporate standby mode and off mode energy consumption.

Although DOE is also not required to incorporate standby mode and off mode energy consumption for any cooking products at this time, in the November 2007 ANOPR, DOE stated that it is considering including standby power in the energy conservation standards and intends to initiate amendment of its test procedure to measure microwave oven standby power because: (1) Energy consumption in standby mode represents a significant proportion of microwave oven annual energy consumption, and (2) the range of standby power among microwave ovens currently on the market suggests that the likely impact of a standard would be significant in terms of energy consumption. 72 FR 64432, 64440–42 (Nov. 15, 2007). Such a test procedure change is a prerequisite to incorporate a standby power requirement as part of the energy conservation standard for microwave ovens.[16] DOE invited comments on this issue, and commenters generally supported the early initiation of test procedure amendments to measure standby power consumption in microwave ovens. The comments on this issue are discussed in section III.B.2 of this notice.

DOE also invited comment on the incorporation of standby power in an energy conservation standard for residential cooking products. Several organizations—ASAP, Natural Resources Defense Council (NRDC), Northwest Power and Conservation Council (NPCC), Northeast Energy Efficiency Partnerships (NEEP), and the American Council for an Energy-Efficient Economy (ACEEE)—filed a single joint comment (hereafter Joint Comment) that supported a standby power standard for residential ovens, including microwave ovens, or, in the alternative, a prescriptive requirement if test methods cannot be amended in time to support this rulemaking. For the reasons just discussed, DOE is considering incorporating standby power into the energy conservation standard for microwave ovens. For conventional cooking products, as will be discussed in more detail in section III.B.2, DOE does not have data or information to analyze standby mode and off mode power consumption. DOE will instead consider test procedure amendments for conventional cooking products in a later rulemaking that meets the March 31, 2011, deadline set by EISA 2007. (42 U.S.C. 6295(gg)(2)(B))

For microwave ovens, the Joint Comment stated that, while per-unit standby power savings amount to only several W per unit, they represent not only a large proportion of total microwave oven annual energy use but a large national impact as well when considering the stock and sales rate of microwave ovens. (Joint Comment, No. 29 at p. 7) DOE recognizes the Joint Comment's support for a standby power standard, but notes that even if the proposed standard were to be a prescriptive standby power level, a test procedure amendment prior to the final rule of this standards rulemaking would be required to incorporate such a measurement.

In assessing the opportunity to reduce standby power, the Joint Comment compared maximum microwave oven standby power in measurements reported by DOE, AHAM, and the Australian National Appliance and Equipment Energy Efficiency Committee (ANAEEEC). These measurements ranged from almost 6 W to 8.4 W, with

[13] A notation in the form ''AHAM, Public Meeting Transcript, No. 23.7 at p. 20'' identifies an oral comment that DOE received during the December 13, 2007, ANOPR public meeting and which was recorded in the public meeting transcript in the docket for this rulemaking (Docket No. EE–2006–STD–0127), maintained in the Resource Room of the Building Technologies Program. This particular notation refers to a comment (1) made by the Association of Home Appliance Manufacturers (AHAM) during the public meeting, (2) recorded in document number 23.7, which is the public meeting transcript that is filed in the docket of this rulemaking, and (3) which appears on page 20 of document number 23.7. A notation in the form ''EEI, No. 25 at pp. 2–3'' identifies a written comment (1) made by the Edison Electric Institute (EEI), (2) recorded in document number 25 that is filed in the docket of this rulemaking, and (3) which appears on pages 2–3 of document number 25.

[14] IEC standards are available at: *http://www.iec.ch.*

[15] IEC 62087 does not cover any products for this rulemaking, and, therefore, was not considered.

[16] As discussed in the November 2007 ANOPR, addressing standby mode and off mode energy consumption is not required for this standards rulemaking under EPCA, but DOE seeks to publish a final rule for the test procedure amendments prior to March 31, 2009, in order to allow the microwave oven energy conservation standards to account for standby mode and off mode power consumption.

a presumed standby demand of 3 W at most for minimal functionality, as inferred from microwaves listed in the Federal Energy Management Program (FEMP) procurement database which have both a clock display and a cooking sensor. The Joint Comment further stated that since there are no State or Federal standby performance or active mode performance standards, manufacturers have had little incentive to optimize the standby demand of microwave ovens. As an example of a product for which standby power was raised to the highest levels of design consideration by manufacturers, the Joint Comment stated that significant standby power reductions were achieved at minimal or no cost for external power supplies in response to market demands (*e.g.*, portable electronics) and policy demands (*e.g.*, standards or ENERGY STAR levels). (Joint Comment, No. 29 at pp. 5–8) AHAM, on the other hand, commented that DOE should not promulgate a standby power standard for cooking products in general, and in the case of microwave ovens, the contribution of standby power to total microwave oven energy use is relatively small and is associated with significant functionality for the consumer. (AHAM, No. 32 at p. 2)

As part of its engineering analysis, DOE sampled 32 microwave ovens, and AHAM provided test data for an additional 21 units submitted by manufacturers. Each microwave oven was tested according to the existing DOE test procedure, which measures the amount of energy required to raise the temperature of one kilogram of water by 10 degrees Celsius under controlled conditions. The ratio of usable output power over input power describes the EF, which is also a measure of the cooking efficiency. The data from the DOE and AHAM cooking tests show a cooking efficiency range from 55 percent to 62 percent. Reverse engineering conducted by DOE attempted to identify design options associated with this variation in cooking efficiency. Although design options among various microwave ovens were found to be highly standardized, DOE was unable to correlate specific design options or other features such as cavity size or output power with cooking efficiency. (See chapter 5 of the TSD accompanying this notice.)

DOE also observed significant variability in the cooking efficiency measurements obtained using the DOE microwave oven test procedure for the 53 units tested by DOE and AHAM. The data show test-to-test variability of several EF percentage points for a given microwave oven (*i.e.*, where a given combination of design options could be assigned to a number of TSLs, depending upon the test results). DOE was also unable to ascertain why similarly designed, equipped, and constructed microwave ovens showed varying EFs and, hence, annual energy consumption. DOE further notes that manufacturers stated during MIA interviews that the water used in the test procedure is not representative of an actual food load. One manufacturer stated, for example, that this could result in different microwave ovens being rated at the same energy efficiency even though true cooking performance is different.

In a review of the DOE microwave oven test procedure (which does not currently incorporate a measure of standby mode and off mode energy use), DOE explored whether it would be technically feasible to combine the existing measure of energy efficiency during the cooking cycle (per-use) with standby mode and off mode energy use (over time) to form a single metric, as required by EISA 2007. (42 U.S.C. 6295(gg)(2)(A)) Specifically, the test procedure's existing metric for microwave oven overall energy efficiency measures the efficiency of heating a sample of water over a period of seconds. In contrast, standby mode and off mode energy consumption is a measure of the amount of energy used over a period of multiple hours while not performing the function of heating a load. DOE found that an overall energy efficiency that combines the two values is representative of neither the energy efficiency of the microwave oven for a very short period of use (as is the case with the EF) nor the efficiency of the microwave oven over an extended period of time.

DOE notes that certain DOE test procedures for other products combine a measure of cycle efficiency and standby energy use to derive an overall ''energy efficiency measure,'' (*e.g.*, gas kitchen ranges and ovens incorporate pilot gas consumption in EF, electric ovens include clock power in EF, and gas dryers include pilot gas consumption). However, DOE believes that in those cases where the difference in energy use between the primary function of those products and the standby power is so large that the standby power has little impact on the overall measure of energy efficiency or the combined efficiency is based on energy use of the primary energy function and standby power over the same period, (*e.g.*, annual or seasonal), the combined measure of energy efficiency is a meaningful measure. In the case of microwave ovens, the energy consumption associated with standby mode is a significant fraction of the overall energy use. DOE notes, for example, that, depending on the cooking efficiency and standby power, the rank ordering of two microwave ovens based on EF alone could reverse if standby power were factored in, depending on the values of cooking energy use and standby power.[17] Therefore, given the similar magnitudes of microwave oven annual energy consumption associated with these two disparate and largely incompatible metrics that are measured over very different time periods, DOE questioned whether it would be technically feasible to incorporate EF and standby power into a combined energy efficiency metric that produces a meaningful result.

To explore standby mode and off mode power for the purpose of potential microwave oven energy conservation standards, DOE tested 32 sample units using the current IEC Standard 62301 standby test procedure and recorded a standby power range of about 1.2 W to 5.8 W (with less than 0.5 percent test-to-test deviation). DOE observed no off mode power consumption for the microwave ovens in its test sample, and DOE's research suggests that no other microwave ovens available in the United States consume energy in an off mode.[18] Thus, DOE focused its investigations on standby mode. Data suggested correlations between specific features and standby power, thereby

[17] For example, two units among the microwave ovens tested by AHAM, each with 1000 W of input power, will be designated Unit A and Unit B for the purposes of this illustration. The EF of Unit A was measured by AHAM according to the current DOE test procedure as 55.7 percent, while the EF of Unit B was measured as 57.3 percent. The standby power of Unit A, however, was measured as 1.7 W, compared to the 4.4 W of standby power for Unit B. If a combined EF (''CEF'') were to be calculated by adding the annual standby energy use to the annual cooking energy consumption, this CEF for Unit A would be 50.5 percent, while the CEF for Unit B would be 45.0 percent, thereby reversing the rankings of the two microwave ovens according to their energy descriptor. The unit that was formerly considered the higher efficiency unit would thus be rated as lower in efficiency.

[18] A microwave oven is considered to be in ''off mode'' if it is plugged in to a main power source, is not being used for an active function such as cooking or defrosting, and is consuming power for features other than a display, cooking sensor, controls (including a remote control), or sensors required to reactivate it from a low power state. For example, a microwave oven with mechanical controls and no display or cooking sensor that consumed power for components such as a power supply when the unit was not activated would be considered to be in off mode. Note that DOE believes there are no longer any such microwave ovens with mechanical controls on the market, and, in fact, is not aware of any microwave ovens currently available that can operate in off mode.

providing the basis for a cost-efficiency curve. However, for the reasons stated above about combining a per-cycle efficiency with standby power over a long period of time, as well as due to the observed test variability in the cooking efficiency results, DOE is concerned that an overall measure of cooking efficiency that combines cooking and standby energy cannot produce test results that measure energy efficiency or energy use of microwave ovens in a reasonable and repeatable manner. An ''average'' microwave runs 8,689 hours in standby mode per year. Based on the standby power range measured by DOE and AHAM, standby power consumption represents a relatively large component of total annual energy consumption. At the efficiency baseline from the analysis conducted for the previous cooking products rulemaking, as discussed in the 1996 *Technical Support Document for Residential Cooking Products* (1996 TSD), (which was also observed in the test sample), the observed range of annual energy consumption due to cooking (14.2 kWh) is equivalent to approximately 2 W of standby power. (See chapter 3 of the TSD accompanying this notice.)

DOE also explored whether the existing test procedure's measure of annual energy consumption could be modified to be a combined energy efficiency descriptor for microwave ovens, despite the fact that EF is currently listed as the energy efficiency descriptor. For the reasons articulated here, DOE has tentatively concluded that neither approach meets the statutory standard for a combined metric.

In light of the above, DOE believes that, although it may be mathematically possible to combine energy consumption into a single metric encompassing active (cooking), standby, and off modes, it is not technically feasible to do so at this time, because of the high variability in the current cooking efficiency measurement from which the active mode EF and annual energy consumption are derived (as discussed previously) and because of the significant contribution of standby power to overall microwave oven energy use. Given DOE's recent research, there is concern that cooking efficiency results for microwave ovens would not be meaningful, so incorporation of such results in a combined metric similarly would not be expected to be meaningful. Inherent in a determination of technical feasibility under EISA 2007 for a combined metric for active, standby, and off mode energy consumption is an expectation that the results would be meaningful. Accordingly, for the purposes of this notice, DOE is not proposing to incorporate standby and off modes with active mode into a combined metric, but is instead proposing a separate metric to measure standby power, as provided for by EISA 2007 in cases where it is technically infeasible to incorporate standby and off modes into a combined energy conservation metric.[19] (42 U.S.C. 6295(gg)(3)(B))

Although it may not be technically feasible to develop a combined metric for microwave ovens today, it may be possible to do so in the future, provided that each is measured on a consistent basis (*i.e.*, kWh per year apportioned to each mode) so that the results are meaningful and comparable. In this vein, DOE notes the need to develop a test procedure that addresses the high-variability concerns with its current cooking efficiency measure. DOE understands that IEC, AHAM, manufacturers, and others are exploring whether a test procedure can be developed that responds to the concerns DOE has raised. DOE expects to evaluate potential future test procedures to determine whether any address the concerns discussed above and meet the requirements of section 325(gg) of the Act, thereby making them suitable candidates for use in amending the DOE test procedure. If such test procedures are developed, DOE will consider a combined measure of microwave oven energy efficiency in a future rulemaking.

B. Test Procedures

1. Dishwashers and Dehumidifiers

Because EISA 2007 provides prescriptive energy conservation standards for dishwashers and dehumidifiers based on existing DOE test procedures (42 U.S.C. 6295(g)(10) and (cc)(2), respectively), DOE is not proposing to make changes to the test procedures for these products at this time. DOE will consider test procedure amendments to address potential incorporation of standby mode and off mode power into the energy efficiency metrics in a later rulemaking or rulemakings that meet the March 31, 2011, deadline set by the EISA 2007 amendments to EPCA. (42 U.S.C. 6295(gg)(2)(B)(vi))

[19] DOE notes that if a microwave oven standard is established based on standby power alone, measurable energy savings would certainly be achieved. If, however, standby power were to be combined with cooking efficiency, it is conceivable that many microwave ovens could already comply with the standard without reducing standby power, since the annual energy consumption due to standby power is on the same order as that associated with the variability in EF.

2. Cooking Products

As noted in the November 2007 ANOPR, DOE indicated that it does not intend to modify test procedures for cooking products as part of this rulemaking, other than an amendment to consider the standby power consumption of microwave ovens. *72 FR 64432, 64442* (Nov. 15, 2007).

The DOE test procedure for microwave ovens references IEC 705–1988 *Household Microwave Ovens—Methods for Measuring Performance,* and Amendment 2–1993 (IEC 705) for methodology of measuring cooking performance. The Joint Comment on the ANOPR urged DOE to continue to use the existing DOE test method and the referenced IEC 705 for active power measurement for the EF calculation because it appears to provide greater precision of measurement than the current version of the IEC standard, redesignated as IEC 60705–1993 Edition 3.2–2006 (IEC 60705). (Joint Comment No. 29 at p. 9) DOE observed during its efficiency testing of a representative sample of microwave ovens that IEC 705–1988 provides a more stable and repeatable cooking efficiency measurement than IEC 60705. Thus, DOE will not amend the microwave oven test procedure to reference IEC 60705 instead of IEC 705–1988. As discussed above, DOE is not aware of any other alternative test procedures that could be considered for incorporation by reference at this time.

As part of the DOE microwave oven standby power tests, DOE reviewed IEC 62301 to determine whether the specified test conditions were suitable for microwave oven tests. At the December 2007 ANOPR public meeting, DOE contemplated incorporation by reference of IEC 62301 into the DOE test procedure, but suggested several clarifications that would be required to deal with instances where the IEC test conditions were non-specific: (1) the microwave oven clock display should be set to 12 a.m. at the start of the test period; and (2) the standby power test should be run for a period of 12 hours to obtain a true average standby power, since clock power can vary as a function of displayed time, depending on the specific display technology. DOE sought comment on these potential modifications to the microwave oven test procedure, as well as any changes to the conventional cooking product test procedures to include standby power.

The Joint Comment stated that DOE should modify the oven, cooktop, and microwave oven test procedures as necessary to measure the clock face standby energy use and any other

standby energy use, such as control electronics and power supply losses. In addition, the Joint Comment stated that DOE should use IEC 62301 to test standby power, with the instruction to start the test with a clock setting of 12 a.m. and run the test for 12 hours or a lesser period of time demonstrated mathematically to be representative of a 12-hour period. (Joint Comment, No. 29 at pp. 6 and 9) ASAP commented that it supports a test procedure change to address microwave oven standby power, and that this test procedure change should not be a hurdle to implementing a standard that addresses standby power. (ASAP, Public Meeting Transcript, No. 23.7 at p. 72) GE Consumer and Industrial (GE), on the other hand, commented that it does not believe that there is justification for the development of ''necessarily complex'' new test procedures for cooking products. (GE, No. 30 at p. 2)

DOE believes separate test procedure rulemakings for standby mode and off mode power for microwave ovens and conventional cooking products are warranted. To support this rulemaking, the test procedure change to incorporate microwave oven standby mode and off mode power has been initiated in parallel with the current rulemaking, and a final rule for the test procedure will be published before the publication of a final rule on energy conservation standards. For conventional cooking products, DOE sought data and stakeholder feedback on the decision to retain the existing test procedures in the November 2007 ANOPR (72 FR 66432, 64513 (Nov. 15, 2007)), and did not receive any inputs. DOE does not have any data on standby power consumption in conventional cooking products that indicate the potential for significant energy savings. Thus, DOE will consider test procedure amendments in a later rulemaking that meets the March 31, 2011, deadline set by the EISA 2007 amendments to EPCA. (42 U.S.C. 6295(gg)(2)(B))

3. Commercial Clothes Washers

EPCA directs DOE to use the same test procedures for CCWs as those established by DOE for RCWs. (42 U.S.C. 6314(a)(8)) While DOE believes commercial laundry practices likely differ from residential practices,[20] DOE believes that the existing clothes washer test procedure (at 10 CFR part 430, subpart B, appendix J) adequately accounts for the efficiency rating of CCWs, and that DOE's methods for characterizing energy and water use in the NOPR analyses adequately account for the consumer usage patterns specific to CCWs. 72 FR 64432, 64442 (Nov. 15, 2007).

Alliance Laundry Systems (Alliance) commented that, as a first-order estimate, CCW usage patterns would be similar to those of the RCW market. Hence, Alliance supports the continued use of the existing test procedure as being generally representative of the multi-family and laundromat applications of the CCW segment of the market. (Alliance, No. 26 at p. 3)

GE commented that the RCW test procedure gives credit for features, such as multiple water levels, which have no energy efficiency benefit in actual CCW use and which may confuse the end customer. Therefore, GE suggests that DOE develop a representative test procedure specifically for CCWs. (GE, No. 30 at p. 3) Similarly, during the MIA interviews, multiple manufacturers mentioned that the use of the RCW test procedure provides an incentive for CCW manufacturers to incorporate design options for which the RCW test procedure gives credit, but which are unlikely to save energy in actual CCW use or provide additional utility to consumers. For example, commenters stated that adaptive fill and load selector switches are unlikely to be used by consumers who generally pay a fixed fee per load and who are thus likely to run full-sized loads and/or select the maximum fill setting. However, commenters did not provide data that demonstrate differences between CCW and RCW usage patterns or the energy implications thereof, nor did they address the statutory requirement to utilize the RCW test procedure for CCWs.

DOE recognizes that in certain situations, the controls and/or operation of a CCW (*e.g.*, fill level) can be set so that the CCW will not necessarily have the energy and water savings that might be expected to occur for RCWs. However, DOE does not have sufficient usage data to alter its preliminary conclusion that the existing RCW test procedure is adequate to measure the energy consumption of CCWs.

C. Technological Feasibility

1. General

DOE considers a design option to be technologically feasible if it is in use by the respective industry or if research has progressed to the development of a working prototype. Therefore, in each standards rulemaking, DOE conducts a screening analysis, based on information it has gathered regarding existing technology options and prototype designs. In consultation with manufacturers, design engineers, and others, DOE develops a list of design options for consideration in the rulemaking. Once DOE has determined that a particular design option is technologically feasible, it further evaluates each design option in light of the following three additional criteria: (a) Practicability to manufacture, install, and service; (b) adverse impacts on product utility or availability; or (c) adverse impacts on health or safety. 10 CFR part 430, subpart C, appendix A, section 4(a)(3) and (4). All design options that pass these screening criteria are candidates for further assessment in the engineering and subsequent analyses in the ANOPR stage. DOE may amend the list of retained design options in the NOPR analyses based on comments received on the ANOPR and on further research.

All of the design options for cooking products and CCWs that DOE identified in the November 2007 ANOPR remain and were considered in today's proposed rule. (See the TSD accompanying this notice, chapter 4.)

a. Cooking Products

During MIA interviews, manufacturers commented that improved contact conductance for electric open (coil) element cooktops was more dependent on the flatness of the cookware used by the consumer rather than the design of the heating element itself. DOE is unaware of data substantiating these statements, and therefore chose to retain the design option for the purposes of this NOPR.

In addition to the design options for microwave oven cooking efficiency presented in the November 2007 ANOPR, DOE also investigated technology options that reduce standby power. DOE identified lower-power display technologies, improved power supplies and controllers, and alternative cooking sensor technologies as options to reduce standby power. DOE conducted this research when it became aware of the likelihood of EISA 2007 being signed, which DOE understood was to contain provisions pertaining to standby mode and off mode power consumption. Therefore, DOE presented details of each design option to stakeholders at the December 2007 public meeting even though the results were not available in time for publication in the November 2007 ANOPR. DOE believes all of these options are technologically feasible, and in the ANOPR invited comment on technology options that reduce standby power in microwave ovens. 72 FR

[20] Commercial clothes washers are typically used more frequently and filled with a larger load than residential clothes washers.

64432, 64513 (Nov. 15, 2007). For more details of these technology options and stakeholder comments, see section IV.B of this notice.

b. Commercial Clothes Washers

Alliance concurred with the CCW design options that DOE screened out and requested that DOE also screen out ''added insulation'' and ''tighter tub tolerances'' from the CCW list of design options. Alliance stated that neither of these has been shown to impact energy consumption. (Alliance, No. 26 at p. 3) Since DOE received no data regarding the effectiveness of these two design options, today's NOPR retains them.

2. Maximum Technologically Feasible Levels

EPCA requires as part of an energy conservation standards rulemaking that DOE must ''determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible'' for such product. (42 U.S.C. 6295(p)(1) and 6316(a)) Table III.1 lists the ''max-tech'' levels that DOE determined for this rulemaking.

TABLE III.1—MAX-TECH LEVELS FOR COOKING PRODUCTS AND COMMERCIAL CLOTHES WASHERS

Product		Max-Tech EF
Gas Cooktops		0.42
Electric Open (Coil) Cooktops		0.769
Electric Smooth Cooktops		0.753
Gas Standard Ovens		0.0583
Gas Self-Clean Ovens		0.0632
Electric Standard Ovens		0.1209
Electric Self-Clean Ovens		0.1123
Microwave Ovens		0.602
		Max-Tech Standby Power (W)
Microwave Ovens		0.02 W
	Max-Tech MEF (ft^3/kWh)	Max-Tech WF (gal/ft^3)
Top-Loading Commercial Clothes Washers	1.76	8.3
Front-Loading Commercial Clothes Washers	2.35	4.4

a. Cooking Products

For cooking products, DOE has retained the max-tech efficiency levels that the previous analysis outlined in the 1996 TSD defined, for the reasons that follow. DOE does not have efficiency data for conventional cooking products currently on the market, since manufacturers are not required to report EF. However, as reported in the November 2007 ANOPR, manufacturers have stated there have been no substantive changes in technology since the 1996 analysis that would affect max-tech efficiency levels. 72 FR 64432, 64436 and 64452 (Nov. 15, 2007).

For microwave ovens, both AHAM data and DOE supplemental testing, as presented at the December 2007 public meeting, confirmed that the max-tech EF level from the 1996 TSD remains the max-tech level in the context of the current rulemaking. The max-tech microwave oven standby power level corresponds to a unit equipped with a default automatic power-down function that shuts off certain power-consuming components after a specified period of user inactivity. The standby power at max-tech was obtained from a microwave oven currently on the market in Korea which incorporates such a feature. (See the TSD accompanying this notice, chapter 5.)

b. Commercial Clothes Washers

For CCWs, DOE recognizes that MEF and WF pairings may not simultaneously achieve max-tech levels. That is, a CCW with the highest possible MEF may not achieve the lowest possible WF. Similarly, a CCW with the lowest WF may not achieve the highest MEF. DOE considered several models currently available to determine max-tech values that best represent optimal performance for CCWs on the market today. DOE did not specify max-tech levels that represent a ''hybrid'' of the highest possible MEF and the lowest possible WF for each product class. For more details on this selection, see section IV.C.1 of this notice.

D. Energy Savings

1. Determination of Savings

DOE used its NIA spreadsheet to estimate energy savings from amended standards for the appliance products that are the subject of this rulemaking. (Section IV.E of this notice and in chapter 11 of the TSD accompanying this notice describe the NIA spreadsheet model.) DOE forecasted energy savings over the period of analysis (beginning in 2012, the year that amended standards would go into effect, and ending in 2042) for each TSL, relative to the base case, which represents the forecast of energy consumption in the absence of amended energy conservation standards. DOE quantified the energy savings attributable to amended energy conservation standards as the difference in energy consumption between the standards case and the base case.

The base case considers market demand for more efficient products. For example, the market share of gas cooking appliances with standing pilot ignition systems has been declining for several years. (See section IV.E.3 of this notice and chapter 11 of the TSD accompanying this notice for more details.) As kitchens are remodeled or updated, consumers frequently take the opportunity to replace existing appliances with new ones, often replacing older ranges, ovens, and cooktops that incorporated standing pilots with models that are ignited electronically. The National Electrical Code (NEC) allows gas-fired appliances

to be attached to existing small appliance branch circuits, making such retrofits during kitchen remodels relatively easy. (2008 NEC section 210.52(B)(2)) While outlets for gas-fired ovens, ranges, and cooktops are not required by the NEC, many local and State building codes require them in new construction and kitchen renovations, gradually reducing the number of kitchens in which there are no such outlets. Section IV.D.2.a describes in detail the additional installation costs that would be incurred by consumers in the event that standards are issued for gas cooking products that eliminate the use of standing pilot ignition systems. The added installation costs are accounted for in the evaluation of consumer economic impacts in the LCC and PBP analysis and the NIA.

The NIA spreadsheet model calculates the electricity savings in ''site energy'' expressed in kWh. Site energy is the energy directly consumed on location by an individual product. DOE reports national energy savings on an annual basis in terms of the aggregated source energy savings, which is the savings of energy that is used to generate and transmit the energy consumed at the site. To convert site energy to source energy, DOE derived conversion factors, which change with time, from *AEO 2008*. (See TSD chapter 11 accompanying this notice for further details.)

2. Significance of Savings

EPCA, as amended, prohibits DOE from adopting a standard for a product if that standard would not result in ''significant'' energy savings. (42 U.S.C. 6295(o)(3)(B)) While the Act does not define the term ''significant,'' the U.S. Court of Appeals for the District of Columbia, in *Natural Resources Defense Council* v. *Herrington*, 768 F.2d 1355, 1373 (D.C. Cir. 1985), indicated that Congress intended ''significant'' energy savings in this context to be savings that were not ''genuinely trivial.'' The energy savings for energy conservation standards at each of the TSLs considered in this rulemaking are nontrivial, and, therefore, DOE considers them ''significant'' within the meaning of 42 U.S.C. 6295(o)(3)(B).

E. Economic Justification

1. Specific Criteria

As noted earlier, EPCA provides seven factors to be evaluated in determining whether an energy conservation standard is economically justified. (42 U.S.C. 6295(o)(2)(B)) The following sections discuss how DOE has addressed each of those seven factors in this rulemaking.

a. Economic Impact on Manufacturers and Consumers

To determine the quantitative impacts of a new or amended standard on manufacturers, the economic impact analysis is based on an annual-cash-flow approach. This includes both a short-term assessment, based on the cost and capital requirements during the period between the announcement of a regulation and the time when the regulation becomes effective, and a long-term assessment. The impacts analyzed include INPV (which values the industry on the basis of expected future cash flows), cash flows by year, changes in revenue and income, and other measures of impact, as appropriate. Second, DOE analyzes and reports the impacts on different types of manufacturers, with particular attention to impacts on small manufacturers. Third, DOE considers the impact of standards on domestic manufacturer employment, manufacturing capacity, plant closures, and loss of capital investment. Finally, DOE takes into account cumulative impacts of different regulations (not limited to DOE) on manufacturers.

For consumers, measures of economic impact include the changes in LCC and payback period for the product at each TSL. Under EPCA, the LCC is one of the seven factors to be considered in determining economic justification. (42 U.S.C. 6295(o)(2)(B)(i)(II)) It is discussed in detail in the section below.

b. Life-Cycle Costs

The LCC is the sum of the purchase price of equipment (including the installation) and the operating expense (including energy and maintenance expenditures), discounted over the lifetime of the appliance or equipment.

In this rulemaking, DOE calculated both LCC and LCC savings for various efficiency levels. For cooking products, the LCC analysis estimated the LCC for representative equipment in housing units that represent the segment of the U.S. housing stock that uses these appliances. Through the use of a housing stock sample, DOE determined for each household in the sample the energy consumption and energy price of the cooking product. Thus, by using a representative sample of households, the analysis captured the wide variability in energy consumption and energy prices associated with cooking product use.

For CCWs, although DOE was unable to develop a representative sample of the building stock that uses the appliance, it still established the variability and uncertainty in energy and water use by defining the uncertainty and variability in the use (cycles per day) of the equipment. The variability in energy and water pricing were characterized by regional differences in energy and water prices. To account for uncertainty and variability in other inputs, such as equipment lifetime and discount rate, DOE used a distribution of values with probabilities attached to each value.

Therefore, for each housing unit with a cooking appliance and each consumer with a CCW, DOE sampled the values of these inputs from the probability distributions. As a result, the analysis produced a range of LCCs. This approach permits DOE to identify the percentage of consumers achieving LCC savings or attaining certain payback values due to an increased energy conservation standard, in addition to the average LCC savings or average payback for that standard. DOE presents the LCC savings as a distribution, with a mean value and a range, and for purposes of the analysis, DOE assumed that the consumer purchases the product in 2012.

c. Energy Savings

While significant energy conservation is a separate statutory requirement for imposing an energy conservation standard, EPCA requires DOE, in determining the economic justification of a standard, to consider the total projected energy savings that are expected to result directly from the standard. (42 U.S.C. 6295(o)(2)(B)(i)(III)) DOE used the NIA spreadsheet results in its consideration of total projected savings.

d. Lessening of Utility or Performance of Products

In establishing classes of products, DOE considered whether the evaluated design options would likely lessen the utility or performance of the products under consideration in this rulemaking. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) DOE determined that none of the considered TSLs would reduce the utility or performance of the products under consideration in the rulemaking.

- For gas cooking products, the potential elimination of standing pilot ignition systems and replacement with electronic ignition systems retains the basic consumer utility of igniting the gas to initiate a cooking process, while following safety requirements specified in American National Standards Institute (ANSI) Z21.1–2005 and

Addenda 1–2007, *Household Cooking Gas Appliances* (ANSI Z21.1).[21]

• For microwave ovens, all consumer utility features that affect standby power, such as a clock display and a cooking sensor, would be retained.

• For CCWs, the proposed standards maintain the consumer utility of washing clothes in a washer with either top or front access.

Alliance, Whirlpool, and AHAM commented in support of multiple product classes for CCWs due in part to consumer utility issues, including capacity, reliability, and access of axis. (Alliance, No. 26 at p. 1; Whirlpool, No. 28 at pp. 3–4; AHAM No. 32, at pp. 3–4) DOE believes that all of these consumer utilities will be maintained by the standards under consideration, as is discussed in the context of the CCW product class definition in section IV.A.2 of this notice.

e. Impact of Any Lessening of Competition

EPCA directs DOE to consider any lessening of competition that is likely to result from standards. It directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a proposed standard and to transmit such determination to the Secretary, not later than 60 days after the publication of a proposed rule, together with an analysis of the nature and extent of such impact. (42 U.S.C. 6295(o)(2)(B)(i)(V) and (B)(ii)) DOE has transmitted a copy of today's proposed rule to the Attorney General and has requested that the Department of Justice (DOJ) provide its determination on this issue.

f. Need of the Nation To Conserve Energy

The non-monetary benefits of the proposed standard are likely to be reflected in improvements to the security and reliability of the Nation's energy system-namely, reductions in the overall demand for energy will result in reduced costs for maintaining reliability of the Nation's electricity system. DOE conducts a utility impact analysis to estimate how standards may impact the Nation's needed power generation capacity. This analysis captures the effects of efficiency improvements on electricity consumption by the appliance products which are the subject of this rulemaking.

The proposed standard also is likely to result in improvements to the environment. In quantifying these improvements, DOE has defined a range of primary energy conversion factors and associated emission reductions based on the estimated level of power generation displaced by energy conservation standards. DOE reports the environmental effects from each TSL for this equipment in the environmental assessment in the TSD. (42. U.S.C. 6295(o)(2)(B)(i)(VI) and 6316(a))

2. Rebuttable Presumption

As set forth under 42 U.S.C. 6295(o)(2)(B)(iii), there is a rebuttable presumption that an energy conservation standard is economically justified if the increased installed cost for a product that meets the standard is less than three times the value of the first-year energy savings resulting from the standard (and water savings in the case of a water efficiency standard). However, although DOE examined the rebuttable-presumption criteria, it determined economic justification for the proposed standard levels through a detailed analysis of the economic impacts of increased efficiency as described above, pursuant to 42 U.S.C. 6295(o)(2)(B)(i). Section IV.D.12 of this notice addresses the rebuttable-presumption payback calculation.

IV. Methodology and Discussion of Public Comments

DOE used spreadsheet models to estimate the impacts of the TSLs used in weighing the benefits and burdens of amended standards for the products that are the subject of this rulemaking. Specifically, it used the engineering spreadsheet to develop the relationship between cost and efficiency for these products and to calculate the simple payback period for the purposes of addressing the rebuttable presumption that a standard with a payback period of less than three years is economically justified. The LCC spreadsheet calculates the consumer benefits and payback periods for amended energy conservation standards. The NIA spreadsheet provides shipments forecasts and then calculates NES and NPV impacts of potential amended energy conservation standards. DOE also assessed manufacturer impacts, largely through use of the Government Regulatory Impact Model (GRIM).

Additionally, DOE estimated the impacts of energy conservation standards for the appliance products on utilities and the environment. DOE used a version of EIA's National Energy Modeling System (NEMS) for the utility and environmental analyses. The NEMS model simulates the energy economy of the United States and has been developed over several years by the EIA primarily for the purpose of preparing the *Annual Energy Outlook*. The NEMS produces forecasts for the United States that are available in the public domain. The version of NEMS used for appliance standards analysis is called NEMS–BT and is primarily based on the *AEO 2008* with minor modifications.[22] The NEMS–BT offers a sophisticated picture of the effect of standards, since it accounts for the interactions between the various energy supply and demand sectors and the economy as a whole.

A. Product Classes

In general, when evaluating and establishing energy conservation standards, DOE divides covered products into classes by the type of energy used, capacity, or other performance-related features that affect consumer utility and efficiency. (42 U.S.C. 6295(q); 6316(a)) Different energy conservation standards may apply to different product classes. *Id.*

1. Cooking Products

For cooking products, DOE based its product classes on energy source (*e.g.*, gas or electric) and cooking method (*e.g.*, cooktops, ovens, and microwave ovens). DOE identified five categories of cooking products: gas cooktops, electric cooktops, gas ovens, electric ovens, and microwave ovens. In its regulations implementing EPCA, DOE defines a ''conventional range'' as ''a class of kitchen ranges and ovens which is a household cooking appliance consisting of a conventional cooking top and one or more conventional ovens.'' 10 CFR 430.2. The November 2007 ANOPR presents DOE's reasons for not treating gas and electric ranges as a distinct product category and for not basing its product classes on that category. 72 FR 64432, 64443 (Nov. 15, 2007). For example, DOE defined a single product class for gas cooktops as gas cooktops with conventional burners.

For electric cooktops, DOE determined in the 1996 TSD that the ease of cleaning smooth elements provides greater utility to the consumer than coil elements, and that smooth elements typically consume more energy than coil elements. Therefore, DOE has defined two separate product

[21] ANSI standards are available at *http://www.ansi.org.*

[22] The EIA approves the use of the name NEMS to describe only an *AEO* version of the model without any modification to code or data. Because the present analysis entails some minor code modifications and runs the model under various policy scenarios that deviate from *AEO* assumptions, the name NEMS–BT refers to the model as used here. (''BT'' stands for DOE's Building Technologies Program.) For more information on NEMS, refer to *The National Energy Modeling System: An Overview,* DOE/EIA–0581 (98) (Feb. 1998) (available at: *http://tonto.eia.doe.gov/FTPROOT/forecasting/058198.pdf*).

classes for open (coil) element and smooth element electric cooktops.

For electric 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 different overall energy consumption, as compared to either standard or catalytically lined ovens, due to the amount of energy used during the cleaning cycle and better insulation. Thus, DOE has defined two product classes for electric ovens: standard ovens with or without a catalytic line and self-cleaning ovens.

DOE applied the same reasoning for gas ovens as it used for electric ovens, defining two product classes, one for standard ovens with or without a catalytic line and one for self-cleaning ovens.

DOE determined that microwave ovens constitute a single product class for the purposes of this rulemaking. This product class can encompass microwave ovens with and without browning (thermal) elements, but does not include microwave ovens that incorporate convection systems. For a discussion of why DOE is not considering microwave ovens with convection capability in this rulemaking, see section IV.A.1.c of this notice.

In sum, in this rulemaking DOE is using the following eight product classes in analyzing and setting standards for cooking products:

- Gas cooktop/conventional burners;
- Electric cooktop/open (coil) elements;
- Electric cooktop/smooth elements;
- Gas oven/standard oven;
- Gas oven/self-clean oven;
- Electric oven/standard oven;
- Electric oven/self-clean oven; and
- Microwave oven.

For more information on the specification of product classes for cooking products, see chapter 3 of the TSD accompanying this notice.

a. Standing Pilot Ignition Systems

DOE proposed in the November 2007 ANOPR that standing pilot ignition systems do not provide unique utility that would warrant a separate product class for gas cooking products incorporating them, and requested comment on such a determination for product classes. 72 FR 66432, 64463 and 64513 (Nov. 15, 2007). The American Gas Association (AGA) and GE commented that standing pilot ignition systems do provide unique utility for several reasons, including: (1) The ability to operate the range during electrical power outages, (2) providing safe ignition where electrical supply is unavailable (such as lodges and hunting cabins) or not located reasonably close to the range, and (3) providing safe ignition where religious and cultural practices prohibit the use of electronic ignition. (AGA, Public Meeting Transcript, No. 23.7 at p. 21; AGA, No. 27 at p. 2; GE, No. 30 at p. 2) AGA commented that religious and cultural prohibitions on the use of electricity in the United States were the reason for the original EPCA language requiring electronic ignition only on gas cooking products with other electrical features. (AGA, No. 27 at pp. 2, 14) AGA further stated that this consideration was the reason for DOE's exception allowing standing pilot lights on gravity gas-fired boilers in the EISA 2007. (AGA, No. 27 at p. 2) On the other hand, the Joint Comment stated that non-standing pilot ignition (*i.e.*, electronic ignition) should be a design option and that an exemption for standing pilot ignition ranges is inappropriate. (Joint Comment, No. 29 at p. 6)

In considering standing pilot ignition systems as either a separate product class or a design option, DOE notes that the purpose of such systems is to ignite the gas when burner operation is called for during a cooking process, and either standing pilot or electronic ignition provides this function. In addition, DOE has concluded from previous analysis that the average consumer does not experience frequent enough or long enough power outages to consider the ability to operate in the event of an electric power outage a significant utility.

DOE also addressed a similar issue in the residential furnace and boiler rulemaking, where DOE made an exception to allow standing pilot ignition for gravity gas-fed boilers. Gravity gas-fed boilers, however, are a type of heating equipment that represent a unique utility in that they do not require an electric circulation motor to operate, a utility which happens to accommodate religious and cultural practices which prohibit electronic ignition as well. Thus, the exception is based on continuing to allow products with certain performance characteristics to be available to all consumers. But DOE is unable to create a similar exception for gas cooking products because there is no unique utility associated with standing pilot ignition.

Through market research, DOE determined that battery-powered electronic ignition systems have been implemented in other products, such as instantaneous gas water heaters, barbeques, furnaces, and other appliances, and the use of such ignition systems appears acceptable under ANSI Z21.1. Therefore, subgroups with religious and cultural practices which prohibit the use of line electricity (*i.e.*, electricity from the utility grid) can still use gas cooking products without standing pilots, assuming gas cooking products are made available with battery-powered ignition. Furthermore, there is not expected to be any appreciable difference in cooking performance between gas cooking products with or without a standing pilot. Thus, DOE concludes that standing pilot ignition systems do not provide a distinct utility and that a separate class for standing pilot ignition systems is not warranted under section 325(q)(1) of EPCA. (42 U.S.C. 6295(q)(1))

b. Commercial-Style Cooking Products and Induction Technology

DOE stated in the November 2007 ANOPR that it lacks efficiency data to determine whether certain designs (*e.g.*, commercial-style cooking products) and certain technologies (*e.g.*, induction cooktops) should be excluded from the rulemaking. 72 FR 64432, 64444 and 64460 (Nov. 15, 2007). AHAM, Whirlpool, and Sub-Zero Wolf Incorporated (Wolf) supported DOE's approach to exclude commercial-style cooking products, given the relatively small gains in energy savings for cooking products as a whole, the small relative size of the commercial-style products market, and required changes to the test procedure. (AHAM, No. 32 at p. 3, 9; Whirlpool, No. 28 at p. 6; Wolf, No. 24 at p. 2) AHAM and Wolf also stated that induction technology should not be considered for a variety of reasons, including (1) the lack of an applicable test procedure, (2) the relatively small gains in energy savings for cooking products as a whole, (3) the small relative size of the induction cooking market, and (4) the special cookware requirements. (Wolf, No. 24 at p. 2; AHAM, No. 32 at p. 3) DOE did not receive any comments opposing this proposal.

Therefore, absent any comment opposing the proposal and in light of the comments in support of the proposal, DOE is not considering commercial-style cooking products and induction technology in this rulemaking as proposed in the November 2007 ANOPR.

c. Microwave Ovens

In the November 2007 ANOPR, DOE considered a single product class for

microwave ovens. The Joint Comment agreed that microwave ovens should be represented in a single product class without consideration of cavity size or output power rating, due to the lack of correlation between microwave oven size and efficiency demonstrated by both the AHAM and DOE studies. (Joint Comment, No. 29 at p. 9) AHAM opposed a single microwave oven product class, stating that the product class should be broken up into subcategories according to features that may be different than when the standard was first put into effect many years ago. (AHAM, Public Meeting Transcript, No. 23.7 at pp. 32–33)

Based on the data already supplied to DOE by AHAM, and by DOE's own testing, no features or utilities were observed to be uniquely correlated with efficiency such that they would warrant defining multiple product classes for microwave ovens, according to the criteria put forth by EPCA. (42 U.S.C. 6295(q)) Thus, for the purposes of this rulemaking, DOE has retained a single product class for microwave ovens.

2. Commercial Clothes Washers

In the November 2007 ANOPR, DOE stated that it planned to consider a single product class for CCWs in accordance with the prescriptive standards for such equipment set in EPACT 2005. 72 FR 64432, 64465 (Nov. 15, 2007). Through EPACT 2005, Congress imposed a minimum energy efficiency threshold for all CCWs to meet.[23] EPACT 2005 placed all CCWs into a single product class with a single energy efficiency and water efficiency standard for all covered equipment. *Id.* Accordingly, these standards encompass CCWs with wash baskets that rotate around either a vertical or horizontal axis.[24]

At the same time, DOE noted in the ANOPR that it has the authority to establish additional product classes within the CCW product category if warranted, and requested data and information on the product class definitions in the November 2007 ANOPR. 72 FR 64432, 64513 (Nov. 15, 2007). AHAM, Alliance, and Whirlpool supported two CCW product classes, suggesting that DOE should set a separate standard for top-loaders and front-loaders. (AHAM, Public Meeting Transcript, No. 23.7 at pp. 35–36 and pp. 81–82; Alliance, Public Meeting Transcript, No. 23.7 at pp. 36–37; and Whirlpool, No. 28 at pp. 3–4)

In considering whether separate classes are warranted, DOE must consider the utility and performance characteristics to determine whether the relevant requirements have been met. (42 U.S.C. 6295(q); 6313(a)) Among the criteria DOE considered when examining potential separate product classes for clothes washers was the wash basket axis of rotation, which DOE also used for RCWs. (See 10 CFR 430.32(g))

Alliance stated that front-loading and top-loading CCWs show no overlap in operating efficiency, in terms of MEF and WF, and that they have unique characteristics. For example, such characteristics include the ability of top-loaders to allow a consumer to lift the lid mid-cycle to add an item, whereas front-loaders must drain the water in the drum before the door can be opened. (Alliance, Public Meeting Transcript, No. 23.7 at pp. 36–37)

DOE notes that a review of the current California Energy Commission (CEC), Consortium for Energy Efficiency (CEE), and ENERGY STAR clothes washer product databases shows some overlap in energy efficiency for top-loading and front-loading CCWs. However, this overlap is not nearly as broad as in the RCW market. DOE agrees that the efficiency levels that can be achieved by front-loading CCWs are generally higher than the levels that can be achieved by top-loading CCWs.

Regarding product utility, Whirlpool cited the November 2007 ANOPR's statement that ''[T]he residential clothes washer rulemaking history clearly demonstrated that size, axis of access, and certain technologies had consumer utility that affect performance and, therefore, warranted separate product classes for residential products.'' Whirlpool's point was that RCWs and CCWs are analogous products that should be treated in a consistent fashion. (Whirlpool, No. 28 at p. 4) ASAP, on the other hand, agreed with DOE's tentative approach of maintaining a single product class, noting that Congress and DOE have set standards over the last 20 years that have changed the mix of unit characteristics available on the market. ASAP argued that in an earlier RCW efficiency standards rulemaking, DOE had eliminated the warm rinse cycle, a feature many consumers liked. ASAP concluded that maintaining every characteristic on the market would restrict DOE's ability to set any efficiency standards. (ASAP, Public Meeting Transcript, No. 23.7 at pp. 38–40) ASAP also commented that the consumer utility of CCWs to wash clothes is independent of whether they are accessed from the top or the front. (ASAP, Public Meeting Transcript, No. 23.7 at pp. 83–84)

Although DOE considered issuing a single CCW product class in the ANOPR that would encompass both top-loading and front-loading CCWs, further consideration of the relevant statutory provisions and the public comments on the November 2007 ANOPR have led DOE to conclude that EPCA does not permit adoption of a standard that would eliminate top-loading CCWs. Accordingly, for the reasons explained below, DOE has decided to establish two classes of CCWs based upon axis of access (*i.e.*, top-loading or front-loading).

When directing the Secretary to consider amendments to the energy efficiency standards for CCWs, Congress did not mandate use of a single class or alter other relevant provisions of the statute related to setting classes. First, under 42 U.S.C. 6311(21), the definition of ''commercial clothes washer'' specifically includes both horizontal-axis clothes washers (front-loading machines) and vertical-axis clothes washers (top-loading machines). Further, the prescriptive standards for CCWs (1.26 MEF/9.5 WF), as set forth in 42 U.S.C. 6313(e), are achievable by both top-loading and front-loading machines. Neither provision indicates an intention to eliminate either type of CCW currently available.

Next, 42 U.S.C. 6295(o)(4)[25] provides, ''The Secretary may not prescribe an amended or new standard * * * that is likely to result in the unavailability in the United States in any covered product type (or class) of 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.'' This statutory provision demonstrates congressional intent to forego potential energy savings under certain enumerated circumstances. DOE has determined that this provision applies to the present CCW rulemaking.

In previous rulemakings, DOE has concluded that the method of ''loading'' clothes in washers (axis of access) is a

[23] 42 U.S.C. 6313(e); codified at 10 CFR 431.156.

[24] Typically, vertical-axis clothes washers are accessed from the top (also known as ''top-loaders''), while horizontal-axis clothes washers are accessed from the front (also known as ''front-loaders''). However, a limited number of residential horizontal-axis clothes washers which are accessible from the top (using a hatch in the wash basket) are currently available, although DOE is unaware of any such CCWs on the market. For the purposes of this analysis, the terms ''vertical-axis'' and ''top-loading'' will be used interchangeably, as will the terms ''horizontal-axis'' and ''front-loading.'' Additionally, clothes washers that have a wash basket whose axis of rotation is tilted from horizontal are considered to be horizontal-axis machines.

[25] This provision is also applicable to CCWs, pursuant to 42 U.S.C. 6316(a).

''feature'' within the meaning of 42 U.S.C. 6295(o)(4) and, consequently, established separate product classes for top-loading and front-loading RCWs. (56 FR 22263 (May 14, 1991)) DOE reiterated this position in denying the California Energy Commission's (CEC) petition for waiver from Federal preemption of its RCW regulation.[26] (71 FR 78157 (Dec. 28, 2006)) DOE denied the CEC petition for three separate and independent reasons, one of which was that ''interested parties demonstrated by a preponderance of evidence that the State of California regulation would likely result in the unavailability of a class of residential clothes washers in California. * * * [T]he rule would violate EPCA in another way, *i.e.*, it would mandate the 6.0 WF standard in 2010, which would likely result in the unavailability of top-loader residential clothes washers.'' *Id.* at 78157–58. Given the similarities in technologies and design and operating characteristics between RCWs and CCWs, in DOE's judgment, the axis of access must be accorded similar treatment in the context of the current CCW rulemaking.

If DOE were to propose an amended standard for CCWs under the statutory criteria set forth in EPCA based upon a single product class, the result would be a standard that would effectively eliminate top-loading CCWs from the market, because it would set an MEF for all CCWs at a level significantly higher than the max-tech for top-loading machines. Because such a standard would violate the statute (42 U.S.C. 6295(o)(4); 6313(a)), DOE has decided to propose separate product classes and accompanying standards for top-loading and front-loading CCWs in today's NOPR.

B. Technology Assessment

In the market and technology assessment DOE conducted for the November 2007 ANOPR, DOE identified technology options available to improve the energy efficiency of each type of covered product. (See the TSD accompanying this notice, chapter 3.) A discussion of these options as they relate to the product categories at issue in this rulemaking follows.

1. Cooking Products

At the December 2007 public meeting, DOE summarized its initial observations of technologies associated with standby power in microwave ovens and invited comment. DOE investigated technology options that appeared to be feasible means of decreasing standby power. Based on observations from tests, DOE suggested that microwave oven standby power largely depends on the display technology used, the associated power supplies and controllers, and the presence or lack of a cooking sensor that requires standby power.[27] AHAM stated that functions such as sensors, clocks, and perhaps others consume standby power but also provide consumer utility. If a standby power standard is developed, AHAM believes it is critical to look at these functions and identify them properly in order to change the test procedure appropriately. AHAM stated it would work with DOE to identify the changes and some of the consumer utilities. (AHAM, Public Meeting Transcript, No. 23.7 at pp. 70–71)

According to Whirlpool, microwave ovens use standby power primarily for a clock and the instant-on capability. Whirlpool noted that consumers who purchase over-the-range microwave ovens with features such as sensing and auto-cook cycles expect a display that allows execution of these capabilities, matches their other premium appliances such as their ranges, and differentiates itself from the simple display on a basic-functionality countertop microwave oven. (Whirlpool, No. 28 at pp. 1–2; Whirlpool, Public Meeting Transcript, No. 23.7 at p. 73)

The Edison Electric Institute (EEI) commented that it does not consider cooking sensors in microwave ovens to be a part of ''standby,'' since the sensors perform useful and helpful functions to consumers. EEI stated that DOE should test microwave ovens to see if cooking sensors reduce overall cooking times because reduced cooking times will likely create greater energy savings than the standby energy consumption of the sensor. (EEI, No. 25 at pp. 2–3)

DOE will analyze any data and information provided by stakeholders to evaluate the utility provided by specific features that contribute to microwave oven standby power. In addition, DOE has conducted additional research on several microwave oven technologies that significantly affect standby power, including cooking sensors, display technologies, and control strategies and associated control boards.

a. Cooking Sensors

Product teardowns performed by DOE during the November 2007 ANOPR analyses revealed that the most common identifiable cooking sensors are absolute humidity sensors. This sensor technology currently requires standby power in the range of 1 to 2 W to keep the sensing element heated, and also requires warm-up times in excess of two minutes if the sensor power is switched off. Japanese microwave oven manufacturers stated that they are unaware of any absolute humidity sensors that did not require standby power to stay warm. Standby testing by DOE and AHAM revealed no microwave ovens with cooking sensors that consume less than 2 W in standby mode.

EEI questioned whether cooking sensors that lack multi-minute warm-up times exist, since microwave oven cooking times typically do not exceed two minutes. (EEI, Public Meeting Transcript, No. 23.7 at p. 234) The Joint Comment stated that, in the unlikely event that there is not a straightforward technical solution (*e.g.*, a faster-stabilizing gas-sensing medium) to existing sensor technology, DOE should look into alternative sensing approaches to cooking status. The Joint Comment stated that if DOE fails to find standard-type cook sensors with shorter stabilization times or alternative sensing and control strategies, at a minimum, DOE should evaluate other options including (1) an auto power-down mode for cooking sensing devices that is consumer programmable, and (2) requirements that microwave ovens be shipped with the cooking sensor disabled. (Joint Comment, No. 29 at p. 8)

Whirlpool commented that a potential standby power standard could eliminate cooking sensors in microwave ovens as current cooking sensors typically require two minutes to warm up before use. According to Whirlpool, imposing a two-minute waiting period before each microwave oven use would negate much of its consumer utility. (Whirlpool, No. 28 at pp. 1–3)

During teardown analyses, DOE observed that microwave ovens from one manufacturer use a piezoelectric steam sensor, which requires zero power in standby mode. In addition, DOE has identified infrared and weight sensors with little to no warm-up time that do not consume standby power and that have been applied successfully in microwave ovens currently available in the Japanese market. DOE has also identified relative humidity sensors as a type of zero-standby sensor that can be used in a microwave oven, but is unaware of any microwave ovens on the market that use this type of sensor. Lastly, DOE was made aware of an

[26] DOE's denial of the CEC petition is currently in litigation *(California Energy Comm'n* v. *DOE,* No. 07–71576 (9th Cir. filed April 23, 2007)).

[27] Cooking sensors, which infer the cooking state of the food load, can reduce cook times and potentially produce real-world energy savings, although this benefit is not currently captured by the DOE test procedure and DOE is unaware of any data quantifying such an effect.

absolute humidity sensor that requires no standby power, has zero incremental cost above that of a conventional absolute humidity sensor, and is in the process of being phased into production for a major microwave oven supplier to the U.S. market. Based on its research and manufacturer interviews, DOE believes that the number of different sensor technologies available on the market that do not require standby power suggests that the utility of a cooking sensor can be maintained with zero standby power. Further, DOE believes all manufacturers could transition to no-standby-power cooking sensors at a zero incremental cost for the sensor change by the effective date of a proposed standby power standard.

b. Display Technologies

During reverse-engineering activities conducted as part of the November 2007 ANOPR analysis, DOE observed three different display types used in microwave ovens: Light-emitting diode (LED) displays, liquid crystal displays (LCD) with and without backlighting, and vacuum fluorescent displays (VFD). (See chapter 3 of the TSD accompanying this notice for further discussion of these technologies.) Within the 32-unit sample that DOE examined, microwave ovens equipped with VFDs consumed the most power, on average, followed by units featuring backlit LCDs, LEDs, and non-backlit LCDs. DOE sought comment regarding the consumer utility of different display technologies.

The Joint Comment stated that, unless a unique consumer utility can be shown for VFDs, the standard level analyzed should be based on LCD backlit or LED displays. According to the Joint Comment, LED and organic LED (OLED) products have dramatically increasing efficiency performance, and more color palettes are becoming available. In their opinion, a 1.0 to 1.5 W combined allowance for clock face display and illumination with power supply losses appears more than ample in view of rapidly improving power supply and lighting technologies. (Joint Comment, No. 29 at pp. 8–9)

Interviews DOE conducted with display manufacturers revealed that VFDs can achieve higher brightness levels, wider viewing angles, and higher contrast than backlit LCDs. Display manufacturers also stated that LEDs have largely comparable performance to VFDs in terms of brightness and viewing angle. A VFD manufacturer mentioned that, while VFD technologies with efficiencies comparable to backlit LCDs do exist, such displays are substantially more expensive than the VFDs commonly found in microwave ovens today.

Multiple manufacturers of cooking products interviewed as part of the MIA process mentioned the need to differentiate their cooking appliance lines from those of their competitors with (among other things) coordinated displays and user interfaces. Manufacturers noted that LCD displays (backlit or not) do not work well in appliances that get very hot, such as ovens, due to thermal limitations. Manufacturers also opposed switching entirely to LED-based displays since it could make it harder for them to differentiate their products, particularly in a market as commoditized as microwave ovens. Lastly, manufacturers noted that larger, more complex, and more colorful displays are usually associated with premium appliances, which will have a harder time achieving the same standby power consumption as units with smaller, dimmer, and simpler displays.

The current rulemaking does not seek to regulate the standby power consumption of conventional cooking appliances, and microwave ovens do not feature high surface temperatures and can incorporate one of many display options, as noted in the DOE sample. In addition, not all high-end appliance manufacturers use the same display technology across all cooking appliances that they manufacture. For example, at least one manufacturer uses a backlit LCD in its microwave oven, with the backlighting LEDs color-coordinated with the VFDs found in its ovens. DOE believes that the consumer utility of a microwave oven display is its brightness, viewing angle, and ability to display complex characters, and that this utility can be achieved by several display technologies. Therefore, in determining standby power levels, DOE will consider each of these display technologies and their respective power requirements.

c. Power Supply and Control Board Options

Another potential area for standby power improvements is the power supplies on the control board. Multiple improvement paths with varying risk to manufacturers are available, including the selective upgrading of power supply components to boost efficiency, the reduction of peak power demand through the use of lower-power components, and the transition to switching power supplies.

Power supply topology experts that DOE consulted noted that the quality of the transformer core material, types of diodes, capacitor quality, and voltage regulator selection could reduce no-load standby power for the power supply by half and boost conversion efficiency from 55 to 70 percent. Switching power supplies offer the highest conversion efficiencies (up to 75 percent) and lowest no-load standby losses (0.2 W or less) though at a higher cost, higher part count, and greater complexity. However, switching power supplies are as yet unproven in long-term microwave oven applications, and the greater complexity of these power supplies may also lower overall reliability. For more detail, see chapter 3 of the TSD accompanying this notice.

There already are some premium microwave ovens on the U.S. market that incorporate switching power supplies. However, due to the incremental cost of such a power supply over a conventional power supply and the price competition in the microwave oven market, it is unlikely that switching power supplies will find wider application unless low standby power budgets force manufacturers to consider them.

d. Power-Down Options

Manufacturers could also meet very low (less than 1 W) standby power levels according to the EISA 2007 and IEC 62301 definitions of ''standby mode'' by incorporating an automatic function that turns off most power-consuming components once a period of inactivity has elapsed. Such a low-consumption state could be user-selectable on demand, or could be the default condition in which the microwave oven is shipped such that the consumer would be required to opt into maintaining the display, cooking sensor, or other utility feature during standby. DOE has determined that some microwave oven suppliers to the U.S. market have already taken such approaches to meet prescriptive standby power standards in other markets such as Japan. Therefore, DOE analyzed how the consumer utility of a microwave oven is influenced by this design option. A large number of microwave ovens in the Japanese market implement this feature, according to DOE discussions with the Japanese Electrical Manufacturers' Association.

As outlined in the cooking sensor discussion (see section IV.B.1 of this notice), the Joint Comment stated that if DOE fails to find suitable cooking or other sensors, at a minimum, DOE should evaluate (1) an auto power-down mode for cooking sensing devices that is consumer programmable and (2) requirements that microwave ovens be shipped with the cooking sensor

disabled. (Joint Comment, No. 29 at p. 8)

DOE determined that control strategies are available that allow manufacturers to make design tradeoffs between incorporating standby-power-consuming features such as displays or cooking sensors and including a function to turn power off to these components during standby.

2. Commercial Clothes Washers

DOE did not receive any comments on the technology assessment for CCWs other than those discussed previously in section III.C.1. Therefore, DOE retained all of the CCW design options listed in the November 2007 ANOPR for the engineering analysis. (For further information, see chapter 3 of the TSD accompanying this notice.)

C. Engineering Analysis

The purpose of the engineering analysis is to characterize the relationship between the efficiency (or annual energy use) and cost of the products that are the subject of this rulemaking. DOE used this efficiency/cost relationship as input to the payback period, LCC, and national impact analyses. To generate manufacturing costs, DOE has identified three basic methodologies: (1) The design-option approach, which provides the incremental costs of adding to a baseline model's design options that will improve its efficiency; (2) the efficiency-level approach, which provides the incremental costs of moving to higher energy efficiency levels, without regard to the particular design option(s) used to achieve such increases; and (3) the cost-assessment (or reverse-engineering) approach, which provides ''bottom-up'' manufacturing cost assessments for achieving various levels of increased efficiency, based on detailed data on costs for parts and material, labor, shipping/packaging, and investment for models that operate at particular efficiency levels.

DOE conducted the engineering analysis for this rulemaking using different methods for each of the covered products. For cooking products, DOE selected the design-option approach, because efficiency ratings of products on the market are not reported; therefore, the engineering analysis for cooking products was based upon an update to the analysis contained in the 1996 TSD. For CCWs, published efficiency data allowed the use of an efficiency-level approach. DOE supplemented both approaches with data gained through reverse-engineering analysis and primary and secondary research, as appropriate. Details of the engineering analysis are in the TSD accompanying this notice (see chapter 5).

1. Efficiency Levels

a. Cooking Products

For cooking products, DOE reviewed and updated the design options and efficiency levels published in the 1996 TSD analysis, as generally supported by stakeholders. DOE did not receive any comments regarding omitted cooking technologies and will retain all the cooking technologies and design options identified in the November 2007 ANOPR. (See chapter 3 of the TSD accompanying this notice.)

Microwave Oven Cooking Efficiency. To identify microwave oven design options, DOE performed a reverse-engineering analysis on a representative sample of microwave ovens. DOE did not find any additional design options beyond those identified in the November 2007 ANOPR. DOE also performed efficiency testing on the sample of microwave ovens, which validated data submitted by AHAM (reproduced in appendix 5–A of the TSD accompanying this notice). Results from both AHAM and DOE efficiency testing showed no identifiable correlation between cooking efficiency and either cavity volume or rated output power. DOE's reverse-engineering analysis included an evaluation of microwave oven magnetrons, magnetron power supplies, and fan motors (identified as design options in the TSD). This evaluation determined that efficiencies for these design options have changed little since the 1996 analysis. Therefore, DOE believes that this supplementary analysis validates the efficiency levels that were presented in the November 2007 ANOPR. For more detail, see chapter 5 of the TSD accompanying this notice.

Microwave Oven Standby Power. DOE is considering a maximum average standby power, in W, for microwave ovens. DOE's analysis estimates the incremental manufacturing cost for microwave ovens with standby power levels below the baseline standby power level of 4 W. For the purposes of this standby power analysis, a baseline microwave oven is considered to incorporate an absolute humidity cooking sensor.

To analyze the cost-efficiency relationship for microwave oven standby, DOE defined standby power levels expressed as a maximum average standby power, in W. To analyze the impacts of standards, DOE defined the following four standby levels for analysis: The FEMP procurement efficiency recommendation; the IEA One-Watt level; a standby power level as a gap-fill between the FEMP Procurement Efficiency Recommendation and IEA One-Watt Program levels; and the current maximum microwave oven standby technology (*i.e.*, lowest standby power) that DOE believes is or could be commercially available when the energy conservation standards become effective, based on a review of microwave ovens currently on the market worldwide. Table IV.1 provides the microwave oven standby levels and the reference source for each level that DOE has analyzed. For more details on the determination of standby power levels, see chapter 5 of the TSD accompanying this notice.

TABLE IV.1—STANDBY POWER LEVELS FOR MICROWAVE OVENS

Standby level	Standby level source	Standby power (W)
Baseline	Baseline	4.0
1	FEMP Procurement Efficiency Recommendation	2.0
2	Gap Fill	1.5
3	IEA 1-Watt Program	1.0
4	Max-Tech	0.02

The Joint Comment stated that opportunities exist for reducing standby power without affecting consumer utility. The Joint Comment noted that, for the microwave ovens listed in the FEMP procurement database, 50 percent of the models with both a clock display and a cooking sensor have a standby demand of between 2.1 and 3.0 W,

implying that a baseline standby demand could be reduced to 3.0 W and probably less without threat of reduction of consumer utility. (Joint Comment, No. 29 at pp. 6–8)

b. Commercial Clothes Washers

The efficiency levels for CCWs are defined by two factors normalized by wash basket volume—MEF and WF. These two variables are only directly related to each other via the average hot water usage by a clothes washer as measured by the DOE test procedure. Other measured parameters affect only one variable or the other. For example, cold water consumption only affects the WF, while remaining moisture content (RMC) only affects the MEF. (See chapter 5 of the TSD accompanying this notice for further explanation.) Based on comments and the determination at that time to consider a single product class for CCWs, DOE selected potential efficiency levels for the November 2007 ANOPR that were based on current Federal energy conservation standards, ENERGY STAR and CEE Commercial Clothes Washer Initiative criteria, and specifications for CCWs currently on the market. DOE sought comment on whether efficiency level 5 (2.0 MEF/5.5 WF, which corresponds to efficiency level 2 for front-loading CCWs in the current analysis) should be changed to allow for manufacturer cost differentiation above and below this level.

Alliance stated that the only reason to adjust CCW energy and water consumption at the 2.0 MEF/5.5 WF level would be to allow inclusion of other manufacturers (since Alliance already produces units at this level) and to allow manufacturers to add water through additional rinses. The latter would address rinsing issues prevalent in front-loading machines but would consume more energy in the motor. Alliance stated that it could support adjusting the 2.0 MEF/5.5 WF level to be less stringent and more flexible in meeting consumer demands for cleaning and rinsing performance, as well as to allow the inclusion of existing manufacturer designs that would obviate the need for incurring additional investment. (Alliance, No. 26 at p. 2) DOE notes that, based on the entries in the CEC, CEE, and ENERGY STAR databases, CCWs from several manufacturers can attain 2.0 MEF/5.5 WF for both institutional and non-institutional use. For example, two other manufacturers produce non-institutional front-loading CCWs that achieve energy and water efficiency levels of 2.13 MEF/5.03 WF and 1.99 MEF/6.8 WF, respectively. Alliance and one of its competitors could thus add water to their CCW cycle, whereas the third competitor would have to reduce water consumption to meet the 5.5 WF standard with its current model that nearly meets the 2.0 MEF efficiency level.

Based upon the determination of two product classes for CCWs (see section IV.A.2), DOE subsequently revised the efficiency levels presented in the November 2007 ANOPR to characterize top-loading and front-loading CCWs separately. Accordingly, DOE considered the efficiency levels subsequently presented in Table IV.3, which were derived from current Federal energy conservation standards, ENERGY STAR and CEE Commercial Clothes Washer Initiative criteria and databases of currently available models, and entries in the CEC database. DOE seeks comment on these revised efficiency levels.

DOE also sought comment on the max-tech efficiency level defined for the single product class in the November 2007 ANOPR. DOE noted that some CCWs on the market have MEFs or WFs that exceed the CCW max-tech efficiency level for one measure, but not both. For example, one CCW on the market at the time of the November 2007 ANOPR (2.45 MEF/9.5 WF) had a max-tech MEF performance but a baseline WF performance.[28] DOE did not receive comment on which front-loading CCWs best represent max-tech, and why. Stakeholder comments discussed in the November 2007 ANOPR indicated that a high MEF and low WF are not necessarily correlated, and, thus, a max-tech level based on the highest MEF and lowest WF is not realistic. 72 FR 64432, 64465 (Nov. 15, 2008). As discussed in section III.C.2.b, DOE agreed with these comments, and selected top-loading and front-loading CCWs currently available on the market that exhibit a balance of high MEF and low WF to represent max-tech for each product class.

For top-loading CCWs, no max-tech level was defined in the November 2007 ANOPR because the analysis was structured as a single product class, and, generally, top-loading machines cannot achieve as high an efficiency level as front-loading machines. Based on market surveys of currently available models, DOE proposes in this notice a max-tech level of (1.76 MEF/8.3 WF) for top-loading CCWs. For front-loading CCWs, DOE considered the max-tech level proposed in the November 2007 ANOPR for the single product class, since all CCWs at such high efficiencies are front-loading. However, because new model introductions and discontinuations have occurred since the November 2007 ANOPR, DOE has determined a new max-tech level for front-loading CCWs as well, which is higher in efficiency than the max-tech level proposed in the November 2007 ANOPR (2.2 MEF/5.1 WF). The new max-tech level for front-loading machines is (2.35 MEF/4.4 WF), based on a currently available CCW. These units were selected after an extensive market survey, and DOE's research suggests that their combination of high MEF and low WF represent the best-in-class balance between MEF and WF for the two product classes of CCWs. These max-tech levels were also the basis for all MIA incremental cost data developed in DOE's analysis. DOE seeks comment on the determination of the max-tech efficiency levels for top-loading and front-loading CCWs.

2. Manufacturing Costs

DOE estimates a manufacturing cost for products at each efficiency level in this rulemaking. These manufacturing costs are the basis of inputs for a number of other analyses, including the LCC, national impact, and the GRIM analyses.

The Joint Comment made the following three cross-cutting comments about manufacturing costs spanning the product families that this rulemaking could affect:

- Rather than rely primarily on manufacturer average cost data, DOE should give greatest weight in its analysis to cost data determined through its reverse-engineering analyses, which have a better track record of estimating actual costs.
- When using manufacturer data, DOE should use the minimum cost data submitted, rather than the average cost data. Minimum data are appropriate because the low-cost manufacturer will determine prices in a market at equilibrium. If one manufacturer has found a cheaper way to make a product, others will follow if they wish to compete in the price-sensitive portion of the marketplace.
- Once a new standard is promulgated, producers have a strong incentive to invest in new engineering solutions and production capacity that will enable them to comply at the lowest possible cost. (Joint Comment, No. 29 at p. 13)

DOE agrees with the first point of the Joint Comment that reverse-engineering provides valuable information in

[28] This information, available at *http://www.energy.ca.gov/appliances/appliance/excel_based_files/Clothes_Washers/*, was accessed on April 29, 2008.

determining manufacturing cost, and DOE notes that, in addition to considering the manufacturer-submitted cost data, it conducts reverse-engineering analysis and teardowns to the extent practicable. DOE also considers sales census data combined with a markup data to reflect all the steps in the distribution chain, as well as previous TSD cost data, updated to reflect current manufacturing costs. DOE has used all the listed approaches as part of this rulemaking, although the precise approach varied by product.

In response to the Joint Comment's second point, DOE does not believe that it has been demonstrated that the low-cost manufacturer will determine the prices in a market at equilibrium, nor that a low-cost manufacturer will correspond to low-cost products on the market. There may be relatively complex, low-cost machines that are not necessarily produced by the low-cost manufacturer. There may also be features, including quality, that are indicative of higher-cost units that the marketplace demands. Therefore, DOE continues to use shipment-weighted average cost data in its analyses because it believes that such costs are the most reflective of the manufacturing costs that industry incurs. DOE notes that many appliances with nominally similar functions sell at a range of price points. Such differentiation may be the result of features that may not be efficiency-related but may provide consumer utility. Through its shipments-weighted average costing process, DOE believes that the rulemaking will factor in continuing product differentiation, since it best reflects the actual state of the industry and the preferences by consumers. This shipment-weighted approach is also consistent with the data submitted by stakeholders, allowing direct comparisons between DOE analyses such as the reverse engineering and the data submittals.

In considering the Joint Comment's third point, DOE recognizes that it may well be true that a change in energy conservation standards is an opportunity for manufacturers to make investments beyond what would be required to meet the new standards in order to minimize the costs or to respond to other factors. For example, a product could be re-engineered to take out cost (*e.g.*, reduce the number of parts); capital investments could be made to remove labor costs (*e.g.*, automate production); or production could be moved to lower-cost areas. However, these are individual company decisions, and it is impossible for DOE to forecast and analyze such investments. DOE does not know of any data that provide it with the capability of determining what precise course a manufacturer will take. Furthermore, while manufacturers have been able to take costs out of products to meet previous energy conservation standards, there are no data to suggest that there are any further costs to take out. Regarding capital investments, DOE assumes that the existing manufacturing processes remain the same. If capital investments are expected to be made, DOE requires data demonstrating this in order to include in the MIA and the employment impact analysis. Similarly, because the potential for moving production is unknown to DOE, data must be provided for analysis.

Cooking Products. The Joint Comment suggested that DOE should collect energy and cost data for ovens for individual features such as low-power electronic controls, clock faces, and other standby load features. If industry cannot provide compelling cost data, the Joint Comment suggested that DOE should model it as a zero-cost design option. (Joint Comment, No. 29 at p. 6; ASAP, Public Meeting Transcript, No. 23.7 at p. 62) Regarding microwave oven costs, Whirlpool supported the approach of using the Producer Price Index (PPI) to update design options identified in the prior rulemaking, and stated that it is unaware of meaningful new design options to recommend to DOE. (Whirlpool, No. 28 at p. 5)

DOE contacted original equipment manufacturer (OEM) suppliers and manufacturers to better understand the costs associated with various microwave oven components such as displays, power supplies, and magnetrons. Suppliers and manufacturers agreed that many lower-power, higher-efficiency components cost more to implement. For example, a switching power supply has more, and higher cost, components than a standard unregulated power supply. Similarly, increases in raw material prices have affected the cooking efficiency design options that DOE had identified in this and past analyses. Because no industry cost data were provided, DOE scaled the costs associated with each cooking efficiency design option from the 1996 TSD by the PPI. Because DOE proposes a microwave oven standby power standard, DOE developed manufacturing costs related to improved standby performance by estimating costs of published power supply designs and components, referencing subject-matter experts, and interviewing manufacturers that use such components.

Commercial Clothes Washers. For CCWs, AHAM supplied industry-aggregated manufacturing cost data for the November 2007 ANOPR analyses at two efficiency levels, which correspond to efficiency level 1 for top-loading CCWs and efficiency level 2 for front-loading CCWs. DOE updated these costs following the November 2007 ANOPR to include additional efficiency levels for each product class, based on manufacturer-supplied data and DOE analysis. DOE undertook a limited reverse-engineering approach to costing out the different efficiency points.[29] In addition, DOE relied on interviews with manufacturers, knowledge of the clothes washer market through previous rulemakings, ENERGY STAR, and other activities. DOE believes that the updated cost-efficiency curves reflect costs that clothes washer manufacturers are likely to experience.

The following discussion addresses specific issues raised in response to the November 2007 ANOPR.

a. Cooking Products

Electronic Ignition Systems. In the November 2007 ANOPR, DOE identified electronic ignition systems as a design option that can be used instead of standing pilot lights to light gas-fired cooking appliances. DOE estimated incremental manufacturing costs of electronic ignition systems by scaling the manufacturing costs that were provided in the 1996 TSD by the PPI.

DOE did not receive any comments that electronic ignition systems were an inappropriate design option to consider for this rulemaking. However, AGA commented that DOE underestimated the incremental manufacturing cost of electronic ignition for gas cooking products. According to AGA, the Harper-Wyman Co. provided an incremental retail price of $150 for a gas range with electronic ignition relative to a range with standing pilot ignition system in 1998 comments to DOE. This retail price increment stands in sharp contrast to the $37 incremental manufacturing cost estimated by DOE. (AGA, No. 27 at p. 13)

In response to AGA's comments, DOE contacted component suppliers of gas cooking product ignition systems to validate DOE's manufacturing cost estimates in the November 2007 ANOPR. DOE believes that the information collected verifies that the costs in the November 2007 ANOPR represent current costs and, therefore, will continue to characterize the incremental manufacturing costs for the non-standing pilot ignition systems with

[29] Late introductions of high-efficiency models did not allow for extensive reverse engineering due to the rulemaking schedule.

the estimates developed for the November 2007 ANOPR.

Microwave Oven Standby Power. For microwave ovens, DOE estimates a cost-efficiency relationship (or ''curve'') for microwave oven standby power in the form of the incremental manufacturing costs associated with incremental reductions in baseline standby power. As part of the November 2007 ANOPR analysis, DOE tested and tore down 32 microwave ovens and determined that microwave oven standby power depends on, among other factors, the display technology used, the associated power supplies and controllers, and the presence or lack of a cooking sensor. The results and discussion of standby testing along with standby power data submitted by AHAM can be found in chapter 5 of the TSD accompanying this notice. From this testing and reverse-engineering, DOE observed correlations between specific components and technologies, or combinations thereof, and measured standby power.

DOE estimated costs for each of component and technology by using quotes obtained from suppliers, interviews with manufacturers, interviews with subject matter experts, research and literature review, and numerical modeling. DOE obtained preliminary incremental manufacturing costs associated with the standby levels by considering combinations of these components as well as other technology options identified to reduce standby power. DOE also conducted manufacturer interviews to obtain greater insight into the design strategies to improve efficiency and the associated costs.

Table IV.2 shows microwave oven standby power preliminary cost-efficiency results. Based upon DOE's research, interviews with subject matter experts, and discussions with manufacturers, DOE believes that all consumer utility (*i.e.*, display, cooking sensor, etc.) can be maintained by standby levels down to standby level 3 (1.0 W). At the max-tech level, DOE would expect the implementation of an auto power-down feature that would, among other things, shut off the display after a period of inactivity, potentially impacting consumer utility. For the detailed cost-efficiency analysis, including descriptions of design options and design changes to meet standby levels, see chapter 5 of the TSD accompanying this notice.

TABLE IV.2—INCREMENTAL MANUFACTURING COSTS FOR MICROWAVE OVEN STANDBY POWER

Standby level	Incremental cost
Baseline	NA
1	$ 0.30
2	$ 0.67
3	$ 1.47
4	$ 5.13

DOE observed several different cooking sensor technologies in its sample of 32 microwave ovens. Follow-on testing after the December 2007 public meeting showed that some of these sensors are zero-standby (relative humidity) cooking sensors. One manufacturer also indicated during its MIA interview that its supplier of cooking sensors had developed zero-standby absolute humidity cooking sensors and that these sensors would have the same manufacturing cost as the higher-standby power devices they would replace. Based on the number of zero-standby cooking sensor approaches from which manufacturers can choose, DOE believes that all manufacturers can and likely will implement zero-standby cooking sensors by the effective date of a standby power standard, and maintain the consumer utility of a cooking sensor without affecting unit cost.

DOE believes that a standard at standby levels 1 or 2 would not affect consumer utility, because all display types could continue to be used. For these two levels, better power supplies should allow the continued use of any display that DOE found in its sample of 32 units. At standby level 3 for VFDs and standby level 4 for all display technologies, DOE analysis suggests the need for a separate controller (auto power-down) that automatically turns off all other power-consuming components during standby mode. Such a feature would impact the consumer utility of having a clock display only if the consumer could not opt out of auto power-down. For the detailed cost-efficiency analysis, including descriptions of design options and design changes to meet standby levels, see chapter 5 of the TSD accompanying this notice.

b. Commercial Clothes Washers

The CCW industry currently has only three major manufacturers (*i.e.*, with more than one percent market share), and a limited number of CCWs models are available for purchase. As a result, only a few models are available for purchase at a given efficiency point, thereby restricting the amount of data that AHAM could submit.[30] Accordingly, AHAM submitted two manufacturing cost estimates: (1) $74.63 at (1.42 MEF/9.5 WF), and (2) $316.35 at (2.00 MEF/5.5 WF.) These are incremental costs over a baseline top-loading CCW. Without additional data, and based on preliminary manufacturer inputs, DOE, in the November 2007 ANOPR, adopted a cost-efficiency curve where all efficiency levels at or above (1.60 MEF/8.5 WF) incorporated the same manufacturing cost published for (2.00 MEF/5.5 WF.) DOE sought stakeholders' comment on how to refine the cost curve to better reflect shipment-weighted manufacturing costs by efficiency level. 72 FR 64432, 64513 (Nov. 15, 2007).

In comments on the ANOPR, Whirlpool, Alliance, and AHAM stated that it was not reasonable to assume that all CCWs achieving (1.60MEF/8.5 WF) through (2.20 MEF/5.1 WF) would have the same costs. (Whirlpool, No. 28 at pp. 4–5, Alliance, No. 26 at p. 2 and AHAM, No. 32 at p. 10) For example, Whirlpool stated that step functions generally exist in product cost as efficiency increases, and that the cost differences between these steps are significant, whereas the cost differences within the steps are less significant. (Whirlpool, No. 28 at pp. 4–5) In other words, certain efficiency levels can only be reached using certain technology options. In the case of CCWs, there is a point beyond which standard top-loading CCWs with agitators can no longer be used and a switch has to be made to higher-efficiency platforms. Whereas the run up to the switch may be gradual in terms of design changes, a switch to a higher-efficiency platform such as a front-loading CCW usually entails a significant jump in product cost, which appears as a step function. Whirlpool noted that DOE has identified the steps for CCWs as traditional top-load and front-load units. According to Whirlpool, DOE's analysis does not include the possibility of a high-efficiency top-load CCW. Further, Whirlpool stated that, although such a machine is not in the market today, the company's experience in building residential high-efficiency top-load clothes washers could be translated into the development of a high-efficiency top-load CCW. Such a machine could likely perform at CCW efficiency levels (1.72 MEF/8.0 WF), (1.80 MEF/7.5 WF),

[30] In order to avoid anti-competitive effects, AHAM is limited to publishing aggregated data by efficiency levels for which at least three AHAM members have submitted cost-efficiency data. AHAM weights the submission by unit shipments for each manufacturer to reflect current market conditions and to maintain confidentiality.

and (2.00 MEF/5.5 WF). (Whirlpool, No. 28 at pp. 4–5)

Although AHAM is unable to provide cost information at levels other than (1.42 MEF/9.5 WF) and (2.0 MEF/5.5 WF) while maintaining the confidentiality of its members, it recommended that DOE either approach CCW manufacturers directly or evaluate the cost differentials between residential front-loading units and verify with manufacturers that application of these costs and design options are realistic for CCWs. (AHAM, No. 32 at p. 10) In response, DOE contacted all CCW manufacturers and constructed its own estimate of the manufacturer cost curve by efficiency level.

Alliance produces both top-loading and front-loading CCWs. Alliance stated that a low-cost alternative to front-loading CCWs for efficiency levels above 1.42 MEF would use existing, non-traditional technologies that are proprietary and have been shown not to be accepted in the residential market, and thus would never be accepted in the commercial market. According to Alliance, the reason for a constant incremental CCW manufacturing cost at MEF = 1.6 and above is that Alliance cannot afford to invest in any new technology in that range, because they already have a washer at the higher (2.00 MEF/5.5 WF) efficiency level. (Alliance, No. 26 at p. 2) DOE noted the new listing of a traditional top-loading CCW in December 2007 that achieves (1.76 MEF/8.3 WF), well beyond the limits that Alliance stated could be achieved. However, market acceptance of the new unit is unknown and similar washers incorporating spray rinse technology have been previously withdrawn from the CCW market due to consumer acceptance issues.

DOE is sensitive to the unique position of the low volume manufacturer (LVM) in the marketplace, as its low manufacturing scale makes product development and capital expenditure investments that much harder to justify. Unlike its diversified competitors, the LVM services the comparatively small (*i.e.* 45× smaller) CCW market almost exclusively. Whereas its competitors can develop new technologies for use in the CCW market as well as the much larger RCW market, the LVM has to depreciate its investments over a much smaller production range. As a result of its concentration on commercial laundry and its low manufacturing scale, the LVM will be disproportionately affected by any CCW rulemaking compared to its competitors who derive less than two percent of their clothes washer revenues from CCW sales. DOE research to date suggests that a wholesale conversion of the LVM production facility to a lower-cost front-loading washer is not cost-justified. Thus, a consumer boycott of higher-efficiency but traditional top-loading clothes washers due to wash performance issues could be just as effective at ending top-loading CCW production as a single product class designation requiring the use of front-loading washers. The LVM has stated that if it were required to convert its production facility to front-loading production that it would likely suffer material harm and exit the clothes washer business altogether.

The Joint Comment argued that Alliance has a dominant CCW market share and can thus make the kinds of investments that are required to meet applicable efficiency standards. The Joint Comment also stated that Alliance's competitors would be forced to recover their efficiency-related investments over a smaller shipment base, and that their investments in CCWs could not be distributed over the cost-competitive RCW market as well. (Joint Comment, No. 29 at p. 3)

In response to these comments, DOE notes that most CCWs on the market in the United States are based largely on RCW platforms that are upgraded selectively. Some investments (such as the controllers) are CCW-specific but only make up part of the total unit cost. The majority of capital expenditures related to tooling, equipment, and other machinery in a plant can usually be applied to the residential as well as the commercial market. Thus, overall (RCW + CCW) manufacturing scale has a significant impact on the cost-effectiveness of potential upgrades. A manufacturer with a high-volume residential line can cost-justify much more capital-intensive solutions if they are applicable in both markets, in contrast to a low-volume manufacturer that lacks the scale to make the investments worthwhile. Thus, a low-volume manufacturer may be required to purchase upgrade options from third-party vendors to upgrade their units instead of developing less expensive, but capital-intensive, in-house solutions. In the clothes washer market, the most direct CCW competitor has over 60 times the overall shipment volumes of the LVM. This scale difference also relates to purchasing power. A large, diversified appliance manufacturer can use its production scale to achieve better prices for raw materials and commonly purchased components like controllers, motors, belts, switches, sensors, and wiring harnesses. Even if a large company purchases fewer items of a certain component, its overall revenue relationship with a supplier may still enable it to achieve better pricing than a smaller competitor can, even if that competitor buys certain components in higher quantities. Lastly, high-volume manufacturers benefit from being able to source their components through sophisticated supply chains on a worldwide basis. A low-volume manufacturer is unlikely to be able to compete solely on manufacturing cost.

Based on the comments, DOE reviewed the November 2007 ANOPR CCW manufacturing cost information and interviewed CCW manufacturers representing nearly 100 percent of U.S. sales to discuss, among other things, the cost-efficiency curve. (See section IV.H.6.b of this notice and appendix 5–B of the TSD for further detail.) Based on this review and the information gathered, DOE modified the cost-efficiency curve based on detailed CCW manufacturer feedback, aggregating the responses by unit shipments to ensure confidentiality. Table IV.3 shows the updated cost-efficiency data.

TABLE IV.3 INCREMENTAL MANUFACTURING COSTS FOR COMMERCIAL CLOTHES WASHERS

Efficiency level	Modified energy factor/water factor		Incremental cost	
	Top-loading	Front-loading	Top-loading	Front-loading
Baseline	1.26/9.5	1.72/8.0	$0.00	$0.00
1	1.42/9.5	1.8/7.5	$74.63	$0.00
2	1.6/8.5	2.0/5.5	$129.83	$13.67
3	1.76/8.3	2.2/5.1	$144.43	$37.84
4	N/A	2.35/4.4	N/A	$63.63

D. Life-Cycle Cost and Payback Period Analyses

DOE conducted LCC and PBP analyses to evaluate the economic impacts of possible amended energy conservation standards for the two appliance products, on individual consumers for the cooking products and commercial consumers for CCWs. (See the TSD accompanying this notice, chapter 8.) The LCC is the total consumer expense over the life of the appliance, including purchase and installation expense and operating costs (energy expenditures and maintenance costs). To compute LCCs, DOE discounted future operating costs to the time of purchase and summed them over the lifetime of the appliance. The PBP is the change in purchase expense as a result of an increased efficiency standard, divided by the change in annual operating cost that results from the standard. Otherwise stated, the PBP is the number of years it would take for the consumer to recover the increased costs of a higher efficiency product through energy savings.

DOE measures the change in LCC and the change in PBP associated with a given efficiency level relative to an estimate of base-case appliance efficiency. The base-case estimate reflects the market in the absence of amended mandatory energy conservation standards, including the demand for products that exceed the current energy conservation standards. Section IV.E.9 discusses the estimate of base-case efficiency in detail.

For cooking products, DOE calculated the LCC and payback periods for a nationally representative set of housing units, which were selected from EIA's *Residential Energy Consumption Survey* (RECS). Similar to the November 2007 ANOPR, today's proposed rule for residential cooking products continues to use the 2001 RECS.[31] EIA had not yet released the 2005 RECS when the analysis was performed. For each sampled household, DOE determined the energy consumption and energy price for the cooking product. Thus, by using a representative sample of households, the analysis captured the wide variability in energy consumption and energy prices associated with cooking product use. The Department determined the LCCs and payback periods for each sampled household using the cooking product's unique energy use and energy price, as well as other input variables. The Department calculated the LCC associated with the baseline cooking product in each household. To calculate the LCC savings and payback period associated with more efficient equipment (*i.e.*, equipment meeting higher efficiency standards), DOE substituted the baseline unit with a more-efficient design.

For CCWs, DOE was unable to develop a consumer sample because neither RECS nor EIA's *Commercial Building Energy Consumption Survey*[32] (CBECS) provide the necessary data to develop one. As a result, DOE was not able to use a consumer sample to establish the variability in energy and water use and energy and water pricing. Instead, DOE established the variability and uncertainty in energy and water use by defining the uncertainty and variability in the use (cycles per day) of the equipment. The variability in energy and water pricing were characterized by regional differences in energy and water prices.

Inputs for determining the total installed cost include equipment prices—which account for manufacturer costs, manufacturer markups, retailer or distributor markups, and sales taxes—and installation costs. Inputs for determining operating expenses include annual energy and water consumption, natural gas, electricity, and water prices, natural gas, electricity, and water price projections, repair and maintenance costs, equipment lifetime, discount rates, and the year that standards take effect. To account for uncertainty and variability in certain inputs, DOE created distributions of values with probabilities attached to each value. As described above, DOE characterized the variability in energy consumption and energy prices for residential cooking products by using household samples. For CCWs, DOE characterized the uncertainty and variability in equipment usage to capture the variability and uncertainly in energy and water consumption, whereas regional differences were used to capture the variability in energy and water pricing. For the installed cost inputs identified above, DOE characterized the sales taxes with probability distributions. For the other operating cost inputs, it characterized the discount rate and the equipment lifetime with distributions.

The LCC and PBP model uses a Monte Carlo simulation to incorporate uncertainty and variability into the analysis when combined with Crystal Ball (a commercially available software program). The Monte Carlo simulations sampled input values randomly from the probability distributions (and the household samples for residential cooking products). The model calculated the LCC and PBP for each efficiency level for 10,000 housing units per simulation run.

For both cooking products and CCWs, Table IV.4 summarizes the approach and data that DOE used to derive the inputs to the LCC and PBP calculations for the November 2007 ANOPR and the changes made for today's proposed rule. The following sections discuss the inputs and the changes.

[31] U.S. Department of Energy-Energy Information Administration, *Residential Energy Consumption Survey, 2001 Public Use Data Files* (2001). Available at: *http://www.eia.doe.gov/emeu/recs/recs2001/publicuse2001.html.*

[32] U.S. Department of Energy-Energy Information Administration, *Commercial Buiilding Energy Consumption Survey, 2003 Public Use Data Files* (2003). Available at *http://www.eia.doe.gov/emeu/cbecs/cbecs2003/public_use_2003/cbecs_pudata2003.html.*

TABLE IV.4—SUMMARY OF INPUTS AND KEY ASSUMPTIONS IN THE LCC AND PBP ANALYSES

Inputs	2007 ANOPR description	Changes for the proposed rule
Affecting Installed Costs		
Product Price	Derived by multiplying manufacturer cost by manufacturer, retailer (for residential cooking products) and distributor (for CCWs) markups and sales tax, as appropriate.	No change.
Installation Cost	Cooking Products: Baseline cost based on RS Means *Plumbing Cost Data*, 2005.[33] Estimated that 20 percent of households with gas cooktops and standard ovens that do not require electricity to operate would incur added costs for the installation of an electrical outlet to accommodate designs that require electricity (*e.g.*, glo-bar or electronic spark ignition). Electrical outlet installation cost based on the type of cable, tubing and wire used, resulting in an average cost of $76. All other standard levels for all other product classes incur no additional installation costs.	Cooking Products: Baseline cost updated with RS Means *Mechanical Cost Data*, 2008.[34] Revised the percent of households with gas cooking products that would need to install an electrical outlet. Based on requirements in the NEC, estimated that 10 percent of households with gas standard ovens and 4 percent of households with gas cooktops would need to install an electrical outlet to accommodate designs that require electricity. Updated electrical outlet installation costs based on requirements in the NEC. Revised cost of $235 based on the installation of ground-fault circuit-interrupter (GFCI).
	CCWs: Baseline cost based on RS Means *Plumbing Cost Data*, 2005. No additional installation cost for all standard levels.	CCWs: Baseline cost updated with RS Means *Mechanical Cost Data*, 2008.
Affecting Operating Costs		
Annual Energy and Water Use.	Cooking Products: Based on recent estimates from the 2004 *California Residential Appliance Saturation Survey*[35] (RASS) and the Florida Solar Energy Center[36] (FSEC). Used 2001 RECS data to establish the variability of annual cooking energy consumption.	Cooking Products: No change with one exception—microwave oven standby power included.
	CCWs: Per-cycle energy and water use based on MEF and WF levels. Disaggregated into per-cycle machine, dryer, and water heating energy using data from DOE's 2000 TSD for residential clothes washers. Annual energy and water use determined from the annual usage (number of use cycles). Usage based on several studies including research sponsored by the Multi-housing Laundry Association[37] (MLA) and the Coin Laundry Association[38] (CLA). Different use cycles determined for multi-family and laundromat product applications.	CCWs: No change.
Energy and Water/Wastewater Prices.	Electricity: Based on EIA's 2005 Form 861 data. Natural Gas: Based on EIA's 2005 *Natural Gas Monthly.*[39] Water/Wastewater: Based on Raftelis Financial Consultants (RFC) and the American Water Works Association's (AWWA) 2004 *Water and Wastewater Survey.*[40] Variability: Regional energy prices determined for 13 regions; regional water/wastewater price determined for four regions.	Electricity: Updated using EIA's 2006 Form 861 data. Natural Gas: Updated using EIA's 2006 *Natural Gas Monthly.* Water/Wastewater: Updated using RFC/AWWA's 2006 *Water and Wastewater Survey.* Variability: No change.
Energy and Water/Wastewater Price Trends.	Energy: Forecasted with EIA's *AEO 2007.* Water/Wastewater: Forecasted with extrapolation from Bureau of Labor Statistics' (BLS) national water price index from 1970 through 2005.[41]	Energy: Forecasts updated with EIA's *AEO 2008.* Water/Wastewater: Forecasts updated with BLS index through 2007.
Repair and Maintenance Costs.	Cooking Products: Estimated no change in costs for products more efficient than baseline products.	Cooking Products: For gas cooktops and standard ovens, accounted for increased costs associated with glo-bar or electronic spark ignition systems relative to standing pilot ignition systems. For all standard levels for all other product classes, maintained no change in costs between products more efficient than baseline products.

[33] RS Means, *Plumbing Cost Data* (28th Annual Edition (2005). Available for purchase at: *http://www.rsmeans.com/bookstore/.*

[34] RS Means, *Mechanical Cost Data* (30th Annual Edition) (2008). Available for purchase at: *http://www.rsmeans.com/bookstore/.*

[35] Please see the following Web site for further information: *http://www.energy.ca.gov/appliances/rass/.*

[36] Please see the following Web site for further information: *http://www.fsec.ucf.edu/en/.*

[37] Please see the following Web site for further information: *http://www.mla-online.com/.*

[38] Please see the following Web site for further information: *http://www.coinlaundry.org/.*

[39] Please see the following Web site for further information: *http://www.eia.doe.gov/.*

[40] Please see the following Web site for further information: *http://www.awwa.org/Bookstore/.*

[41] Please see the following Web site for further information: *http://www.bls.gov/.*

TABLE IV.4—SUMMARY OF INPUTS AND KEY ASSUMPTIONS IN THE LCC AND PBP ANALYSES—Continued

Inputs	2007 ANOPR description	Changes for the proposed rule
	CCWs: Estimated no change in costs for products more efficient than baseline products.	CCWs: Estimated annualized repair costs for each efficiency level based on half the equipment lifetime divided by the equipment lifetime.
Affecting Present Value of Annual Operating Cost Savings		
Product Lifetime	Cooking Products: Based on data from *Appliance Magazine*,[42] past DOE TSDs, and the California Measurement Advisory Committee (CALMAC).[43] Variability and uncertainty characterized with uniform probability distributions.	Cooking Products: No change with the exception that variability and uncertainty characterized with Weibull probability distributions.
	CCWs: Based on data from various sources including the CLA. Different lifetimes established for multi-family and laundromat product applications. Variability and uncertainty characterized with uniform probability distributions.	CCWs: No change with the exception that variability and uncertainty characterized with Weibull probability distributions.
Discount Rates	Cooking Products: Approach based on the finance cost of raising funds to purchase appliances either through the financial cost of any debt incurred to purchase equipment, or the opportunity cost of any equity used to purchase equipment. Primary data source is the Federal Reserve Board's *Survey of Consumer Finances* (SCF) for 1989, 1992, 1995, 1998, 2001, and 2004.[44]	Cooking Products: No change.
	CCWs: Approach based on cost of capital of publicly traded firms in the sectors that purchase CCWs. Primary data source is Damodaran Online.[45]	CCWs: No change.
Affecting Installed and Operating Costs		
Effective Data of New Standard.	2012	No change.
Base-Case Efficiency Distributions.	Gas cooktops: 7% at baseline; 93% with electronic spark ignition.	Gas cooktops: No change.
	Gas standard ovens: 18% at baseline; 82% with glo-bar ignition.	Gas standard ovens: 18% at baseline; 74% with glo-bar ignition; 8% with electronic spark ignition.
	Microwave ovens: 100% at baseline EF of 0.557. Standby power was not considered in the analysis.	Microwave ovens: 100% at baseline EF but accounted for product market shares at different standby power levels; 46% with standby power consumption of greater than 2.0 W; 35% with standby power consumption of greater than 1.5 W and less than or equal to 2.0 W; 19% with standby power consumption of greater than 1.0 W and less than or equal to 1.5 W.
	All other cooking products: 100% at baseline	All other cooking products: No change.
	CCWs: Analyzed as single product class with 80% at baseline (1.26 MEF/9.5 WF); 20% at 2.00 MEF/5.50 WF.	CCWs: Analyzed as two product classes: top-loading and front-loading. Distributions for both classes based on the number of available models at the efficiency levels. Top-Loading: 63.6% at 1.26 MEF/9.5 WF; 33.3% at 1.42 MEF/9.5 WF; 0% at 1.60 MEF/8.5 WF; 3.0% at 1.76 MEF/8.3 WF. Front-Loading: 7.4% at 1.72 MEF/8.0 WF; 4.4% at 1.80 MEF/7.5 WF; 85.3% at 2.00 MEF/5.5 WF; 1.5% at 2.20 MEF/5.1 WF; 1.5% at 2.35 MEF/4.4 WF.

1. Product Price

To calculate the consumer product prices, DOE multiplied the manufacturing costs developed from the engineering analysis by the supply-chain markups it developed (along with sales taxes). To calculate the final, installed prices for baseline products, as well as higher efficiency products, DOE added the consumer product prices to the installation costs.

a. Cooking Products

For cooking products, DOE relied on data from AHAM's *2003 Fact Book*[46] showing that over 93 percent of residential appliances (including cooking products) are distributed from the manufacturer directly to a retailer. Therefore, DOE determined cooking product retail prices using markups based solely on the premise that these appliances are sold through a manufacturer-to-retailer distribution channel. Whirlpool commented that DOE should not focus solely on the retail distribution channel for its determination of retail prices. Whirlpool

[42] Please see the following Web site for further information: *http://www.appliancemagazine.com/*.

[43] Please see the following Web site for further information: *http://www.calmac.org/*.

[44] Please see the following Web site for further information: *http://www.federalreserve.gov*.

[45] Please see the following Web site for further information: *http://pages.stern.nyu.edu/~adamodar/*.

[46] Available online at: *http://www.aham.org*.

stated that the analysis and assumptions made for the retail distribution channel are reasonably accurate but completely ignore the contractor distribution channel. Whirlpool claimed that the contractor distribution channel comprises approximately 20 percent of total industry volume (not the seven percent cited in the November 2007 ANOPR TSD), with a greater portion of cooking products flowing through this channel. Whirlpool said that larger new home builders and apartment management firms use the contractor channel, and that the margins and behavior of the parties in this channel differ from those in the retail channel. Whirlpool recommended that future rulemakings consider the contractor channel. (Whirlpool, No. 28 at p. 12) DOE understands that the contractor distribution channel may distribute a significant portion of cooking product sales. However, since DOE's analysis for rulemakings on other residential appliances indicates that overall markups in the contractor channel are on average similar to those in the retailer channel, DOE believes that it can reasonably assume that the retail prices determined from the manufacturer-to-retailer distribution channel for this standards rulemaking provide a good estimate for cooking product prices.

b. Commercial Clothes Washers

For CCWs, DOE developed the distribution channels based on data developed by the CEE.[47] The CEE data indicate that the relevant portions of the commercial, family-sized clothes washer market can be divided into three areas: (1) Laundromats; (2) private multi-family housing; and (3) large institutions (*e.g.*, military barracks, universities, housing authorities, lodging establishments, and health care facilities). For purposes of developing the markups for CCWs, DOE based its calculations on the distribution channel that involves only distributors, because it believed that this channel would provide good estimates of consumer prices for the entire market. In the November 2007 ANOPR, DOE specifically sought comment on whether determining CCW consumer prices based solely on the distribution channel that includes distributors will result in representative equipment prices for all CCW consumers. AHAM, Alliance, and Whirlpool generally agreed with DOE's approach of representing CCW equipment prices with data from the distributor channel only. (AHAM, No. 32 at p. 11; Alliance, Public Meeting Transcript, No. 2 at p. 132; Whirlpool, No. 28 at p. 8) DOE did not receive any negative comments on this approach. As a result, DOE did not change its approach for determining CCW markups for today's proposed rule.

According to the Joint Comment, for relatively small changes in a standard level, as associated with many product rulemakings to date, the available literature shows that products just meeting an amended standard have often had no price change or even price declines after the adoption of the more stringent standards. The Joint Comment cited reports from the European Union suggesting that actual price impacts are lower than predicted in their most recent round of standards for several products. Possible explanations include manufacturing economies found as a result of re-engineering of products after a standards amendment and retailer pricing strategies that prevent pass-through of small manufacturer cost increases to the retail customer. The Joint Comment claimed that this issue is especially relevant to microwave ovens, because the manufacturing cost to reduce standby power is likely to be very low, but the principle also will be relevant for any standard that entails a small impact on manufacturing costs. The Joint Comment stated that DOE should review actual pricing for standards effective in recent years to calibrate the accuracy of DOE's price predictions. In developing such a calibration, the Joint Comment stated that DOE must separate commodity price impacts (*e.g.*, the cost of steel has increased sharply since 2001) from impacts associated with a new efficiency standard. (Joint Comment, No. 29 at pp. 9–10, 13–14) As described in section IV.C.2, Manufacturing Costs, DOE does not find merit to the Joint Comment's claims that the price change of meeting an amended standard declines after the standards' adoption. DOE recognizes that every change in minimum energy conservation standards is an opportunity for manufacturers to make investments beyond what would be required to meet the new standards in order to minimize the costs or to respond to other factors. DOE's manufacturing cost estimates, MIA interviews, and the GRIM analysis seek to gauge the most likely industry response to proposed energy conservation standards. DOE's analysis of responses must be based on currently available technology that will be non-proprietary when a rulemaking becomes effective, and thus cannot speculate on future product and market innovation. For more details on DOE's response, see section IV.C.2.

2. Installation Cost

The installation cost is the consumer's total cost to install the equipment, excluding the marked-up consumer equipment price. More specifically, installation costs include labor, overhead, and any miscellaneous materials and parts. DOE determined baseline product installation costs for cooktops, ovens, and CCWs based on data from RS Means. For the November 2007 ANOPR, DOE used data from the RS Means *Plumbing Cost Data,* 2005 to estimate installation costs for cooking products and CCWs.[48] RS Means provides estimates on the labor required to install each of above three products. For today's proposed rule, DOE updated its baseline installation costs using RS Means *Mechanical Cost Data,* 2008.[49]

a. Cooking Products

For cooking products (except gas cooktops and standard ovens), DOE estimated that installation costs would not increase with product efficiency. For gas cooktops and standard ovens, DOE estimated the impact that eliminating standing pilot ignition systems would have on the installation cost. Specifically, DOE considered the percentage of households with gas ranges, cooktops, and ovens that would require the installation of an electrical outlet in the kitchen to accommodate a gas cooking product that would need electricity to operate, as well as the cost of installing an electrical outlet.

DOE estimated for its November 2007 ANOPR that an upper bound of 20 percent of households using gas cooktops and standard ovens with standing pilot ignition systems would require the installation of an electrical outlet in the kitchen for a product that requires electricity. AGA commented that the percentage of consumers that would need to install an electrical outlet is much greater than 20 percent, and suggested that the vast majority of pilot ignition products shipped are for installations where rewiring would be required for a range without pilot ignition. AGA questioned DOE's assumption that kitchens with existing electrical outlets would not require modification or installation of additional outlets, stating that State and

[47] Consortium for Energy Efficiency, *Commercial Family-Sized Washers: An Initiative Description of the Consortium for Energy Efficiency* (1998). This document is available at: *http://www.cee1.org/com/cwsh/cwsh-main.php3.*

[48] RS Means, *Plumbing Cost Data* (28th Edition)(2005) p. 97. Available for purchase at: *http://www.rsmeans.com.*

[49] RS Means, *Mechanical Cost Data* (31st Annual Edition) (2008). Available for purchase at: *http://www.rsmeans.com.*

local building codes, most of which mandate adherence to National Fire Protection Agency (NFPA) 70, NEC, may not be ignored by consumers who would install a range with an electrical connection when replacing their pilot ignition ranges. AGA stated that many homes with standing pilot gas ranges are older and will not have outlets in close enough proximity to the range. AGA believes that current shipments of pilot ignition gas products are used in a segment of the replacement market where an electrical outlet is not within six feet of the appliance, and that these consumers will have to install an electrical outlet in the vicinity of their range. (AGA, Public Meeting Transcript, No. 23.7 at pp. 149–52; and AGA, No. 27 at pp. 2–3, 6–7, and 11–12)

ASAP inquired as to whether DOE's estimate that 20 percent of households would require the installation of an electrical outlet would be updated using more recent data. (ASAP, Public Meeting Transcript, No. 23.7 at pp. 150–151) According to the Joint Comment, homes with no electricity in the kitchen may exist, but they would be such a small proportion of homes that the installation cost would be negligible in a national LCC analysis. (Joint Comment, No. 29 at p. 5)

In response to these comments, DOE conducted an assessment of NEC requirements over time.[50] DOE reviewed the gas oven and gas cooktop household samples to establish which houses may require an outlet installation. Because RECS specifies the home's vintage (year built), DOE was able to determine the composition of the household sample by particular vintage groupings. DOE also determined that every household in each sample had an electric refrigerator, so DOE concluded that every home had at least one electrical outlet in the kitchen. However, the NEC did not require spacing of electrical outlets every six feet prior to 1959. As a result, DOE could not conclusively determine that pre-1960 houses would have an outlet near the gas-fired appliance. Thus, it assumed that pre-1960 homes, representing 57 percent of the standard gas oven sample and 54 percent of the gas cooktop sample, may need an additional outlet installed in the kitchen to accommodate a gas cooking product without standing pilot ignition. Because DOE is not aware of any data on how the use of gas cooking products equipped with standing pilot lights is distributed across housing stock vintages, it assumed that all of the households in each vintage could purchase a product with standing pilot lights in the base case, but that homes built after 1960 would not need an outlet.

For its November 2007 ANOPR, DOE estimated the installation cost of an electrical outlet based on data from RS Means. The resulting installation cost ranged from $42 to $125 and an average installation cost of $76 was used in the analysis. AGA commented that the installation costs used in the November 2007 ANOPR are much too low, adding that the NEC requires a lot of work to install an outlet near a range. AGA said that RS Means is an excellent source but has severe limitations, especially with respect to the variety of likely retrofit installations. Also, the RS Means data cover repair/remodeling projects in the $10,000 to $1 million range, which do not capture the true, consumer cost of rewiring for a gas range that requires electricity (*i.e.*, costs for retrofit wiring in a finished kitchen would be significantly higher). AGA also stated that if the outlet is exposed and available for countertop services, a ground-fault circuit-interrupter (GFCI) is required. If the consumer wants to avoid the installation of a GFCI, the outlet must be located behind the range and may require the installation of an additional circuit to service the additional load. In 1997, AGA's Building Energy and Code Committee indicated installation costs ranging from $110 to $350 in 1997 dollars for retrofits, depending on the region, with an average cost of $204. In AGA's opinion, such installation estimates are more representative than the cost used by DOE. AGA requested that DOE conduct a survey in major metropolitan areas and include varied housing types to obtain current installation costs. (AGA, Public Meeting Transcript, No. 23.7 at p. 22, 150; AGA, No. 27 at p. 3, pp. 12–13, and pp. 6–7) Supporting this position, GE commented that adding a new outlet to an existing kitchen would easily cost hundreds of dollars, whereas providing electricity to a rural household could cost thousands. (GE, No. 30 at p. 2)

DOE notes that the current NEC allows outlets for gas-fired appliances to be attached to existing small appliance circuits in kitchens. DOE revisited its installation cost estimates to address the requirements in the NEC for installing electrical outlets. As noted above, the NEC did not require that electrical outlets be spaced every six feet prior to 1959. In addition, the NEC had no requirement prior to 1962 that branch electrical circuits include a grounding conductor or ground path to which the grounding contacts of the receptacle could be connected. Therefore, because a GFCI outlet may need to be installed for older housing units built prior to the modern NEC, DOE revised its installation costs based solely on the installation of a GFCI outlet in a finished space. DOE derived its estimates based on the grounding of the outlet to a water pipe in the kitchen rather than back to a fuse box or circuit breaker panel. As in the November 2007 ANOPR, DOE relied on cost data from RS Means to estimate the installation cost. DOE recognizes that RS Means covers large projects totaling at least $10,000, so it added an electrician's trip charge to the installation cost. The resulting average installation cost determined by DOE is $235, much higher than the $76 cost it estimated for the November 2007 ANOPR.

Providing information on an alternative approach to installing an electrical outlet near the range, the Joint Comment urged DOE to consider the cost of adding an external, low-voltage power supply to the range to enable spark ignition. This power supply could then be plugged into more distant, existing outlets. The cost of such a power supply, even considering the need to include several transformer stages, would likely be a fraction of the cost of installing an outlet in the house. (Joint Comment, No. 29 at p. 6) DOE did not consider options to install a power supply in the appliance that would enable the use of low-voltage wiring to power the gas cooking product. This does not affect DOE's estimate that an outlet would need to be installed, because homes built before 1960 would still require an outlet installation to avoid the use of long extension cords to connect the appliance to an available outlet that could be up to 20 feet away from the cooking product.

b. Commercial Clothes Washers

DOE did not receive comments about installation costs for CCWs. Therefore, today's proposed rule used roughly the same installation costs as in the November 2007 ANOPR. As noted previously, the only change implemented by DOE was to update its costs from the November 2007 ANOPR, which were based on the RS Means *Plumbing Cost Data,* 2005, to those based on the RS Means *Mechanical Cost Data,* 2008. The resulting installation cost that DOE estimated equaled $186. DOE estimates that installation costs do not increase with product efficiency.

[50] D.A. Dini, *Some History of Residential Wiring Practices,* Underwriters Laboratories, Inc. (2006). This document is available at: *http://www.nfpa.org/assets/files//PDF/Proceedings/Dini_paper_-_History_Residential_Wiring.pdf.*

3. Annual Energy Consumption

a. Cooking Products

For cooking products (except microwave ovens), DOE determined in its November 2007 ANOPR that cooking energy consumption has declined since the mid-1990s. DOE based its determination on results from the 2004 California *Residential Appliance Saturation Survey* (RASS) [51] and the Florida Solar Energy Center (FSEC).[52] GE stated that its own internal information confirms DOE's conclusions—namely, that household cooking energy use is declining. (GE, No. 30 at p. 2) For today's proposed rule, DOE continues to base its annual energy consumption estimates for cooking products, other than microwave ovens, on the data from the 2004 RASS and FSEC. As for the November 2007 ANOPR, DOE continues to use the 2001 RECS data to establish the variability of annual cooking energy consumption for cooktops and ovens.

For microwave ovens, DOE used the 2004 RASS for its November 2007 ANOPR to estimate the product's annual energy consumption. DOE used the 2001 RECS data to establish the variability of annual cooking energy consumption for microwave ovens. For today's proposed rule, DOE continues to use the above approaches. Whirlpool stated that DOE should consider that microwave ovens use only one-quarter to one-third the energy of conventional ovens because conventional ovens are preheated and need to heat larger oven cavities. (Whirlpool, No. 28 at p. 5) DOE's findings indicate that both standard and self-cleaning electric ovens use approximately 170 kWh per year, whereas microwave ovens use on average 131 kWh per year, or 77 percent of the annual energy consumed by conventional ovens.

One change from the November 2007 ANOPR is inclusion of annual energy consumption associated with standby power. To estimate the annual energy use associated with standby power, DOE multiplied the baseline standby power by the number of hours in a year that the oven is in standby mode. The annual standby hours equals total hours in a year minus the number of hours that the microwave oven is in active operation. DOE determined the hours of active operation by dividing the average annual energy consumption by a representative input power for microwave ovens. Based on DOE's testing of microwave ovens reported at the December 2007 public meeting, the average microwave output power is 1,026 W. Based on the baseline microwave EF of 0.557, the average input power is 1,842 W. Therefore, based on an annual cooking energy consumption of 131 kWh per year, there are 71 hours of active operation, resulting in 8,689 hours that the appliance is in standby mode. See chapter 6 of the TSD accompanying this notice for further details.

b. Commercial Clothes Washers

For CCWs, DOE determined the annual energy and water consumption for its November 2007 ANOPR by multiplying the per-cycle energy and water use by the estimated number of cycles per year. CCW per-cycle energy consumption has three components: (1) Water-heating energy; (2) machine energy (the motor energy for turning an agitator or rotating a drum); and (3) drying energy. DOE determined the per-cycle clothes-drying energy use by first establishing the RMC based on the relationship between RMC and the MEF, and then using the DOE test procedure equation that determines the per-cycle energy consumption for the removal of moisture. DOE took the per-cycle machine energy use from its 2000 TSD for RCWs.[53] As noted in the discussion of the CCW test procedure (section III.B.3 of this notice,) DOE believes that the existing RCW test procedure adequately accounts for the characteristic energy and water use for CCWs in the NOPR analyses. As a result, DOE also believes that the per-cycle machine energy use for RCWs would be representative of CCW machine energy consumption. In the 2000 TSD, machine energy was calculated to be 0.133 kWh per cycle for MEFs up to 1.40, and 0.114 kWh per cycle for MEFs greater than 1.40. With the per-cycle clothes-drying and machine energy known, DOE determined the per-cycle water-heating energy use by first determining the total per-cycle energy use (the clothes container volume divided by the MEF) and then subtracting from it the per-cycle clothes-drying and machine energy.

In the November 2007 ANOPR, DOE specifically requested comment on whether the RCW per-cycle energy consumption values for clothes-drying and machine use are representative of CCWs. 72 FR 64432, 64513 (Nov. 15, 2007). AHAM and Whirlpool commented generally that residential clothes washer energy consumption is representative of the energy consumption of CCWs. (AHAM, No. 32 at p. 10 and Whirlpool, No. 28 at pp. 7–8) More specifically, AHAM stated that residential clothes washer per-cycle energy consumption is representative of CCW per-cycle energy consumption. (AHAM, No. 32 at p. 10) Whirlpool commented that the RMC values that DOE used appear to be reasonable. (Whirlpool, No. 28 at pp. 7–8) Whirlpool added that because machine energy use is a relatively small component of overall energy consumption,[54] mischaracterization of it probably would not distort the overall analysis. (Whirlpool, No. 28 at p. 7) NPCC, on the other hand, referred to studies (specifically one commissioned by the City of Toronto) [55] that have found that drying times in commercial laundry do not decrease with RMC. Because dryers do not have moisture sensors to terminate the cycle, NPCC claims they will continue to run based on the amount of money fed into the machine. (NPCC, Public Meeting Transcript, No. 23.7 at p. 126)

DOE recognizes that in some commercial settings, the drying cycle time may be fixed at a longer period than what the DOE dryer test procedure requires to achieve a ''bone dry'' state. As a result, the actual drying energy may not decrease as the RMC in clothing loads are lowered, which would imply that a CCW that produces a lower RMC in the wash load could be improperly receiving credit in the calculation of MEF. However, DOE notes that the cycle length for some

[51] California Energy Commission, *California Statewide Residential Appliance Saturation Survey* (Prepared for the CEC by KEMA–XNERGY, Itron, and RoperASW. Contract No. 400–04–009)(June 2004). This document is available at: *http://www.energy.ca.gov/appliances/rass/index.html.*

[52] Parker, D. S., ''Research Highlights from a Large Scale Residential Monitoring Study in a Hot Climate,'' *Proceedings of International Symposium on Highly Efficient Use of Energy and Reduction of its Environmental Impact* (Japan Society for the Promotion of Science Research for the Future Program, JPS–RFTF97P01002) (Jan. 2002) pp. 108–116. (Also published as FSEC–PF369–02, Florida Solar Energy Center.) This document is available at: *http://www.fsec.ucf.edu/en/publications/html/FSEC-PF-369-02/index.htm.*

[53] U.S. Department of Energy, *Final Rule Technical Support Document (TSD): Energy Efficiency Standards for Consumer Products: Clothes Washers* (Dec. 2000) Chapter 4, Table 4.1. This document is available at: *http://www.eere.energy.gov/buildings/appliance_standards/residential/clothes_washers.html.*

[54] The DOE clothes washer test procedure calculates total per-cycle energy consumption as the sum of: (1) The energy required to heat the water; and (2) the electrical energy required for the basket motor and drive system, controls, display, etc. (*i.e.*, machine energy use.) In addition, the MEF includes the energy required by a dryer to remove the RMC. Water heating energy and the energy required to remove the RMC are significantly higher than machine energy.

[55] City of Toronto Works and Emergency Services and Toronto Community Housing Corporation, *Multi-Unit Residential Clothes Washer Replacement Pilot Project 1999* (May 2003).

commercial dryers can be adjusted by the laundromat owner or route operator to match the average RMC of the CCWs at the same location, allowing for shorter drying cycles if the RMC is lowered. In addition, electronic payment systems, if equipped, provide the end-user the opportunity to select only the amount of time required to achieve the desired dryness of the load. Even if such adjustments are not made, customers of laundromats with fixed-cycle dryers can still benefit from lower RMCs by either putting more clothes into the dryer than they would have previously, or by interrupting the drying cycle when the clothes have dried to add a new set of clothes. Lastly, some laundromats operate ''free'' dryers (*i.e.*, consumers just pay for the wash cycle), which incentivize the owners to use CCWs equipped with moisture sensors to minimize drying time and energy consumption. For these reasons, as well as the supporting comments received from AHAM and Whirlpool, DOE believes that the use of the existing residential clothes washer test procedure provides a representative basis for rating and estimating the per-cycle energy use of CCWs.

4. Energy and Water Prices

a. Energy Prices

DOE derived average electricity and natural gas prices for 13 geographic areas consisting of the nine U.S. Census divisions, with four large States (New York, Florida, Texas, and California) treated separately. For Census divisions containing one of these large States, DOE calculated the regional average values minus the data for the large State.

DOE estimated residential and commercial electricity prices for each of the 13 geographic areas based on data from EIA Form 861, *Annual Electric Power Industry Report.*[56] DOE calculated an average residential electricity price by first estimating an average residential price for each utility—by dividing the residential revenues by residential sales—and then calculating a regional average price by weighting each utility with customers in a region by the number of residential consumers served in that region. For the November 2007 ANOPR, DOE used EIA data from 2004. The calculation methodology for today's proposed rule uses the most recent available data from 2006. The calculation methodology of average commercial electricity prices is identical to that for residential prices, except that DOE used commercial sector data.

DOE estimated residential and commercial natural gas prices in each of the 13 geographic areas based on data from the EIA publication *Natural Gas Monthly.*[57] For the November 2007 ANOPR, DOE used the complete annual data for 2005 to calculate an average summer and winter price for each area. For today's proposed rule, DOE used more recent 2006 data from the same source. It calculated seasonal prices because, for some end uses, seasonal variation in energy consumption is significant. DOE defined summer as the months May through September, with all other months defined as winter. DOE calculated an average natural gas price by first calculating the summer and winter prices for each State, using a simple average over the appropriate months, and then calculating a regional price by weighting each State in a region by its population. This method differs from the method used to calculate electricity prices, because EIA does not provide consumer-level or utility-level data on gas consumption and prices. The methods for calculating average commercial and residential natural gas prices are identical to each other except that the former relies on commercial sector data. Upon review of natural gas prices, AGA stated that, because DOE's analysis relied upon 2005 natural gas prices, the analysis overstates the cost of natural gas. AGA requested that DOE conduct a new natural gas cost survey to reflect current prices. (AGA, No. 27 at p. 4) As described above, DOE updated the prices to use the most recent data available from 2006. As described below, DOE uses price projections from EIA's *AEO* to forecast prices for future years. As is discussed in detail in section IV.E.3.g of this notice, for today's proposed rule, DOE did assess the impact of new energy conservation standards for cooking products and CCWs on forecasted energy prices.

To estimate the trends in electricity and natural gas prices for the November 2007 ANOPR, DOE used the price forecasts in EIA's *AEO 2007.* For today's proposed rule, DOE updated its energy price forecasts to those in the *AEO 2008.*[58] For today's proposed rule, DOE based its results on the *AEO 2008* reference case price forecasts. The spreadsheet tools which DOE used to conduct the LCC and PBP analysis allow users to select either the *AEO*'s high-growth case or low-growth case price forecasts to estimate the sensitivity of the LCC and PBP to different energy price forecasts. To arrive at prices in future years, DOE multiplied the average prices described above by the forecast of annual average price changes in *AEO 2008.* Because *AEO 2008* forecasts prices to 2030, DOE followed past guidelines provided to the FEMP by EIA and used the average rate of change during 2020–2030 to estimate the price trends after 2030. For the analyses to be conducted for the final rule, DOE intends to update its energy price forecasts based on the latest available *AEO.*

b. Water and Wastewater Prices

DOE obtained residential and commercial water and wastewater price data from the *Water and Wastewater Rate Survey* conducted by Raftelis Financial Consultants (RFC) and the American Water Works Association (AWWA). For the November 2007 ANOPR, DOE used the version of the survey from 2004, but for today's proposed rule, DOE used the most recent version (*i.e.*, the *2006 Water and Wastewater Rate Survey.*)[59] The survey covers approximately 300 water utilities and 200 wastewater utilities, with each industry analyzed separately. Because a sample of 200–300 utilities is not large enough to calculate regional prices for all U.S. Census divisions and large States, DOE calculated regional values at the Census region level (Northeast, South, Midwest, and West).

To estimate the future trend for water and wastewater prices, DOE used data on the historic trend in the national water price index (U.S. city average) provided by the Bureau of Labor Statistics (BLS).[60] For the November 2007 ANOPR, DOE used data covering the time period from 1970 through 2005. For today's proposed rule, DOE used updated data to extend that time period through 2007. DOE extrapolated a future trend based on the linear growth from 1970 to 2007.

5. Repair and Maintenance Costs

Repair costs are associated with repairing or replacing components that have failed in the appliance, whereas maintenance costs are associated with maintaining the operation of the equipment. For the November 2007 ANOPR, DOE assumed that small,

[56] Available at *http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html.*

[57] DOE-Energy Information Administration, *Natural Gas Monthly.* Available at: *http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.htm.*

[58] U.S. Department of Energy-Energy Information Administration, *Annual Energy Outlook 2008 with Projections to 2030* (DOE/EIA–0383) (March 2008).

[59] Raftelis Financial Consultants, Inc., ''2006 RFC/AWWA Water and Wastewater Rate Survey, 2006,'' (2006). This document is available at: *http://www.raftelis.com/ratessurvey.html.*

[60] Available at: *http://www.bls.gov.*

incremental changes in products related to efficiency result in either no or only small changes in repair and maintenance costs, compared with baseline products. However, DOE sought comment on its assumption that increases in product energy efficiency would not have a significant impact on the repair and maintenance costs.

a. Cooking Products

AGA noted that DOE had not included higher maintenance costs in its LCC analysis for gas cooking products with a more complex ignition system (*i.e.*, non-standing pilot ignition systems). According to AGA, this is a significant omission that DOE needs to address, especially since AGA stated that standing pilot ignition systems are likely to be relatively maintenance-free over the assumed product life of 19 years, whereas electronic ignition systems are not. AGA noted that in an analysis provided to DOE in 1998, Battelle estimated independent failure rates for each electronic ignition system as 0.9 failures over the life of the product. Battelle assumed that two such ignition system failures would occur on a free-standing range and that these failures would be non-concurrent. AGA commented that DOE needs to account for the increased repair costs for pilot ranges equipped with electronic controls and recommended that DOE's analysis include two electronic ignition service calls for these products, which AGA estimated currently costs between $125 and $300, including parts and labor, per service call. (AGA, Public Meeting Transcript, No. 23.7 at pp. 154–155; AGA, No. 27 at pp. 3–4 and p. 15)

DOE contacted six contractors in different States to estimate whether repair and maintenance costs still differ between standing pilot and non-standing pilot ignition systems. Based on the contractors' input, DOE determined that standing pilots are less costly to repair and maintain than either electric glo-bar/hot surface ignition systems (used in most gas ovens) or electronic spark ignition systems (used in gas cooktops and a small percentage of gas ovens). Standing pilot ignition systems require repair and maintenance every 10 years to clean valves. Electric glo-bar/hot surface ignition systems require glo-bar replacement approximately every 5 years. In the case of electronic ignition systems, control modules tend to last 10 years. The electrodes/igniters can fail because of hard contact from pots or pans, although failures are rare. Based on the above findings, DOE revised its analysis of repair and maintenance costs for gas cooking products. For standing pilot ignition systems, DOE estimated an average cost of $126 occurring in the tenth year of the product's life. For electric glo-bar/hot surface ignition systems, DOE estimated an average cost of $147 occurring every fifth year during the product's lifetime. For electronic spark ignition systems, DOE estimated an average cost of $178 occurring in the tenth year of the product's life. See chapter 8 of the TSD accompanying this notice for further information regarding these estimates.

b. Commercial Clothes Washers

AHAM, Alliance, and Whirlpool commented that front-loading units generally require more maintenance and repair than top-loading units. (AHAM, No. 32 at pp. 4, 9, 11, Alliance, No. 26 at p. 4 and Whirlpool, No. 28 at p. 8) Alliance stated that repair costs for front-loading washers are significantly higher than those for top-loading units because of their incorporation of electronic controls, variable speed motors, door locks, and multiple shock absorbers. Alliance claimed that more electronic circuitry and additional door lock circuitry increases diagnostic time and, thus, increases repair costs. (Alliance, No. 26 at p. 4) Whirlpool said that although the unit shipments of front-loading CCWs are less than half that of top-loading machines, the in-warranty repair costs are double that of top-loading machines, suggesting that the repair of front-loading machines is four times as costly as that of top-loading machines. (Whirlpool, No. 28 at p. 8) The Joint Comment, on the other hand, stated that their organizations are not aware of any data showing or suggesting that more-efficient products break down more often or require more maintenance than less efficient products. (Joint Comment, No. 29 at p. 10)

Although AHAM, Alliance, and Whirlpool claim that repair and maintenance costs are greater for front-loading washers than top-loading machines, no specific data were provided to identify the magnitude of such costs. Although in-warranty repair costs may be greater for front-loading washers as Whirlpool claims, the repair costs are not incurred by the consumer and thus do not contribute to the LCC of owning and operating the washer. However, DOE does recognize that a higher incidence of in-warranty repairs is likely to be an indication of the frequency of out-of-warranty repairs. Therefore, rather than continue to assume that higher-efficiency CCW designs do not incur higher repair costs, DOE included increased repair costs in today's proposed rule based on an algorithm developed by DOE for central air conditioners and heat pumps and which was also used for residential furnaces boilers.[61] This algorithm calculates annualized repair costs by dividing half of the equipment retail price by the equipment lifetime.

6. Product Lifetime

For the November 2007 ANOPR, DOE used a variety of sources to establish low, average, and high estimates for product lifetime. For residential cooking products, DOE established average product lifetimes of 19 years for conventional electric and gas cooking products and 9 years for microwave ovens. For CCWs, the average lifetime was 11.3 years for multi-family applications, and 7.1 years for laundromats. For the November 2007 ANOPR, DOE primarily used the full range of lifetime estimates to characterize the product lifetimes with uniform probability distributions ranging from a minimum to a maximum value. For microwave ovens, DOE used a triangular probability distribution to characterize product lifetime.

Whirlpool commented on DOE's use of uniform probability distributions by stating that the vast majority of statistical texts apply a ''long-tailed'' distribution to product failure/lifetimes. According to Whirlpool, generally, the Weibull,[62] or at least the Poisson distribution, is used for such purposes. Whirlpool strongly urged DOE to correct this oversimplification. (Whirlpool, No. 28 at p. 12) Because Weibull distributions are commonly used in reliability analyses, DOE agrees with Whirlpool and revised its characterization of residential cooking product and CCW product lifetimes for today's proposed rule with Weibull probability distributions. See chapter 8 of the TSD accompanying this notice for further details on the sources used to develop product lifetimes, as well as the use of Weibull distributions to characterize product lifetime distributions.

[61] U.S. Department of Energy, *Technical Support Document: Energy Efficiency Standards for Consumer Products: Residential Central Air Conditioners and Heat Pumps* (May 2002) Chapter 5. This document is available at: *http://www.eere.energy.gov/buildings/appliance_standards/residential/ac_central_1000_r.html.*

[62] The Weibull distribution is one of the most widely used lifetime distributions in reliability engineering. It is a versatile distribution that can take on the characteristics of other types of distributions, based on the value of its shape parameter.

7. Discount Rates

a. Cooking Products

To establish discount rates for the cooking products in the November 2007 ANOPR, DOE derived estimates of the finance cost of purchasing these appliances. Because the purchase of equipment for new homes entails different finance costs for consumers than the purchase of replacement equipment, DOE used different discount rates for new construction and replacement installations.

DOE estimated discount rates for new-housing purchases using the effective real (after-inflation) mortgage rate for homebuyers. This rate corresponds to the interest rate after deduction of mortgage interest for income tax purposes and after adjusting for inflation. DOE used the Federal Reserve Board's *Survey of Consumer Finances* (SCF) for 1989, 1992, 1995, 1998, and 2001 for mortgage interest rates.[63] After adjusting for inflation and interest tax deduction, effective real interest rates on mortgages across the six surveys averaged 3.2 percent. For replacement purchases, DOE's approach for deriving discount rates involved identifying all possible debt or asset classes that might be used to purchase replacement equipment, including household assets that might be affected indirectly. DOE estimated the average shares of the various debt and equity classes in the average U.S. household equity and debt portfolios using data from the SCFs from 1989 to 2004. DOE used the mean share of each class across the six sample years as a basis for estimating the effective financing rate for replacement equipment. DOE estimated interest or return rates associated with each type of equity and debt using SCF data and other sources. The mean real effective rate across the classes of household debt and equity, weighted by the shares of each class, is 5.6 percent. See chapter 8 of the TSD accompanying this notice for further details on the development of discount rates for cooking products.

The Joint Comment stated that if DOE continues to use a weighted-average cost of capital approach, the agency should make sure its calculations are up to date and consider consumers who use credit cards as month-to-month free loans by paying their bills on time. (Joint Comment, No. 29 at p. 13) As noted above, in developing its discount rates for residential consumers, DOE used data from the SCF. Data from the 2007 SCF survey were not available for this rulemaking. However, because the rates for various forms of credit carried by households in these years were established over a range of time, DOE believes they are representative of rates that may be in effect in 2013. The SCF data do not allow consideration of the special situations cited by the stakeholders, and DOE is not aware of any other nationally representative data source that provides interest rates from a statistically valid sample. Therefore, DOE continued to use the above approach and results for today's proposed rule.

b. Commercial Clothes Washers

For CCWs, DOE derived the discount rate for its November 2007 ANOPR from the cost of capital of publicly traded firms in the sectors that purchase CCWs. DOE estimated the cost of capital of these firms as the weighted average of the cost of equity financing and the cost of debt financing. DOE identified the following sectors purchasing CCWs: (1) Educational services; (2) hotels; (3) real estate investment trusts; and (4) personal services. DOE estimated the cost of equity using the capital asset pricing model (CAPM). The cost of debt financing is the interest rate paid on money borrowed by a company. DOE estimated the weighted-average cost of capital (WACC) using the respective shares of equity and debt financing for each sector that purchases CCWs. It calculated the real WACC by adjusting the cost of capital by the expected rate of inflation. To obtain an average discount rate value, DOE used additional data on the number of CCWs in use in various sectors. DOE estimated the average discount rate for companies that purchase CCWs at 5.7 percent. DOE received no comments on its development of discount rates for CCWs and continued to use the same approach for today's proposed rule.

8. Effective Date of the Amended Standards

The effective date is the future date when parties subject to the requirements of a new standard must begin compliance. Consistent with DOE's semi-annual implementation report for energy conservation standards activities submitted to Congress pursuant to section 141 of EPACT 2005, a final rule for all of the appliance products considered for this rulemaking is scheduled to be completed by March 2009. Any new energy efficiency standards for these products become effective three years after the final rule is published in the **Federal Register** (*i.e.*, March 2012). DOE calculated the LCC for the appliance consumers as if they would purchase a new piece of equipment in the year the standard takes effect.

9. Equipment Assignment for the Base Case

For the LCC analysis for its November 2007 ANOPR, DOE analyzed candidate standard levels relative to a baseline efficiency level. However, some consumers already purchase products with efficiencies greater than the baseline product levels. Thus, to accurately estimate the percentage of consumers that would be affected by a particular standard level, DOE's analysis considered the full breadth of product efficiencies that consumers already purchase under the base case (*i.e.*, the case without new energy efficiency standards). DOE refers to this distribution of product efficiencies as base-case efficiency distributions.

a. Cooking Products

DOE's approach for conducting the LCC analysis for cooking products relied on developing samples of households that use each of the products. Using the current distribution of product efficiencies, DOE assigned a specific product efficiency to each sample household. Because DOE performed the LCC calculations on a household-by-household basis, it based the LCC for a particular standard level on the efficiency of the product in the given household. For example, if a household was assigned a product efficiency that is greater than or equal to the efficiency of the standard level under consideration, the LCC calculation would show that this household is not impacted by an increase in product efficiency that is equal to the standard level.

DOE currently does not regulate cooking product efficiency with an energy efficiency descriptor, so little is known about the distribution of product efficiencies that consumers currently purchase. Thus, for all electric cooking products (other than microwave ovens) and gas self-cleaning ovens, DOE estimated that 100 percent of the market is at the baseline efficiency levels. For gas cooktops and gas standard ovens, data are available that allowed DOE to estimate the percentage of gas cooktops and gas standard ovens still sold with standing pilot lights.

DOE sought stakeholder feedback on its methodology and data sources for estimating base-case efficiency distributions. Whirlpool commented that DOE's distributions for the November 2007 ANOPR for all cooking products (except for gas standard ovens)

[63] The Federal Reserve Board, *1989, 1992, 1995, 1998, 2001, 2004 Survey of Consumer Finances* (1989, 1992, 1995, 1998, 2001, 2004). These documents are available at: *http://www.federalreserve.gov/pubs/oss/oss2/scfindex.html.*

were reasonably accurate. (Whirlpool, No. 28 at pp. 8–9) DOE continued to use these base-case efficiency distributions for today's proposed rule. For gas standard ovens, Whirlpool stated that the percentage of the market at the baseline level should be half of what DOE estimated. (*Id.*) DOE developed the market share of gas standard ovens with standing pilots on actual shipments data, the most recent being data from the *Appliance Recycling Information Center* (ARIC) for 1997, 2000, and 2004. Without actual shipments data from Whirlpool, DOE believes it has no basis to change its estimated market share of gas standard ovens with standing pilots.

For the November 2007 ANOPR, DOE allocated the entire market share of products without standard pilots to standard level 1 (products with glo-bar ignition). Based on information collected during the course of DOE's contacts with contractors to establish the repair and maintenance costs of gas cooking product ignition systems, DOE now estimates that 10 percent of products without standing pilots use spark ignition systems.

Table IV.5 shows the market shares of the efficiency levels in the base case (*i.e.*, in the absence of new energy conservation standards) for gas cooktops and gas standard ovens. In the table, candidate standard level 1 represents products without standing pilot light ignition systems.

TABLE IV.5—GAS COOKTOPS AND GAS STANDARD OVENS: BASE CASE MARKET SHARES

Gas cooktops			Gas standard ovens		
Standard level	EF	Market share (percent)	Standard level	EF	Market share (percent)
Baseline	0.156	6.8	Baseline	0.0298	17.6
1	0.399	93.2	1*	0.0536	74.2
2	0.420	0	2	0.0566	0
			3	0.0572	0
			4	0.0593	0
			5	0.0596	0
			6	0.0600	0
			1a*	0.0583	8.2

* For gas standard ovens, candidate standard levels 1 and 1a correspond to designs that are used for the same purpose—to eliminate the need for a standing pilot—but the technologies for each design are different. Candidate standard level 1 is a hot surface ignition device, whereas candidate standard level 1a is a spark ignition device. Candidate standard level 1a is presented at the end of the table because candidate standard levels 2 through 6 are derived from candidate standard level 1.

DOE's regulations do not currently contain standards for microwave ovens, so very little is known about the distribution of product efficiencies that consumers currently purchase. For its November 2007 ANOPR, DOE estimated that 100 percent of the microwave oven market was at the baseline efficiency level. This baseline efficiency level was described only in terms of the EF, because DOE did not consider standby power consumption for microwave ovens in its November 2007 ANOPR. As discussed previously in section IV.D, DOE established four standby power levels for consideration in today's proposed rule. Because DOE tentatively determined that it is technically infeasible to combine EF and standby power into a single efficiency metric, it continues to address the four cooking efficiency levels considered in the November 2007 ANOPR, independent of standby power consumption. (See section III.A. for a complete discussion on the technical infeasibility of combining EF and standby power into a single metric.) Table IV.6 shows the EF levels and their market shares in the base case. 72 FR 64432, 64488 (Nov. 15, 2007).

TABLE IV.6—MICROWAVE OVENS: BASE CASE MARKET SHARES FOR EF

Standard level	EF	Market share (percent)
Baseline	0.557	100
1a	0.586	0.0
2a	0.588	0.0
3a	0.597	0.0
4a	0.602	0.0

With regard to standby power, during the course of DOE's investigation of microwave oven standby power consumption, DOE and AHAM tested a combined total of 52 units (see section III.A.). Based on these tests, DOE determined the percentage at each of the standby power levels identified in section IV.C.1. Because no other data were available, DOE used the test data from the combined sample to develop the market shares of standby power consumption in the base case. DOE seeks comment on whether the market share data in Table IV.7 are representative of the microwave oven market as a whole.

TABLE IV.7—MICROWAVE OVENS: BASE CASE MARKET SHARES FOR STANDBY POWER

Standard level	Standby power (watts)	Market share (percent)
Baseline	4.0	46.2

TABLE IV.7—MICROWAVE OVENS: BASE CASE MARKET SHARES FOR STANDBY POWER—Continued

Standard level	Standby power (watts)	Market share (percent)
1b	2.0	34.6
2b	1.5	19.2
3b	1.0	0.0
4b	0.02	0.0

b. Commercial Clothes Washers

For the November 2007 ANOPR, DOE derived its base-case market share data for CCWs based on shipment-weighted efficiency data provided by AHAM and assuming that CCWs were to be analyzed as a single product class. DOE sought stakeholder feedback on its methodology and data sources.

Whirlpool commented that the distributions used by DOE for CCWs are reasonably accurate. (Whirlpool, No. 28 at p. 9)

As discussed previously in section IV.A.2., DOE has now decided to analyze CCWs with two product classes for today's proposed rule—top-loading washers and front-loading washers. DOE used the number of available models within each product class to establish the base-case effciency distributions. Table IV.8 presents the market shares of the efficiency levels in the base case for CCWs. See chapter 8 of the TSD accompanying this notice for further details on the development of CCW base-case market shares.

TABLE IV.8—COMMERCIAL CLOTHES WASHERS: BASE CASE MARKET SHARES

Top-loading				Front-loading			
Standard level	MEF	WF	Market share (percent)	Standard level	MEF	WF	Market share (percent)
Baseline	1.26	9.50	63.6	Baseline	1.72	8.00	7.4
1	1.42	9.50	33.3	1	1.80	7.50	4.4
2	1.60	8.50	0.0	2	2.00	5.50	85.3
3	1.76	8.30	3.0	3	2.20	5.10	1.5
				4	2.34	4.40	1.5

10. Commercial Clothes Washer Split Incentive

Under a split incentive situation, the party purchasing more efficient and presumably more expensive equipment may not realize the operating cost savings from that equipment, because another party (*e.g.*, a landlord) may pay the utility bill. In the November 2007 ANOPR, DOE did not explicitly consider the potential of split incentives in the CCW market, because it believed that the probability of such incentives was very low.

Whirlpool disagreed with DOE's dismissal of the potential for split incentives in the CCW market. Whirlpool stated that those who own CCWs (usually route operators) do not incur the operating costs (as do, generally, laundromats and owners of multi-family dwellings). Route operators generally have contracts that run from 5 to 10 years, which limits their ability to pass on the higher costs of higher-efficiency units. (Whirlpool, No. 28 at pp. 12–13) Alliance noted that multi-housing property owners typically lease CCWs, and the route operator owns the machine. (Alliance, Public Meeting Transcript, No. 23.7 at p. 85)

To evaluate the ability of CCW owners to pass on the costs of more expensive CCWs in the form of higher lease costs, DOE examined the SEC filings of two of the largest route operators, Coinmach Service Corporation (Coinmach) and Mac-Gray Corporation (Mac-Gray). DOE found that the lease agreements for those two operators allow for flexibility in their contracting. Coinmach stated the following in a June 2000 10–K Securities and Exchange Commission (SEC) filing: ''The Company's [Coinmach] leases typically include provisions that allow for unrestricted price increases, a right of first refusal (an opportunity to match competitive bids at the expiration of the lease term) and termination rights if the Company does not receive minimum net revenues from a lease. The Company has some flexibility in negotiating its leases and, subject to local and regional competitive factors, may vary the terms and conditions of a lease, including commission rates and advance location payments.'' [64] The 2006 Mac-Gray 10–K SEC filing suggests that lease agreements are relatively short term, *i.e.*, under five years rather than the 5 to 10 years identified by Whirlpool: ''As of December 31, 2006, approximately 90% of our [Mac-Gray] installed machine base was located in laundry facilities subject to long-term leases, which have a weighted average remaining term of approximately five years . . . Approximately 10% to 15% of such laundry room leases are up for renewal each year.'' [65] This lease turnover rate suggests that route operators should be able to time equipment replacement and/or upgrades with lease renewals. This in turn allows route operators to renegotiate lease terms to compensate them for the higher capital expenditures associated with more-efficient laundry equipment while splitting the economic benefits of such CCWs with the building owner(s) as part of the lease.

Based on this information, DOE believes that few route operators would allow themselves to be held to a lease agreement that would prevent them from recovering the cost of more efficient CCW equipment. Therefore, DOE concludes that new CCW efficiency standards are unlikely to lead to split incentives in the CCW market.

11. Inputs to Payback Period Analysis

The payback period is the amount of time it takes the consumer to recover the additional installed cost of more

[64] This document is available at: *http://sec.edgar-online.com/2000/06/29/16/0000902561-00-000328/Section2.asp.*

[65] This document is available at: *http://www.secinfo.com/d11MXs.ujBa.htm#1j71.*

efficient equipment through energy (and water) cost savings, compared to baseline equipment. The simple payback period does not account for changes in operating expense over time or the time value of money. Payback periods are expressed in years. Payback periods greater than the life of the product mean that the increased total installed cost is not recovered in reduced operating expenses.

The inputs to the PBP calculation are the total installed cost of the equipment to the customer for each efficiency level and the annual (first-year) operating expenditures for each efficiency level. The PBP calculation uses the same inputs as the LCC analysis, except that energy (and water) price trends and discount rates are not needed.

12. Rebuttable-Presumption Payback Period

DOE performs a PBP analysis to determine whether the three-year rebuttable presumption of economic justification applies (in essence, whether the purchaser will recover the higher installed cost of more-efficient equipment through lowered operating costs within three years). For each TSL, DOE determined the value of the first year's energy savings by calculating the quantity of those savings in accordance with DOE's test procedure, and multiplying that amount by the average energy price forecast for the year in which a new standard is expected to take effect—in this case, 2012. Section V.B.1.c. of this notice and chapter 8 of the TSD accompanying this notice present the rebuttable-presumption PBP results. DOE did not receive any comments on its analysis of the three-year rebuttable presumption of economic justification.

E. National Impact Analysis—National Energy Savings and Net Present Value Analysis

1. General

DOE's NIA assesses the national energy savings, as well as the NPV of total customer costs and savings expected to result from new standards at specific efficiency levels.

DOE used the NIA spreadsheet to perform calculations of energy savings and NPV, using the annual energy consumption and total installed cost data used in the LCC analysis. DOE forecasted the energy savings, energy cost savings, equipment costs, and NPV for each product class from 2012 through 2042. The forecasts provided annual and cumulative values for all four output parameters. In addition, DOE incorporated into its NIA spreadsheet the capability to analyze sensitivities to forecasted energy prices and product efficiency trends.

Table IV.9 summarizes the approach and data DOE used to derive the inputs to the NES and NPV analyses for the November 2007 ANOPR and the changes made in the analyses of the proposed rule. A discussion of the inputs and the changes follows below. (See chapter 11 of the TSD accompanying this notice for further details.)

TABLE IV.9—APPROACH AND DATA USED TO DERIVE THE INPUTS TO THE NATIONAL ENERGY SAVINGS AND NET PRESENT VALUE ANALYSES

Inputs	2007 ANOPR description	Changes for the proposed rule
Shipments	Annual shipments from Shipments Model	See Table IV.10.
Effective Date of Standard	2012	No change.
Base-Case Forecasted Efficiencies.	Shipment-weighted efficiency (SWEF) determined in the year 2005. SWEF held constant over forecast period of 2005–2042.	No change.
Standards-Case Forecasted Efficiencies.	Cooking Products: ''Roll-up'' scenario used for determining SWEF in the year 2012 for each standards case. SWEF held constant over forecast period of 2012–2042.	Cooking Products: No change.
	CCWs: Analyzed as a single product class. Roll-up scenario used for determining SWEF in the year 2012 for each standards case. SWEF held constant over forecast period of 2012–2042.	CCWs: Analyzed as two product classes. For each product class, roll-up scenario used for determining SWEF in the year 2012 for each standards case. SWEF held constant over forecast period of 2012–2042.
Annual Energy Consumption per Unit.	Annual weighted-average values as a function of SWEF.	No change.
Total Installed Cost per Unit	Annual weighted-average values as a function of SWEF.	No change.
Energy and Water Cost per Unit.	Annual weighted-average values a function of the annual energy consumption per unit and energy (and water) prices.	No change.
Repair Cost and Maintenance Cost per Unit.	Cooking Products: No changes in repair and maintenance costs due to standards.	Cooking Products: Incorporated changes in repair costs for non-standing pilot ignition systems.
	CCWs: No changes in repair and maintenance costs due to standards.	CCWs: Incorporated changes in repair costs as a function of efficiency.
Escalation of Energy and Water Prices.	Energy Prices: AEO 2007 forecasts (to 2030) and extrapolation to 2042.	Energy Prices: Updated to AEO 2008 forecasts.
	Water Prices: Linear extrapolation of 1970–2005 historical trends in national water price index.	Water Prices: Updated to include historical trend through 2007.
Energy Site-to-Source Conversion.	Conversion varies yearly and is generated by DOE/EIA's NEMS* program (a time-series conversion factor; includes electric generation, transmission, and distribution losses).	No change.
Effect of Standards on Energy Prices.	Not considered	Determined but found not to be significant.
Discount Rate	Three and seven percent real	No change.

TABLE IV.9—APPROACH AND DATA USED TO DERIVE THE INPUTS TO THE NATIONAL ENERGY SAVINGS AND NET PRESENT VALUE ANALYSES—Continued

Inputs	2007 ANOPR description	Changes for the proposed rule
Present Year	Future expenses are discounted to year 2007	No change.

2. Shipments

An important element in the estimate of the future impact of a standard is product shipments. The shipments portion of the NIA Spreadsheet is a Shipments Model that uses historical data as a basis for projecting future shipments of the appliance products that are the subject of this rulemaking. In projecting shipments, DOE accounted for three market segments: (1) New construction; (2) existing buildings (*i.e.*, replacing failed equipment); and (3) early replacements (for cooking products) and retired units not replaced (*i.e.*, non-replacements for CCWs). DOE used the early replacement and non-replacement market segments to calibrate the Shipments Model to historical shipments data. For purposes of estimating the impacts of prospective standards on product shipments (*i.e.*, forecasting standards-case shipments) DOE accounted for the combined effects of changes in purchase price, annual operating cost, and household income on the consumer purchase decision.

Table IV.10 summarizes the approach and data DOE used to derive the inputs to the shipments analysis for the November 2007 ANOPR, and the changes it made for today's proposed rule. The most significant change pertains to CCWs. For the November 2007 ANOPR, DOE analyzed CCWs as a single product class. For reasons described in section IV.A.2, DOE has decided to analyze CCWs as two product classes—top-loading and front-loading washers. The general approach for forecasting CCW shipments for today's proposed rule remains unchanged from the 2007 ANOPR. That is, all CCW shipments (*i.e.*, shipments for both product classes) were estimated for the new construction, replacement and non-replacement markets. The difference for today's proposed rule is that after establishing forecasted product shipments for all CCWs, DOE allocated shipments to each of the two product classes based on the market share of each class. Based on data provided by AHAM for the 2007 ANOPR, DOE estimated that top-loading washers comprise 80 percent of the market while front-loading washers comprise 20 percent. DOE estimated that the product class market shares would remain unchanged over the time period 2005–2042. A discussion of the inputs and the changes follows below.

TABLE IV.10—APPROACH AND DATA USED TO DERIVE THE INPUTS TO THE SHIPMENTS ANALYSIS

Inputs	2007 ANOPR description	Changes for the proposed rule
Number of Product Classes	Cooking Products: Seven classes for conventional (*i.e.*, non-microwave oven cooking products; one class for microwave ovens.	Cooking Products: No change.
	CCWs: Single product class	CCWs: Two product classes: top-loading washers and front-loading washers. Shipments forecasts established for all CCWs and then disaggregated into the two product classes based on the market share of top- and front-loading washers. Market share data provided by AHAM; 80% top-loading and 20% front-loading. Product class market shares held constant over time period of 2005–2042.
New Construction Shipments	Cooking Products: Determined by multiplying housing forecasts by forecasted saturation of cooking products for new housing. Housing forecasts based on *AEO 2007* projections. New housing product saturations based on EIA's RECS. Forecasted saturations maintained at 2001 levels.	Cooking Products: No change in approach. Housing forecasts updated with EIA *AEO 2008* projections.
	CCWs: Determined by multiplying multi-housing forecasts by forecasted saturation of CCWs for new multi-housing. Multi-housing forecasts based on *AEO 2007* projections. New multi-housing product saturations calibrated against data from the Consortium for Energy Efficiency (CEE). Forecasted saturations maintained (frozen) at 1999 levels.	CCWs: Multi-housing forecasts updated with *AEO 2008* projections. Verified frozen saturations with data from the U.S. Census Bureau's *American Housing Survey* (AHS) for 1997–2005.
Replacements	Cooking Products: Determined by tracking total product stock by vintage and establishing the failure of the stock using retirement functions from the LCC and PBP analysis. Retirement functions were based on uniform lifetime distributions.	Cooking Products: No change in approach. Retirement functions revised to be based on Weibull lifetime distributions.
	CCWs: Determined by tracking total product stock by vintage and establishing the failure of the stock using retirement functions from the LCC and PBP analysis. Retirement functions were based on uniform lifetime distributions.	CCWs: No change in approach. Retirement functions revised to be based on Weibull lifetime distributions.

TABLE IV.10—APPROACH AND DATA USED TO DERIVE THE INPUTS TO THE SHIPMENTS ANALYSIS—Continued

Inputs	2007 ANOPR description	Changes for the proposed rule
Early Replacements (cooking products only).	Used to calibrate Shipments Model to historical shipments data. Two percent of the surviving stock per year is retired early.	No change.
Retired Units not Replaced (*i.e.*, non-replacements) (CCWs only).	Used to calibrate Shipments Model to historical shipments data. Starting in 1999 and extending to 2005, estimated that 3 to 35% of retired units were not replaced. Gradually reduced the percentage of non-replacements to zero between 2006 and 2013.	Froze the percentage of non-replacements at 15 percent for the period 2006–2042. Revision was made to account for the increased saturation rate of in-unit washers in the multi-family stock between 1997 and 2005 timeframe shown by the AHS.
Historical Shipments	Cooking Products: Data sources include AHAM data submittal, AHAM *Fact Book,* and *Appliance Magazine*.	Cooking Products: No change.
	CCWs: Data sources include AHAM data submittal, *Appliance Magazine,* and U.S. Bureau of Economic Analysis' quantity index data for commercial laundry.	CCWs: No change.
Purchase Price, Operating Cost, and Household Income impacts due to efficiency standards.	Developed the ''relative price'' elasticity which accounts for the purchase price and the present value of operating cost savings divided by household income. Used purchase price and efficiency data specific to residential refrigerators, clothes washers, and dishwashers between 1980 and 2002 to determine a ''relative price'' elasticity of demand, of −0.34.	No change.
Fuel Switching	Cooking Products: Not considered	Cooking Products: No change.
	CCWs: Not applicable	CCWs: Not applicable.

a. New Construction Shipments

To determine new construction shipments, DOE used forecasts of housing starts coupled with the product market saturation data for new housing. For new housing completions and mobile home placements, DOE used actual data through 2005, and adopted the projections from EIA's *AEO 2007* for 2006–2030 for the November 2007 ANOPR.[66] DOE updated its housing projections for today's proposed rule using *AEO 2008*. DOE used the 2001 RECS to establish cooking product market saturations for new housing. For CCWs, DOE relied on new construction market saturation data from CEE.[67]

b. Replacements

DOE estimated replacements using product retirement functions that it developed from product lifetimes. For the November 2007 ANOPR, DOE based the retirement function on a uniform probability distribution for the product lifetime. As discussed in section IV.E.6 of this notice, DOE updated its product lifetime distributions for the LCC analysis using Weibull distributions. As a result, DOE also updated its retirement functions for the Shipments Model based on Weibull distributions.

Cooking Products. To calibrate each Shipments Model against historical shipments, DOE established the early replacement market segment for cooking products. DOE determined for its November 2007 ANOPR that two percent of the surviving stock was replaced early. This finding was retained for today's proposed rule.

Commercial Clothes Washers. For the November 2007 ANOPR, DOE determined that from 1988 to 1998, annual shipments of clothes washers stayed roughly in the range of 200,000 to 230,000 units per year. But data provided by AHAM show a drop in shipments to approximately 180,000 units in 2005. To calibrate its Shipments Model for the November 2007 ANOPR, DOE attributed this drop to non-replacements (*i.e.*, a portion of CCWs that were retired from service from 1999 to 2005 were not replaced). Since DOE found no evidence that such non-replacement would continue over time, it projected that overall shipments would recover and gradually increase after the drop witnessed between 1999 and 2005 as stocks of existing machines are retired. DOE specifically sought feedback in the November 2007 ANOPR on its assumptions regarding the shipments forecasts for CCWs.

AHAM, Alliance, Whirlpool, Southern Company (SC) and Miele argued that CCW shipments are likely to decrease further in the future. (AHAM, No. 32 at pp. 4, 11–12; Alliance, No. 26 at p. 5; Whirlpool, No. 28 at pp. 9–10; SCG, Public Meeting Transcript, No. 23.7 at pp. 179–180; and Miele, Public Meeting Transcript, No. 23.7 at pp. 110–111) AHAM disagreed with DOE's forecast of CCW shipments, arguing that future shipments will remain unchanged from historical values, if not somewhat reduced. AHAM stated that both the number of replacement units and the number of new common-area laundry units are decreasing. AHAM cited a study[68] by the National Multi-Housing Council indicating that growth in multi-family housing is being driven in large part by high-end apartment complexes, which often include in-apartment amenities such as clothes washers and dryers, and cited data from the U.S. Census Bureau's *American Housing Survey* (AHS) showing growth in in-unit clothes washers (for rental units). The switch to in-unit laundry appliances in rental units results in a reduction of shared laundry areas, implying a corresponding reduction in CCW shipments. (AHAM, No. 32 at pp. 4, 11–12)

Alliance agreed that CCWs are increasingly competing with in-unit laundry products in multi-family housing. It cited information from the Multi-housing Laundry Association (MLA) stating that most recent multi-family new construction in California and Nevada accommodates in-unit washers and many existing properties of 100 or more units are converting to in-

[66] U.S. Department of Energy-Energy Information Administration, *Annual Energy Outlook 2007 with Projections to 2030* (Feb. 2007) (DOE/EIA–0383 (2007)). This document is available at: *http://www.eia.doe.gov/oiaf/aeo/index.html.*

[67] Consortium for Energy Efficiency, *Commercial Family-Sized Washers: An Initiative Description of the Consortium for Energy Efficiency* (1998). This document is available at: *http://www.ceel.org/com/cwsh/cwsh-main.php3.*

[68] J. Goodman, *The Upscale Apartment Market: Trends and Prospects* (National Multi-Housing Council) (2001).

unit washers. Alliance supported AHAM's conclusions about CCW shipments and urged DOE to revise its shipments forecast to approximate the recent downward trend in CCW shipments, or, at the very least, keep CCW shipments constant. (ALS, No. 26 at p. 5) Whirlpool stated that CCW shipments are not increasing, and argued that an assumption of flat demand would be more realistic, adding that an alternative of declining demand should be explored to estimate the sensitivity of this assumption for overall energy savings. (Whirlpool, No. 28 at pp. 9–10) SC and Miele also stated that there is a trend toward multi-family residences using in-unit washers as opposed to common area laundry facilities. (SC, Public Meeting Transcript, No. 23.7 at pp. 179–180; Miele, Public Meeting Transcript, No. 23.7 at pp. 110–111)

The Joint Comment disagreed with the claims by AHAM, Whirlpool, and Alliance. The Joint Comment argued that Alliance cited no decline in CCW shipments when reporting to the SEC on ''trends and characteristics'' in the North American market for its commercial laundry products. Rather, the Joint Comment stated that Alliance cited population growth as a ''steady driver'' for CCW shipments (*i.e.*, suggesting that the DOE projection appears reasonable). (Joint Comment, No. 29 at p. 5)

DOE appreciates the evidence that AHAM and Alliance have provided to illustrate the movement in multi-family buildings away from common-area laundry facilities to in-unit washers and dryers. To reevaluate its November 2007 ANOPR shipments forecast, DOE verified AHAM's conclusion regarding the AHS data, namely, that the stock of in-unit washers in the multi-family stock has increased 16 percent between 1997 and 2005. DOE also found that from 1997 to 2005, the AHS shows that the saturation of in-unit washers in new multi-family construction has stayed relatively constant, varying only slightly between 76 and 80 percent. The implication is that CCW saturations in new multi-family construction also remained constant between 1997 and 2005. This suggests that the growth in in-unit washer saturations in the multi-family stock over the last 10 years was likely caused by conversions of rental property to condominiums, resulting in the gradual phase-out or non-replacement of failed CCWs in common-area laundry facilities. Based on this apparent trend, DOE revised its November 2007 ANOPR estimate that CCW non-replacements would gradually phase-out by 2013. For today's proposed rule, DOE used the average percent of non-replacements over the period between 1999 and 2005 (18 percent) and maintained it over the entire forecast period of 2006 to 2042. The effect of maintaining non-replacements at 18 percent results in CCW shipments forecasts staying relatively flat between 2006 and 2042. This is in contrast to the annual growth rate of two percent determined for the November 2007 ANOPR.

c. Purchase Price, Operating Cost, and Household Income Impacts

To estimate the combined effects on product shipments from increases in equipment purchase price and decreases in equipment operating costs due to new efficiency standards for the November 2007 ANOPR, DOE conducted a literature review and a statistical analysis on a limited set of appliance price, efficiency, and shipments data. As the November 2007 ANOPR describes, DOE used purchase price and efficiency data specific to residential refrigerators, clothes washers, and dishwashers between 1980 and 2002 to conduct simple regression analyses. DOE's analysis suggests that the relative price elasticity of demand, averaged over the three appliances, is −0.34. Because DOE's forecast of shipments and national impacts due to standards spans over 30 years, DOE considered how the relative price elasticity is affected once a new standard takes effect. After the purchase price change, price elasticity becomes more inelastic over the years until it reaches a terminal value—usually around the tenth year after the price change. DOE incorporated a relative price elasticity change that resulted in a terminal value of approximately one-third of the short-run elasticity (−0.34). In other words, DOE determined that consumer purchase decisions, in time, become less sensitive to the initial change in the product's relative price. DOE received no comments on its analysis to estimate the combined effects of increases in product purchase price and decreases in operating costs and, therefore, retained the analysis and the results for today's proposed rule.

Because the combined market of electric and gas cooking products is completely saturated, DOE assumed in the November 2007 ANOPR that electric and gas cooking product standard levels would neither affect base-case shipments nor cause shifts in electric and gas cooking product market shares for cooking products other than microwave ovens. Thus, DOE's Shipments Model for electric and gas cooking products (*i.e.*, conventional cooking products) does not incorporate use of a relative price elasticity.

d. Fuel Switching

AGA commented that it is likely that consumers will switch from gas to electric cooking products in the event that standing pilot ignition systems are eliminated. According to AGA, consumers who face rewiring costs when replacing a gas cooking product are likely to consider purchasing and rewiring for an all-electric cooking product. Therefore, AGA commented that DOE needs to analyze the likelihood of such fuel switching, including assessing the full fuel-cycle energy consumption and emission implications, and evaluating the tradeoffs between the costs of the wiring jobs and the first costs of competing gas and electric products. (AGA, No. 27 at p. 3)

As section IV.E.2 of this notice describes, DOE estimated a cost of $235 for installing an electrical outlet to accommodate a gas cooking product that needs electricity to operate. If a consumer were to switch from a gas cooking product to an electrical appliance due to the prospect of this installation cost, an outlet would still be needed to accommodate the electrical appliance. Based on the RS Means *Mechanical Cost Data*, 2008, the cost of installing only an outlet suitable for an electrical cooking appliance, which requires a 50-amp, 240-volt receptacle, is $305.[69] Due to the amperage and voltage requirements of the receptacle as well as the age of the household in which the outlet would be installed (pre-1960), a separate branch circuit coming off the fuse box or circuit breaker panel would be necessary to accommodate the electrical cooking appliance. Also, because of the additional amperage required by the electrical cooking appliance, it is highly likely that the fuse box or circuit breaker panel would need to be upgraded. Based on material costs from the Craftsman *2008 Repair & Remodeling Estimator*[70] and labor costs for the RS Means, *Mechanical Cost Data*, 2008, DOE estimated an installation cost of $1247 for installing a branch circuit and upgrading a breaker panel from 50 amps to 100 amps. Combined with the $305 installation cost of the receptacle, the total installation cost to accommodate an electrical cooking appliance is

[69] RS Means, *Mechanical Cost Data* (30th Annual Edition) (2008) *Op. cit.*

[70] Craftsman Book Company, *2008 National Repair & Remodeling Estimator* (2008). Available for purchase at: *http://craftsman-book.com/products/index.php?main_page=cbc_product_book_info&products_id=400.*

estimated to be $1562 or over six times the cost of installing a standard 120-volt outlet for a gas cooking product. Therefore, there is no financial incentive for a consumer to switch from gas cooking to electric cooking. Thus, DOE believes the probability of fuel switching is so low that DOE is not considering it in today's proposed rule. See chapter 11 of the TSD accompanying this notice for further details.

3. Other Inputs

The following is a discussion of the other inputs to the NIA and any revisions DOE made to those inputs for today's proposed rule.

a. Base-Case Forecasted Efficiencies

A key input to DOE's estimates of NES and NPV are the energy efficiencies that DOE forecasts over time for the base case (without new standards) and each of the standards cases. The forecasted efficiencies represent the annual shipment-weighted energy efficiency (SWEF) of the products under consideration over the forecast period (*i.e.*, from the estimated effective date of a new standard to 30 years after the standard becomes effective). Because key inputs to the calculation of the NES and NPV depend on the estimated efficiencies, they are of great importance to the analysis. In the case of the NES, the per-unit annual energy (and water) consumption is a direct function of product efficiency. Regarding the NPV, two inputs (the per-unit total installed cost and the per-unit annual operating cost), depend on efficiency. The per-unit total installed cost is a direct function of efficiency. Because it is a direct function of the per-unit energy (and water) consumption, the per-unit annual operating cost depends indirectly on product efficiency.

As section IV.D.9 of this notice discusses, DOE based its development of the product efficiencies in the base case on the assignment of equipment efficiencies in 2005. In other words, DOE determined the distribution of product efficiencies currently in the marketplace to develop a SWEF for 2005. Using the SWEF as a starting point, DOE developed base-case forecasted efficiencies based on estimates of future efficiency growth. From 2005 to 2012 (2012 being the estimated effective date of a new standard), DOE estimated for the November 2007 ANOPR that there would be no growth in SWEF (*i.e.*, no change in the distribution of product efficiencies). Because there are no historical data to indicate how product efficiencies have changed over time, DOE estimated that forecasted efficiencies would remain frozen at the 2012 efficiency level until the end of the forecast period (*i.e.*, 2042, or 30 years after the effective date). DOE did forecast the market share of gas standard ranges equipped with standing pilot lights to estimate the impact of eliminating standing pilot lights for gas cooktops and gas standard ovens. Although DOE recognizes the possibility that product efficiencies may change over time (*e.g.*, due to voluntary efficiency programs such as ENERGY STAR), without historical information, DOE had no basis for speculating how these product efficiencies may change.

AHAM commented that DOE's approach to estimating forecasted base-case efficiencies was realistic. (AHAM, No. 32 at p. 12) For cooking products, Whirlpool also agreed with DOE's approach because these products are not incentivized by transformation programs such as ENERGY STAR. Whirlpool stated that because a new standard was established for CCWs in 2007, a change from that level is unlikely before 2012 due to product development cycles. Whirlpool would not speculate on changes in efficiency between 2012 and 2042; however, Whirlpool disagreed with DOE's assumption of no change. Whirlpool added that voluntary market transformation programs, such as ENERGY STAR, have a proven track record of saving energy without standards, and one could reasonably assume that such programs will have at least the same impact going forward as they have had historically. (Whirlpool, No. 28 at p. 10)

For today's proposed rule, DOE maintained its approach of freezing forecasted efficiencies at the efficiency level estimated for 2012 for both residential cooking products and CCWs. For cooking products, the two stakeholders that did comment (AHAM and Whirlpool, as discussed above) agreed with DOE's approach. Due to Whirlpool's concerns regarding CCWs, DOE's Building Technologies Program contacted the ENERGY STAR program within DOE to determine what actions are being undertaken to promote the adoption of more-efficient CCWs. CCWs have been a product covered under the ENERGY STAR program since 2000. But the program has not been able to monitor sales on ENERGY STAR-qualified products because manufacturers are not required to submit relevant data to ENERGY STAR. Also, because CCWs are not sold through a distribution channel involving appliance retailers, DOE believes that any market share estimates developed would be dubious. Without reliable data from which to estimate the impact of ENERGY STAR on CCW market efficiency, DOE has decided to retain its frozen efficiency forecasts for today's proposed rule. This is a conservative estimate that will be taken into consideration when DOE weighs the benefits and burdens of TSLs.

b. Standards-Case Forecasted Efficiencies

For its determination of standards-case forecasted efficiencies, DOE used a ''roll-up'' scenario in the November 2007 ANOPR to establish the SWEF for 2012, the year that standards would become effective. DOE stated its expectation that product efficiencies in the base case, which did not meet the standard level under consideration, would roll-up to meet the new standard level. Also, DOE assumed that all product efficiencies in the base case that were above the standard level under consideration would not be affected (*i.e.*, would not require or experience efficiency improvements as a result of a new energy efficiency standard). DOE made the same estimates regarding forecasted standards-case efficiencies as for the base case, namely, that forecasted efficiencies remained frozen at the 2012 efficiency level until the end of the forecast period, because DOE had no data to reasonably estimate how such efficiency levels might change over the next 30 years. By maintaining the same growth rate for forecasted efficiencies in the standards case as in the base case (*i.e.*, zero or frozen growth), DOE retained a constant efficiency difference or gap between the two cases over the length of the forecast period. Although frozen trends may not reflect what happens to base-case and standards-case product efficiencies in the future, DOE nevertheless believes that maintaining a frozen efficiency difference between the base case and standards case provides a reasonable estimate of the impact that standards have on product efficiency. In other words, because the determination of national energy savings and national economic impacts are more reliant on the impact that standards have on product efficiency, it is more important to accurately estimate the product efficiency gap between the standards case and base case, rather than to accurately estimate the actual product efficiencies in the standards-case and base-case efficiency trends. To further explore this point, in the November 2007 ANOPR, DOE specifically sought feedback on its estimates of forecasted standards-case efficiencies and its view of how standards affect product

efficiency distributions in the year that standards take effect.

The Joint Comment on the ANOPR stated that DOE's roll-up assumption is inadequate for estimating impacts, especially for lower and mid-range candidate standard levels. According to the Joint Comment, new distributions of efficiency performance occur largely because ENERGY STAR has offered market distinction for higher efficiency products, while utilities and other efficiency program administrators have offered incentives for beyond-standards levels of performance. The Joint Comment argued that this process will become more important in the future, not less; this means consumers are buying an increasing number of products at levels significantly more efficient than Federal standards. For prior rulemakings, the Joint Comment argued that DOE has also evaluated a ''shift'' scenario, which models savings if the distribution of efficiencies were to remain the same as the current distribution, but simply shift above a given new standard level. The Joint Comment stated that modeling both roll-up and shift scenarios would enable DOE and stakeholders to better evaluate the impacts of a given standard level. (Joint Comment, No. 29 at pp. 4–5) Counter to the Joint Comment, both AHAM and Whirlpool concurred with DOE's use of a roll-up assumption for estimating the impact of standards on product efficiencies. (AHAM, No. 32 at p. 12; Whirlpool, No. 28 at p. 10)

As noted in Whirlpool's comments, there are no market transformation programs such as ENERGY STAR for cooking products. Therefore, without the lure of a market transformation program like ENERGY STAR to promote the use of more-efficient cooking products beyond a particular standard level, DOE believes it is reasonable to estimate the impact of standards on the SWEF with only a roll-up scenario.

As described above, CCWs are under the ENERGY STAR program, but there are no data on the impact that the program has had on market efficiency. In the case of top-loading washers, the base-case efficiency distribution specifies all but three percent of the top-loading CCW market at either the baseline or 1.42 MEF/9.5 WF efficiency levels. Because the technological changes required to achieve higher efficiency levels are not currently being utilized in top-loading CCW designs, DOE estimates that standards would be unlikely to shift the top-loading CCW market to levels beyond minimum required efficiencies. In the case of front-loading washers, over 80 percent of the front-loading CCW market is already at an efficiency level of 2.00 MEF/5.5 WF, which is nearly at the max-tech level of 2.35 MEF/4.4 WF. Therefore, the effects from a shift scenario for front-loading washers would not be significantly different than the effects from a roll-up scenario. That is, the increased energy and water savings resulting from moving the market to the max-tech level would be offset by the increased equipment and repair costs from that level. Because of the reasons stated above, for today's proposed rule, DOE has analyzed only a roll-up scenario to establish the SWEF for top-loading and front-loading washers after new CCW standards would become effective.

c. Annual Energy Consumption

The inputs for determining NES are annual energy (and water) consumption per unit, shipments, equipment stock, national annual energy consumption, and site-to-source conversion factors. Because the annual energy (and water) consumption per unit depend directly on efficiency, DOE used the SWEFs associated with the base case and each standards case, in combination with the annual energy (and water use) data, to estimate the shipment-weighted average annual per-unit energy (and water) consumption under the base case and standards cases. The national energy consumption is the product of the annual energy consumption per unit and the number of units of each vintage. This calculation accounts for differences in unit energy consumption from year to year.

The NIA uses forecasted shipments for the base case and all standards cases. As noted above in section IV.E.2.c, DOE used a relative price elasticity to estimate standards-case shipments for microwave ovens and CCWs, but not conventional cooking products. The increased total installed cost of more-efficient equipment causes some customers to forego equipment purchases. Consequently, shipments forecasted under the standards cases are lower than under the base case. To avoid the inclusion of savings from displaced shipments of microwave ovens, DOE used the standards-case shipments projection and the standards-case stock to calculate the annual energy consumption in the base case. However, for CCWs, DOE assumed any drop in shipments caused by standards would result in the purchase of used machines. As a result, the standards-case forecast explicitly accounted for the energy and water consumption of not only new standard-compliant CCWs but used equipment coming into the market due to the drop in new product shipments as well. Therefore, DOE maintained the use of the base-case shipments to determine the annual energy consumption in the base case.

DOE's November 2007 ANOPR analysis estimated that 0.23 quads of national energy savings would be associated with the elimination of standing pilot ignition systems in gas cooking products and the anticipated substitution of electric spark ignition for gas standard ovens. AGA asserted that the maximum energy savings would be less (0.06 quads over 30 years) and contended that the amount of energy saved from eliminating standing pilot ignition systems is not significant enough to warrant setting a standard that eliminates them. (AGA, No. 27 at pp. 2 and pp. 13–14)

EEI compared the energy savings of eliminating standing gas pilots to the potential energy savings from a microwave oven standby power standard. According to EEI, DOE's analysis shows that gas standby energy use in gas cooking products is a much more significant energy and cost issue than microwave oven standby energy use, and DOE should prioritize its methods and analysis to reduce standby gas energy usage. (EEI, No. 25 at pp. 2–3)

DOE recognizes both AGA's and EEI's comments, but their input focused on how the agency should interpret the results of its energy savings analyses, rather than altering DOE's methodology for estimating the national energy savings due to the elimination of standing pilots. As the November 2007 ANOPR noted, DOE's method accounted for the market share of gas cooking products with standing pilots. Based on historical trends in the shipments data, DOE forecasted a continual decline in the market share of gas cooking products with standing pilots. As described in section IV.D.9.a, DOE estimated that 17.6 percent of standard gas oven shipments and 6.8 percent of gas cooktop shipments would be equipped with standing pilots in 2012. The above percentages are based on all gas standard oven and cooktop shipments (*i.e.*, shipments from both stand-alone or built-in products as well as kitchen ranges). Because DOE estimated that kitchen ranges are the only gas products that still come equipped with standing pilots, only standard ovens and cooktops in kitchen ranges comprise the percent of all standard ovens and cooktops that are still equipped with standing pilots. DOE estimated that approximately 14 percent of gas ranges in 2012 were equipped with standing pilots. Overall, a smaller percentage of gas cooktops are equipped

with standing pilots (6.8 percent) than standard gas ovens (17.6 percent) because there are far more stand-alone cooktop shipments than built-in standard oven shipments. DOE estimated a total market share of less than five percent by 2042 for gas cooking products with standing pilots. See chapter 11 of the TSD accompanying this notice for further details. By forecasting a declining market share of gas cooking products with standing pilots, DOE believes it accurately estimated the national energy savings due to energy efficiency standards that eliminate standing pilots. National energy savings results are presented below in section V.B.3.a.

d. Site-to-Source Conversion

Since it is necessary to estimate the national energy savings expected from appliance standards, DOE uses a multiplicative factor to convert site energy consumption (at the home or commercial building) into primary or source energy consumption (the energy required to deliver the site energy). In the November 2007 ANOPR, DOE used annual site-to-source conversion factors based on the version of NEMS that corresponds to *AEO 2006*. For today's NOPR, DOE updated its conversion factors based on *AEO 2008*.[71] These conversion factors account for natural gas losses from pipeline leakage and natural gas used for pumping energy and transportation fuel. For electricity, the conversion factors vary over time due to projected changes in generation sources (*i.e.*, the power plant types projected to provide electricity to the country). Since the EIA's *AEO* does not provide energy forecasts that go beyond 2030, DOE used conversion factors that remain constant at the 2030 values throughout the remainder of the forecast.

e. Embedded Energy in Water and Wastewater Treatment and Delivery

In the November 2007 ANOPR, DOE did not include the energy required for water treatment and delivery for the reasons that follow. EPCA defines ''energy use'' to be ''the quantity of energy *directly* consumed by a consumer product at point of use, determined in accordance with test procedures under section 6293 of [42 U.S.C.].'' (42 U.S.C. 6291(4)) (emphasis added) Based on the definition of ''energy use,'' DOE does not believe it has the authority to consider embedded energy (*i.e.*, the energy required for water treatment and delivery) in the analysis. Furthermore, even if DOE had the authority, it does not believe adequate analytical tools exist to conduct such an evaluation.[72]

f. Total Installed Costs and Operating Costs

The total annual installed cost increase is equal to the annual change in the per-unit total installed cost (*i.e.*, the difference between base case and standards case) multiplied by the shipments forecasted in the standards case. DOE did not change its approach for calculating total annual installed cost increases for today's proposed rule.

The annual operating cost savings per unit includes changes in energy, water, repair, and maintenance costs. DOE forecasted energy prices for the November 2007 ANOPR based on *AEO 2007* and updated the energy prices for today's proposed rule using forecasts from *AEO 2008*.

In the November 2007 ANOPR analysis, DOE believed there would be no increase in maintenance and repair costs due to standards. But as section IV.D.5 of this notice discusses, based upon public comments, DOE has accounted for the added repair and maintenance costs associated with non-standing pilot ignition systems for today's proposed rule. DOE has also included increases in repair and maintenance costs for more-efficient CCWs.

g. Effects of Standards on Energy Prices

In the November 2007 ANOPR, DOE did not consider the potential impact of energy efficiency standards on energy prices. However, DOE did publish a final rule for residential furnaces and boilers rule in November 2007 that assessed the consumer benefits, in the form of reduced natural gas prices, from a 90-percent annual fuel utilization efficiency (AFUE) or higher standard for non-weatherized gas furnaces. 72 FR 65136, 65152 (Nov. 19, 2007). The Joint Comment stated that because DOE conducted such an analysis for the furnace and boiler standards rulemaking, it must also evaluate gas and electricity price impacts in the context of the residential cooking product and CCW rulemaking. The Joint Comment further stated that DOE should consider the impact of standards on gas and electricity prices as a factor for economic justification, arguing that ''NAECA authorizes the Secretary to account for other, non-enumerated factors that he determines are relevant (42 U.S.C. 6297(o)).''[73] (Joint Comment, No. 29 at p. 12)

In response, DOE did conduct an analysis using a version of the 2008 NEMS–BT, modified to account for energy savings associated with possible standards. The analysis estimated that gas and electric demand reductions resulting from max-tech standards for residential cooking products and CCWs had no detectable change on the U.S. average wellhead natural gas price or the average user price of electricity. Therefore, DOE concludes that residential cooking product and CCW standards will not provide additional consumer benefits over those determined in the NIA. See chapter 11 of the TSD accompanying this notice for more details.

h. Discount Rates

DOE multiplies monetary values in future years by the discount factor to determine the present value. The Joint Comment stated that societal discount rates are the subject of extensive academic research and that the weight of academic opinion is that the appropriate societal discount rate is three percent or less. (Joint Comment, No. 29 at p. 12) DOE estimated national impacts using both a three-percent and a seven-percent real discount rate as the average real rate of return on private investment in the U.S. economy. DOE uses these discount rates in accordance with guidance provided by the Office of Management and Budget (OMB) to Federal agencies on the development of regulatory analysis (OMB Circular A–4 (Sept. 17, 2003), section E, ''Identifying and Measuring Benefits and Costs'').

Chapters 10 and 11 of the TSD accompanying this notice provide additional detail on the shipments and national impacts analyses for the two

[71] For the standards rulemakings, DOE will generally use the same economic growth and development assumptions that underlie the most current *AEO* published by EIA. For its determination of site-to-source conversion factors, DOE used the version of NEMS corresponding to *AEO 2006* for the ANOPR due to the unavailability of the *AEO 2007* version at the time DOE conducted the NIA. For its analyses for the NOPR and final rule, DOE is committed to using the latest available version of NEMS.

[72] An analytical tool equivalent to EIA's NEMS would be needed to properly account for embedded energy impacts on a national scale, including the embedded energy due to water and wastewater savings. This new version of NEMS would need to analyze spending and energy use in dozens, if not hundreds, of economic sectors. This version of NEMS also would need to account for shifts in spending in these various sectors to account for the marginal embedded energy differences among these sectors. 72 FR 64432, 64498–99 (Nov. 15, 2007). DOE does not have access to such a tool or other means to accurately estimate the source energy savings impacts of decreased water or wastewater consumption and expenditures.

[73] DOE notes that the Joint Comment cites to a statutory section that does not exist (*i.e.*, 42 U.S.C. 6297(o). Instead, the Joint Comment presumably intended to cite 42 U.S.C. 6295(o)(2)(B)(i)(VII), which stands for the proposition presented.

appliance products subject to further analyses as part of this rulemaking.

F. Consumer Subgroup Analysis

In analyzing the potential impact of new or amended standards on individual and commercial consumers, DOE evaluates the impact on identifiable subgroups of consumers that may be disproportionately affected by a national standard level.

DOE used RECS data to analyze the potential effect of standards for residential cooking products on two consumer subgroups of interest: (1) Households with low income levels, and (2) households occupied by seniors. In addition, DOE received public comments that identified other specific consumer subgroups that could potentially be affected by the elimination of standing pilot ignition systems. According to AGA, Amish communities, which do not allow the use of electricity, have gas products that use either propane or natural gas. AGA stated that religious and cultural prohibitions regarding electricity use by certain groups in the U.S. are well understood and that this was the reason for the original EPCA language requiring electronic ignition only on gas cooking products with other electrical features. In addition, AGA claimed that this consideration was the reason for the exception to not ban standing pilot lights on gravity gas-fired boilers (which have no electrical supply) in EISA 2007. (AGA, No. 27 at p. 2) However, EEI argued that the Amish communities as a subgroup are extremely small, so it would be very difficult for DOE to analyze this subset. (EEI, Public Meeting Transcript, No. 23.7 at pp. 198–99) EEI estimated that 50,000 families (0.04 percent of U.S. households) do not use electricity in their homes and may use natural gas, propane, kerosene, or wood for cooking purposes. (EEI, No. 5 at pp. 3–4)

DOE reviewed the U.S. Census Bureau's 2005 AHS and found that approximately 13,000 households, representing 0.01 percent of the total U.S. household population, use gas cooking products and are without electricity. Although it is unknown whether this subset of the U.S. household population includes Amish households, DOE does not doubt that Amish households would be affected by the elimination of standing pilots. DOE has contacted the Mennonite Information Center, the Young Center at Elizabethtown College, and businesses that sell gas appliances to the Amish community in Lancaster County, Pennsylvania and verified that Amish households do use gas-only cooking products. But, as section IV.A.1 discusses, DOE market research shows that battery-powered electronic ignition systems have been implemented in other products, such as instantaneous gas water heaters, barbeques, furnaces, and other appliances, and the use of such products is not expressly prohibited by applicable safety standards such as ANSI Z21.1. Therefore, DOE believes that households that use gas for cooking and are without electricity will have technological options that would enable them to continue to use gas cooking if standing pilot ignition systems are eliminated. Because the subgroup consisting of households without electricity will still have technological options for continuing to use gas cooking products even if standing pilots are eliminated, DOE believes that this subgroup will not be adversely impacted by an efficiency standard requiring the elimination of standing pilots.

Another consumer subgroup stakeholders identified is low-income households. GE stated that eliminating gas pilot ranges would cause hardship for most households using these products, since the majority of these products are used in Federally sponsored and municipally sponsored low-income and low-cost housing. GE argued that requiring these households to wire themselves to accommodate a gas range with electronic ignition would be cost prohibitive. (GE, No. 30 at pp. 2–4) EEI commented that DOE may want to identify the percentage of low-income consumers that use equipment with standing pilots. (EEI, No. 5 at p. 4) DOE was not able to verify GE's claim (submitted without data) that the majority of gas pilot ranges are used in Federally sponsored and municipally sponsored low-income housing, because, for example, the RECS data that DOE uses for its consumer subgroup analysis lack sufficient detail.

DOE analyzed the potential effects of CCW standards on two subgroups: (1) Consumers not served by municipal water and sewer providers, and (2) small businesses. For consumers not served by water and sewer, DOE analyzed the potential impacts of standards by conducting the analysis with well and septic system prices, rather than water and wastewater prices based on RFC/AWWA data. For small CCW businesses, DOE analyzed the potential impacts of standards by conducting the analysis with different discount rates, because small businesses do not have the same access to capital as larger businesses. DOE estimated that for businesses purchasing CCWs, the average discount rate for small companies is 3.5 percent higher than the industry average. Due to the higher costs of conducting business, as evidenced by their higher discount rates, the benefits of CCW standards for small businesses will be less than the general population of CCW owners.

More details on the subgroup analysis and the results can be found in chapter 12 of the TSD accompanying this notice.

G. Manufacturer Impact Analysis

1. General Description

In determining whether a standard for either of the two appliance products subject to further analyses as part of this rulemaking is economically justified, the Secretary of Energy is required to consider ''the economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard.'' (42 U.S.C. 6295(o)(2)(B)(i)(I) and 6316(a)) The statute also calls for an assessment of the impact of any lessening of competition as determined by the Attorney General. (42 U.S.C. 6295 (o)(2)(B)(i)(V) and 6316(a)) DOE conducted the MIA to estimate the financial impact of higher efficiency standards on manufacturers of the two appliance products, and to assess the impact of such standards on employment and manufacturing capacity.

The MIA has both quantitative and qualitative aspects. The quantitative part of the MIA relies on the GRIM, an industry cash-flow model customized for this rulemaking. The GRIM inputs characterize the industry cost structure, shipments, and revenues. This includes information from many of the analyses described above, such as manufacturing costs and prices from the engineering analysis and shipments forecasts. The key GRIM output is the INPV, which estimates the value of the industry on the basis of cash flows, expenditures, and investment requirements as a function of TSLs. Different sets of assumptions (scenarios) will produce different results. The qualitative part of the MIA addresses factors such as product characteristics, characteristics of particular firms, and market and product trends, and includes an assessment of the impacts of standards on subgroups of manufacturers. The complete MIA is outlined in chapter 13 of the TSD accompanying this notice.

In the Framework Document for this proceeding, notice of which was published in the **Federal Register** on March 27, 2006, DOE outlined the procedural and analytical approaches to be used in the MIA. (71 FR 15059) In the

November 2007 ANOPR for this rulemaking, DOE reported some preliminary MIA information and data in section II.K. 72 FR 64432, 64505–07 (Nov. 15, 2007). In response to these preliminary data, the November 2007 ANOPR, and DOE statements at the December public meeting, DOE received specific comments on the MIA, which are addressed in this section. In previous energy conservation standards rulemakings, DOE did not report any MIA results during the ANOPR phase of the rulemaking. However, under a new MIA format announced through a report issued to Congress on January 31, 2006, ''Energy Conservation Standards Activities'' [74] (as required by section 141 of EPACT 2005), DOE now reports preliminary MIA information at the ANOPR stage, as was done in the November 2007 ANOPR.

DOE conducted the MIA for cooking products and CCWs in three phases. Phase 1 (Industry Profile) characterized the industry using data on market share, sales volumes and trends, pricing, employment, and financial structure. Phase 2 (Industry Cash Flow) focused on each industry as a whole. In this phase, DOE used the GRIM to prepare an industry cash-flow analysis. Using publicly available information developed in Phase 1, DOE adapted the GRIM's generic structure to perform an analysis of cooking product and CCW energy conservation standards. In Phase 3 (Subgroup Impact Analysis), DOE conducted interviews with manufacturers representing the majority of domestic cooking product and CCW sales. This group included large and small manufacturers, thereby providing a representative cross-section of the two industries.

During these interviews, DOE discussed engineering, manufacturing, procurement, and financial topics specific to each company and obtained each manufacturer's view of the industry as a whole. The interviews provided valuable information that DOE used to evaluate the impacts of an amended energy conservation standard on manufacturers' cash flows, manufacturing capacities, and employment levels. DOE identified subgroups of manufacturers during interviews with manufacturers of cooking products and CCWs. The manufacturer subgroups are described in section IV.G.1.c. of this notice.

a. Phase 1 (Industry Profile)

In Phase 1 of the MIA, DOE prepared a profile of the cooking products and CCW industries based on the market and technology assessment prepared for this rulemaking. Before initiating the detailed impact studies, DOE collected information on the present and past structure and market characteristics of the cooking products and CCW industries. The information DOE collected included market share, equipment shipments, markups, and cost structure for various manufacturers. The industry profile includes: (1) Further detail on product characteristics; (2) estimated manufacturer market shares; (3) the financial situation of manufacturers; and (4) trends in the number of firms, the market, and product characteristics of the cooking products and CCW industries.

The industry profile included a top-down cost analysis of cooking products and CCW manufacturers that DOE used to derive cost and preliminary financial inputs for the GRIM (*e.g.*, revenues; material, labor, overhead, and depreciation expenses; selling, general, and administrative expenses (SG&A); and research and development (R&D) expenses). DOE also used public sources of information to further calibrate its initial characterization of each industry, including SEC 10–K reports, Standard & Poor's (S&P) stock reports,[75] and corporate annual reports. DOE supplemented this public information with data released by privately held companies.

b. Phase 2 (Industry Cash-Flow Analysis)

Phase 2 of the MIA focused on the financial impacts of new energy conservation standards on the industry as a whole. Higher energy conservation standards can affect a manufacturer's cash flow in three distinct ways, resulting in: (1) A need for increased investment; (2) higher production costs per unit; and (3) altered revenue by virtue of higher per-unit prices and changes in sales volumes. To quantify these impacts in Phase 2 of the MIA, DOE performed three separate cash-flow analyses, using the GRIM: One for the conventional cooking products industry, one for microwave ovens, and one for CCWs. In performing these analyses, DOE used the financial values derived during Phase 1 and the shipment scenarios used in the NIA.

c. Phase 3 (Subgroup Impact Analysis)

Using average cost assumptions to develop an industry cash-flow estimate is not adequate for assessing differential impacts among subgroups of manufacturers. For example, small or niche manufacturers, or manufacturers whose cost structure differs significantly from the industry average, could be more negatively affected. DOE used the results of the industry characterization analysis from Phase 1 to group manufacturers that exhibit similar characteristics. In the Framework Document and November 2007 ANOPR, DOE invited stakeholders to comment on the manufacturing subgroups that it should analyze for the MIA.

Cooking Products Subgroup: Small manufacturers of cooking products with standing pilot lights. DOE identified three manufacturers of gas-fired ovens, ranges, and cooktops with standing pilot lights. Two of the three manufacturers are classified as small businesses by the Small Business Administration (SBA). DOE categorized the two small businesses into their own subgroup as a result of their size and their concentration in the residential cooking industry. Both manufacturers produce gas-fired appliances with standing pilot ignition systems and derive over 25 percent of their total revenue from gas-fired appliances with standing pilot ignition systems. Both small manufacturers produce only residential cooking appliances and have annual sales in the $50–60 million range, whereas the third is a large, diversified appliance manufacturer. The two small cooking businesses are privately held, and each employs less than 300 employees.[76] DOE contacted both small cooking product businesses it identified to discuss differential impacts due to the elimination of standing pilot lights. DOE also interviewed the large manufacturer of gas-fired ovens, ranges, and cooktops with standing pilot lights.

Commercial Clothes Washers Subgroup. DOE identified three manufacturers that represent nearly 100 percent of CCW shipments. For CCWs, DOE categorized one manufacturer as its own subgroup because of its focus on the commercial laundry business. Due to the low shipment volumes in the CCW market and the much lower revenues of this manufacturer compared to its competitors, DOE identified this manufacturer as a ''Low-Volume Manufacturer'' (LVM) for its MIA

[74] Available at: *http://www1.eere.energy.gov/buildings/appliance_standards/schedule_setting.html.*

[75] Available at: *http://www2.standardandpoors.com/.*

[76] The SBA classifies a residential cooking appliance manufacturer as a small business if it has less than 750 employees. Refer to: *http://www.sba.gov/idc/groups/public/documents/sba_homepage/serv_sstd_tablepdf.pdf.*

subgroup analysis. In 2006, the LVM derived 87 percent of its clothes washer revenues from CCW sales, while CCW sales for each of its two main competitors represent less than one percent of their individual total clothes washer sales. Thus, the LVM fits the description of a niche manufacturer, even though in 2006 it had over $330 million in revenue and 1,500 employees. As discussed above, its two main competitors in the CCW market are diversified appliance manufacturers that each earns at least 50 times more revenue than the LVM on an annual basis. The LVM has successfully maintained its significant CCW market share despite its much smaller overall revenue base. DOE estimates that the LVM currently accounts for approximately 45 percent of CCW shipments. DOE described the differential cost impacts of new energy conservation standards on the LVM in the engineering analysis contained in the November 2007 ANOPR. (See Chapter 5 and Appendix 5–A of the TSD accompanying the November 2007 ANOPR.) The LVM does not qualify as a small business since it has over 1,000 employees.[77]

Compared to their larger competitors, both small cooking products businesses are highly concentrated in residential cooking appliance manufacturing, and the CCW LVM is highly concentrated in commercial laundry. Unlike their larger competitors, they operate at a much smaller scale and do not manufacture products across a broad range of industries. Thus, the potential impacts of this rulemaking on the small cooking products businesses and the CCW LVM could be disproportionate compared to the impacts on their large, diversified competitors. As a result, DOE performed an in-depth analysis of the issues facing the small cooking products businesses and the CCW LVM. (See chapter 13 and appendix 13–A of the TSD accompanying this notice.) The following paragraphs describe in detail the steps DOE took in developing the information for the MIA.

2. Government Regulatory Impact Model Analysis

As mentioned above, DOE uses the GRIM to quantify anticipated changes in cash flow that may result in a higher or lower industry value, which arise from potential energy conservation standards. The GRIM analysis uses a standard, annual cash-flow analysis that incorporates manufacturer prices, manufacturing costs, shipments, and industry financial information as inputs and models changes in costs, distribution of shipments, investments, and associated margins that would result from new regulatory conditions (in this case, standard levels). The GRIM spreadsheet uses a number of inputs to arrive at a series of annual cash flows, beginning with the base year of the analysis (2007) and continuing to 2042. DOE calculated INPVs by summing the stream of annual discounted cash flows during this period.

DOE used the GRIM to calculate cash flows using standard accounting principles and to compare changes in INPV between a base case and different TSLs (the standards cases). Essentially, the difference in INPV between the base case and a standards case represents the financial impact of the new energy conservation standards on manufacturers. DOE collected this information from several sources, including publicly available data and interviews with a number of manufacturers. See chapter 13 of the TSD accompanying this notice for details.

a. Government Regulatory Impact Model Scenarios and Key Inputs

Base-Case Shipments Forecast. The GRIM estimates manufacturer revenues based on total unit shipment forecasts and the distribution of these values by efficiency level. Changes in the efficiency mix at each standard level affect manufacturer finances. For this analysis, the GRIM used the NIA shipments forecasts from 2007 to 2042. In the shipments analysis, DOE also estimated the distribution of efficiencies in the base case for all product classes. In interviews, manufacturers of all product classes generally agreed with the NIA total shipment results.

Standards-Case Shipments Forecast. For each standards case, DOE considers that shipments at efficiencies below the projected minimum standard levels would roll up to those efficiency levels in response to an increase in energy conservation standards. This scenario assumes that demand for high-efficiency equipment is a function of price, independent of the standard level. See chapter 13 of the TSD accompanying this notice for additional details.

For CCWs, DOE uses a shipment scenario that considers the impacts of changes in relative prices on consumer demand for each product to bound the impacts of standards on manufacturers. As described in the discussion of purchase price, operating cost, and household income impacts found in the shipments model in chapter 10 of the TSD accompanying this notice, this shipment scenario estimates how the combined effects of increases in purchase price and decreases in operating costs due to new energy conservation standards affect shipments. In the ''price elasticity of demand'' shipment scenario, the effects from the increase in product purchase prices offset the effects from decreased operating costs, resulting in a net decrease in shipments.

Base-Case and New Energy Conservation Standards Markup Scenarios. In the GRIM, markups are applied to the manufacturer production costs (MPCs) to calculate manufacturing selling price. After discussions with manufacturers, DOE analyzed two distinct markup scenarios: (1) A preservation of gross margin[78] (percentage) scenario; and (2) a preservation of gross margin (in absolute dollars) scenario.

DOE modeled the preservation of gross margin percentage scenario in all three GRIMs. Under this scenario, DOE applied a single uniform ''gross margin percentage'' markup across all efficiency levels. As production cost increases with efficiency, this scenario implies that the absolute dollar markup will increase. DOE calculated that the non-production cost markup (which consists of SG&A expenses, R&D expenses, interest, and profit) is 1.26. This markup is consistent with the one DOE used in the engineering analysis and GRIM analysis for the base case. In their interviews, all manufacturers believe it is optimistic to assume that, as their production costs increase in response to an energy conservation standard, they would be able to maintain the same gross margin percentage markup. Therefore, DOE believes that this scenario represents a high bound to industry profitability under an energy conservation standard.

During interviews, multiple manufacturers of microwave ovens and conventional cooking products stated that they have not been able to fully recover the increased costs from increased raw material prices. Instead, manufacturers were only able to recover part of the total increase in production cost. Several manufacturers suggested that a similar situation would happen as a result of new energy conservation standards. In the ''preservation of gross

[77] The SBA classifies a commercial laundry equipment manufacturer as a small business if it has less than 500 employees. Refer to: *http://www.sba.gov/idc/groups/public/documents/sba_homepage/serv_sstd_tablepdf.pdf.*

[78] ''Gross margin'' is defined as revenues minus cost of goods sold. On a unit basis, gross margin is selling price minus manufacturer production cost. In the GRIMs, markups determine the gross margin because various markups are applied to the manufacturer production costs to reach manufacturer selling price.

margin (absolute dollars)'' scenario, gross margin is defined as ''revenues less cost of goods sold.'' The implicit assumption behind this markup scenario is that the industry will lower its markups in response to the standards to maintain only its gross margin (in absolute dollars). This means the percentage difference between MPC and selling price will decrease in the standards case compared to the base case and the gross margin percentage will be lower. The industry would do so by passing through its increased production costs to customers, while increased R&D and selling, general, and administrative expenses directly lower profit. DOE implemented this scenario in the microwave oven and conventional cooking products GRIMs by lowering the production cost markups for each TSL to yield approximately the same gross margin in dollars in the standards cases in the year standard are effective (2012) as is yielded in the base case. This scenario is less optimistic than the preservation of gross margin percentage scenario.

Product and Capital Conversion Costs. Energy conservation standards typically cause manufacturers to incur one-time conversion costs to bring their production facilities and product designs into compliance with the new standards. For the purpose of the MIA, DOE classified these one-time conversion costs into two major groups: (1) Product conversion and (2) capital conversion costs. Product conversion expenses are one-time investments in research, development, testing, and marketing, focused on making product designs comply with the new energy conservation standard. Capital conversion expenditures are one-time investments in property, plant, and equipment to adapt or change existing production facilities so that new product designs can be fabricated and assembled.

DOE assessed the R&D expenditures manufacturers would be required to make at each TSL. For microwave ovens (EF standards) and conventional cooking products, DOE obtained financial information through manufacturer interviews and aggregated the data to prevent disclosure of proprietary or confidential information. For all product classes at each TSL, DOE considered these manufacturer responses. DOE estimated average industry product conversion expenditures by weighting these data by market share and, finally, extrapolated each manufacturer's R&D expenditures for each product. Where manufacturers did not comment, DOE used the conversion expenditures estimated in the 1996 TSD, updated by current production volumes and the PPI.[79] For CCW and standby power standards for microwave ovens, DOE used manufacturer interviews to determine the cost of upgrading a product platform. DOE used interviews and product catalogs to estimate the number of product platforms that needed to be upgraded at each TSL to obtain its estimates for the conversion costs of the entire industry.

DOE also evaluated the level of capital conversion costs manufacturers would incur in order to comply with amended energy conservation standards. For conventional cooking products, DOE initially revised the conversion capital expenditure figures in the 1996 TSD with current manufacturing volume projections and 2007 PPI figures.[80] During interviews, DOE asked manufacturers to comment on the figures, which DOE subsequently revised based on these responses. For microwave ovens and CCWs, DOE prepared preliminary estimates of the capital investments required at each TSL, which is affected in part by the ability to use existing plants, warehouses, tooling, and equipment. From the interviews and information in product catalogs, DOE was able to estimate what portion of existing manufacturing assets would need to be replaced and/or reconfigured, and what additional manufacturing assets would be required to manufacture the higher-efficiency products. In most cases, DOE projects that if standard levels were increased, the proportion of existing assets that manufacturers would have to replace would also increase. Additional information on the estimated product conversion and capital conversion costs is set forth in chapter 13 of the TSD accompanying this notice.

3. Manufacturer Interviews

As noted above, as part of the MIA, DOE discussed potential impacts of standards with multiple manufacturers. As section IV.G.1 of this notice describes, DOE conducted MIA interviews on multiple occasions with the three manufacturers representing nearly 100 percent of domestic CCW sales. These interviews were in addition to those DOE conducted as part of the engineering analysis. After the December 2007 public meeting, DOE also interviewed multiple cooking product manufacturers about microwave ovens, as well as conventional gas and electric cooking products. Data from the analysis indicated that the combined market share of these manufacturers represents 25 to 82 percent of unit shipments, depending on the specific cooking product category. For certain issues relating to standby power, DOE also interviewed subject-matter experts. All interviews provided information that DOE used to evaluate the impacts of potential new energy conservation standards on manufacturers' cash flows, manufacturing capacities, and employment levels.

Most of the information received from these meetings is protected by non-disclosure agreements and resides with DOE's contractors. Before each telephone interview or site visit, DOE provided company representatives with an interview guide that included the topics for which DOE sought input. As the November 2007 ANOPR describes, the MIA interview topics included key issues relevant to the rulemaking, including: (1) Product mix; (2) profitability; (3) conversion costs; (4) manufacturing capacity and employment levels; (5) market share and industry consolidation; (6) product utility and innovation; and (7) cumulative burden issues. Appendix 13-B of the TSD accompanying this notice provides copies of the discussion guides.

a. Conventional Cooking Products

During the manufacturer interviews in the November 2007 ANOPR phase, conventional cooking product manufacturers raised three key issues: (1) Continuing intense price competition and an inability to pass on cost increases, (2) financial and consumer utility impacts of standby power standards, and (3) consumer utility and economic/industry impacts of eliminating standing pilot ignition systems for gas-fired appliances. DOE requested additional information on these key issues during manufacturer interviews during the NOPR phase. Additional topics raised by manufacturers of conventional cooking products during the NOPR-phase interviews included: (1) The validity, cost-effectiveness, and potential efficiency improvements of design options; (2) the disproportionate effect of energy efficiency standards on manufacturer and consumer subgroups; (3) factors that affect the INPV; and (4) the expected financial and consumer utility impacts of potential standby power standards.

Multiple manufacturers cited price competition and the inability to pass on increased costs to consumers as their primary concern. DOE sought comment from appliance manufacturers on the potential consumer utility impacts as a

[79] Available at: *http://www.bls.gov/PPI/.*

[80] Available at: *http://www.bls.gov.*

result of standby power standards for conventional cooking products. In addition, a low standby power standard could result in a lack of product differentiation, harming manufacturers' profitability.

DOE sought comment regarding the potential elimination of standing pilot ignition systems from gas-fired cooking products, with replacement by electronic ignition systems using a spark or glo-bar igniter. (See chapter 5 of the TSD accompanying this notice for a further description.) Manufacturers of gas cooking products with standing pilot lights stated that there are several issues regarding the potential elimination of standing pilot lights, including: (1) The consumer utility of standing pilot ignition systems for customers without line power (for religious, economic, or other reasons); (2) likely retrofitting of standing pilot-equipped equipment with non-certified ignition devices, which may be unsafe; (3) the retrofit costs are higher than DOE projects for consumers without an electrical outlet nearby; and (4) competitive impacts on the industry. Furthermore, interviews highlighted that two small businesses will be impacted disproportionately from elimination of pilot lights and could be harmed materially. Both small cooking appliance manufacturers stated that the elimination of the standing pilot option for their gas ranges would likely cause substantial harm, since standing pilot-equipped products represent more than 25 percent of their total revenues. DOE agrees that because the small businesses focus solely on the manufacture of residential cooking products, these two manufacturers could be affected to a greater extent than their larger competitors by a potential energy conservation standard that eliminates standing pilots.

For conventional cooking products, DOE interviewed manufacturers about the design options that were presented in the November 2007 ANOPR, which were based on those identified in the 1996 TSD. All manufacturers stated that their current cooking product designs are optimized for cost and performance, and thus any design options not already incorporated were deemed unlikely to save any significant energy. According to manufacturers, new design options would also result in significant upfront price increases and/or consumer utility issues because even purchased part substitutions result in substantial costs due to reliability, safety, and other necessary testing. During the MIA, DOE also sought to verify consumer subgroup(s) that could be disproportionately affected by this rulemaking. One manufacturer noted that some religious groups generally prohibit the use of line-powered appliances and that previous rulemakings (such as furnaces and boilers [81]) have included special provisions for such consumer sub-categories. See section IV.F of this notice for further discussion of the consumer subgroup analysis conducted for the NOPR.

DOE solicited comments from manufacturers about the likely impact on profitability, unit shipments, markups, and other factors that determine the INPV. Multiple manufacturers stated that energy conservation standards have the potential to significantly harm profitability because high-end cooking products typically have higher profit margins than entry-level appliances. Also, features that differentiate high-end appliances from lower-end appliances may be eliminated or become commonplace as a result of energy efficiency standards. Several manufacturers stated it is impossible to pass along cost increases to customers because of the competitive nature of the industry. Any cost increase due to standards set by DOE would thus automatically lower profit margins. One manufacturer expects greater foreign competition if standards force design options currently found only on high-end cooking products downward in the market, because the required redesign would eliminate the competitive advantage of domestic firms. DOE research suggests that the markups for low- and high-end cooking products differ (*i.e.*, margins on high-end products tend to be higher than the margins on low-end products).

b. Microwave Ovens

During interviews in the November 2007 ANOPR phase with microwave oven manufacturers, DOE identified two key issues: (1) Continuing intense price competition and an inability to pass on cost increases, and (2) financial and consumer utility impacts of standby power standards. Additional topics raised by microwave oven manufacturers during the NOPR-phase interviews included: (1) The validity and cost-effectiveness of design options, (2) factors that determine the INPV; and (3) microwave oven test procedure issues.

All manufacturers noted that most microwave oven manufacturing has moved overseas due to intense price competition and commoditization of this product category. Two manufacturers stated that they still wholly manufacture or assemble microwave ovens from components domestically, though the market share of these shipments is low compared to total industry shipments. All manufacturers stated the difficulty of passing any price increases (due to raw material costs, for example) on to consumers and they expect any energy conservation standard to further cut into manufacturer profits.

DOE sought comment on the various pathways that manufacturers could elect to pursue to meet proposed standby power consumption limits. Multiple pathways exist, based on the selection of the (1) display technology, (2) power supply/control boards, (3) cooking sensors, and (4) the possible incorporation of algorithms to automatically reduce standby power after a period of inactivity (the max-tech option).

All microwave oven manufacturers that DOE interviewed noted that the choice of display technology is an important differentiator in the marketplace. DOE research suggests that, if constantly active, VFD displays of the type commonly found in microwave ovens are unlikely to meet a standby power standard of 1.5 W or lower. Thus, in their opinion such a standby standard could lead to the loss of consumer utility.

Noting manufacturer concerns about reduced utility resulting from standby power requirements, DOE researched this issue in detail. Microwave ovens with all other display types found in the DOE sample are projected to be able to meet a 1.0 W standby level as long as other standby power-consuming components are carefully specified. DOE consulted power supply design subject matter experts before conducting interviews with manufacturers. The subject matter experts noted that the no-load standby loads imposed by the power supplies in the DOE microwave oven test sample could be reduced with improved materials or by a topology change to a switching power supply (which has more parts, a higher cost, and potentially lower reliability). One manufacturer stated that it already makes microwave ovens that use switching power supplies for the U.S. market. The manufacturer noted that such a power supply change reduced the standby power of that manufacturer's product from approximately 3 W to 1–2 W. All manufacturers agreed that substantial investments in product development

[81] Refer to: *http://www.eere.energy.gov/buildings/appliance_standards/residential/furnaces_boilers.html.*

would likely result from standby power standards.

All microwave oven manufacturers believe that a cooking sensor provides significant product differentiation. One manufacturer noted that it will transition this year to an absolute humidity sensor with zero standby power and zero incremental cost above that of a conventional absolute humidity sensor. For further information regarding microwave ovens, sensors, and standby power requirements, see section IV.B.1.a of this notice and chapter 5 of the TSD accompanying this notice.

In some countries, such as Japan, many microwave ovens power down automatically after a period of inactivity. Based on DOE criteria, such microwave ovens achieve max-tech standby power, since they consume minimally more power than microwave ovens with electromechanical timers while allowing the use of a cooking sensor. All manufacturers that DOE interviewed oppose the max-tech standby level (0.02 W), claiming that such a standard would effectively force manufacturers to switch off the displays on their microwave ovens after a period of inactivity. Not only would this require a completely revised control circuit (with additional cost, uncertain reliability, additional testing, and other implications), but it would also reduce the ability of manufacturers to differentiate their products in the marketplace. All manufacturers stated that consumers expect that a microwave oven equipped with a display should show clock time while in standby mode.

DOE identified two domestic microwave oven manufacturing facilities. DOE solicited comments from all microwave oven manufacturers regarding current industry conditions and likely responses to potential energy conservation standards. One manufacturer stated that any incremental cost could lead to plant closures and a shift to production facilities where the labor costs are lower.

All manufacturers oppose a standby level that would effectively limit their ability to differentiate high- versus low-end products in the market. During interviews, manufacturers were asked to comment on the minimum standby limit that would allow such differentiation. The minimum standby limit varied by manufacturer and ranged from 1.5 W to 4 W.

c. Commercial Clothes Washers

The key issues for CCW manufacturers remain unchanged from the November 2007 ANOPR analysis. During the NOPR MIA interviews, all CCW manufacturers stated they continue to support multiple CCW product classes and worry that high efficiency standards will significantly depress CCW unit shipments by encouraging the re-manufacture of old equipment and shifting the market further to in-unit laundry. Since its clothes washer revenue is so dependent on CCW sales, the LVM predicts that it will be impacted disproportionately by any CCW standard. The NOPR MIA interviews also focused on validating the November 2007 ANOPR CCW cost-efficiency curve. Based on conversations with all major CCW manufacturers and the determination of two CCW product classes, DOE is proposing two revised curves. For more details on the updated cost-efficiency curve, see section IV.C.2.b of this notice.

CCW manufacturers identified five key issues in the ANOPR interviews: (1) The risk of eliminating top-loading washers from the market; (2) reduced product shipments due to a shift from central laundry facilities to in-unit residential laundry and prolonging the life of existing equipment; (3) reduced cleaning performance of certain energy-saving design options; (4) the possible relocation of production facilities outside the country; and (5) the potential for industry consolidation and/or the elimination of the LVM. (See chapter 13 of the TSD accompanying this notice for more details.) DOE addressed each of these key issues again during manufacturer interviews in the NOPR phase. Additional topics DOE discussed with CCW manufacturers during the NOPR-phase interviews included: (1) Higher efficiency top-loading CCWs; (2) CCW performance metrics; (3) equipment reliability; and (4) test procedure issues.

All manufacturers stated both publicly and privately that they support two CCW product classes, with separate efficiency standards for front-loading and top-loading CCWs. All CCW manufacturers stated that they expect a single efficiency standard to result in the elimination of top-loading CCWs with a traditional agitator. According to multiple manufacturers, the higher TSLs are technically feasible with non-agitator top-loading platforms that are based on existing RCW designs. Whirlpool stated that it could develop such a washer, though the company did not disclose the cost. (Whirlpool, No. 28 at p. 5) However, multiple manufacturers consider these non-agitator top-loading CCWs unacceptable for the CCW market due to consumer utility issues. They believe that such CCWs cannot properly accommodate overloading and that consumer dissatisfaction could arise from poor wash quality.

Manufacturers believe elimination of agitator top-loading washers could also harm laundromats and route operators who own and operate CCWs. Existing inventories of replacement parts for top-loading washers could become obsolete as top-loading machines are replaced by front-loading models, potentially representing significant stranded capital.

DOE sought comment from manufacturers regarding the possible impacts on CCW shipments due to proposed efficiency standards. All manufacturers agreed that the CCW market is at best flat, and possibly in decline. Manufacturers stated that: (1) Higher CCW costs could hasten the trend in multi-home housing from centralized CCW facilities to in-unit laundry; and (2) route operators and other CCW owners are expected to aggressively repair and remanufacture existing top-loading units rather than replace them with incompatible models. Manufacturers also expressed concern about the potential of energy efficiency standards to decrease shipments due to the higher initial costs of front-loading CCWs. Manufacturers stated that top-loading CCWs are currently significantly lower in price, are more reliable, and have lower spare parts costs than front-loading CCWs. Because multi-housing units typically face fixed capital budgets, those units could purchase fewer CCWs if standards increase purchase prices. Since total industry CCW annual shipments are approximately 200,000, all manufacturers contacted were skeptical that engineering resources and capital would be used to design new, lower-cost front-loading machines or expand existing production lines. During the ANOPR interviews, manufacturers stated that all top-loading CCW manufacturing facilities are domestic, whereas a significant number of front-loading shipments are sourced from abroad. Thus, any forced investments or decrease in top-loading shipments will disproportionately affect U.S. manufacturing sites.

As noted above, three domestic manufacturers comprise nearly 100 percent of the CCW market. Two of them are large, diversified appliance manufacturers, whereas the LVM focuses exclusively on laundry products (and has an approximately 45 percent market share.) Because the LVM derives 87 percent of its clothes washer revenue from CCW sales, the impact of any CCW efficiency standards will affect the LVM more than its competitors, which derive

about one percent of their clothes washer revenue from CCW sales. The LVM has also stated that any standard that eliminates its current top-loading CCW platform, though not necessarily forcing the company out of business entirely, would materially harm the company and likely force it out of the clothes washer market altogether. For a detailed discussion of the LVM MIA issues, see the TSD accompanying this notice, chapter 13 and appendix 13–A.

H. Employment Impact Analysis

DOE considers employment impacts in the domestic economy as one factor in selecting a proposed standard. Employment impacts include direct and indirect impacts. Direct employment impacts are any changes in the number of employees for manufacturers of the appliance products that are the subject of this rulemaking, their suppliers, and related service firms. Indirect employment impacts are employment changes in the larger economy that occur due to the shift in expenditures and capital investment caused by the purchase and operation of more-efficient appliances. The MIA addresses the portion of direct employment impacts that concern manufacturers of the two appliance products that are subject to further analysis in this rulemaking, as well as the direct impacts on the suppliers of these manufacturers and related service firms.

Indirect employment impacts from standards consist of the net jobs created or eliminated in the national economy, other than in the manufacturing sector being regulated, due to: (1) Reduced spending by end users on energy (electricity, gas (including liquefied petroleum gas), and oil); (2) reduced spending on new energy supply by the utility industry; (3) increased spending on the purchase price of new products; and (4) the effects of those three factors throughout the economy. DOE expects the net monetary savings from standards to be redirected to other forms of economic activity. DOE also expects these shifts in spending and economic activity to affect the demand for labor in the short term, as explained below.

One method for assessing the possible effects on the demand for labor of such shifts in economic activity is to compare sectoral employment statistics developed by the BLS. The BLS regularly publishes its estimates of the number of jobs per million dollars of economic activity in different sectors of the economy, as well as the jobs created elsewhere in the economy by this same economic activity. Data from BLS indicate that expenditures in the utility sector generally create fewer jobs (both directly and indirectly) than expenditures in other sectors of the economy. There are many reasons for these differences, including wage differences and the fact that the utility sector is more capital intensive and less labor intensive than other sectors. (See Bureau of Economic Analysis, *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, Washington, DC, U.S. Department of Commerce (1992).) Efficiency standards have the effect of reducing consumer utility bills. Because reduced consumer expenditures for energy likely lead to increased expenditures in other sectors of the economy, the general effect of efficiency standards is to shift economic activity from a less labor-intensive sector (*i.e.*, the utility sector) to more labor-intensive sectors (*e.g.*, the retail and manufacturing sectors). Thus, based on the BLS data alone, DOE believes net national employment will increase due to shifts in economic activity resulting from standards for cooking products and CCWs.

In developing this proposed rule, DOE estimated indirect national employment impacts using an input/output model of the U.S. economy called Impact of Sector Energy Technologies (ImSET). ImSET is a spreadsheet model of the U.S. economy that focuses on 188 sectors most relevant to industrial, commercial, and residential building energy use.[82] ImSET is a special-purpose version of the ''U.S. Benchmark National Input-Output'' (I–O) model, which has been designed to estimate the national employment and income effects of energy-saving technologies that are deployed by DOE's Office of Energy Efficiency and Renewable Energy. Compared with the previous versions of the model used in earlier rulemakings, this version allows for more complete and automated analysis of the essential features of energy efficiency investments in buildings, industry, transportation, and the electric power sectors. The ImSET software includes a computer-based I–O model with structural coefficients to characterize economic flows among the 188 sectors. ImSET's national economic I–O structure is based on the 1997 U.S. benchmark table (Lawson, *et al.* 2002),[83] specially aggregated to 188 sectors. DOE estimated changes in expenditures using the NIA spreadsheet. Using ImSET, DOE then estimated the net national, indirect-employment impacts on employment by sector of potential new efficiency standards for cooking products and CCWs.

While both ImSET and the direct use of BLS employment data suggest the proposed standards could increase the net demand for labor in the economy, the gains would most likely be very small relative to total national employment. Therefore, DOE concludes only that the proposed standards are likely to produce employment benefits that are sufficient to fully offset any adverse impacts on employment in the manufacturing or energy industries related to cooking products and CCWs. (See the TSD accompanying this notice, chapter 15.)

I. Utility Impact Analysis

The utility impact analysis estimates the change in the forecasted power generation capacity for the Nation, which would be expected to result from adoption of new standards. This analysis separately determines the changes to supply and demand as a result of natural gas, fuel oil, liquefied petroleum gas, or electricity residential consumption savings due to the standard. DOE calculated this change using the NEMS–BT computer model. NEMS–BT models certain policy scenarios such as the effect of reduced energy consumption per TSL by fuel type. The analysis output provides a forecast for the needed generation capacities at each TSL. The estimated net benefit of the standard is the difference between the forecasted generation capacities by NEMS–BT and the *AEO 2008* Reference Case.

DOE obtained the energy savings inputs associated with electricity and natural gas consumption savings from the NIA. These inputs reflect the effects of efficiency improvement on residential cooking product and CCW energy consumption, both fuel (natural gas) and electricity. Chapter 14 of the TSD accompanying this notice presents results of the utility impact analysis.

EEI stated that DOE should show the change in natural gas production (*i.e.*, infrastructure) as well as electric generation capacity as a result of standards. (EEI, No. 25 at p. 4) Historically, DOE's approach for the utility impact analysis has only evaluated the impact on natural gas consumption and utility sales. The evaluation of impacts on the natural gas infrastructure that may result from declines in the sales of natural gas is not

[82] Roop, J. M., M. J. Scott, and R. W. Schultz, *ImSET: Impact of Sector Energy Technologies*, (PNNL–15273 Pacific Northwest National Laboratory) (2005). Available at: *http://www.pnl.gov/main/publications/external/technical_reports/PNNL–15273.pdf.*

[83] Lawson, Ann M., Kurt S. Bersani, Mahnaz Fahim-Nader, and Jiemin Guo, ''Benchmark Input-Output Accounts of the U.S. Economy, 1997,'' *Survey of Current Business* (Dec. 2002) pp. 19–117.

possible with the NEMS–BT analysis methodology. Therefore, DOE did not perform this type of evaluation in the utility impact analysis for the residential cooking product and CCW rulemaking. It is unlikely such impacts would be significant for the gas utility industry, however, given that the annual change in natural gas supply resulting from the standards is in the range of 1–18 trillion Btu (compared to an annual national gas supply of 19.04 quadrillion Btu.[84])

In its November 2007 ANOPR, DOE stated that it did not plan to estimate impacts on water and wastewater utilities for its proposed rule, because the water and wastewater utility sector is more complicated than either the electric utility or gas utility sectors, with a high degree of geographic variability produced by a large diversity of water resource availability, institutional history, and regulatory context. 72 FR 64432, 64508 (Nov. 15, 2007). Further, DOE was not aware of any national data or nationally based tool that would allow it to calculate the impacts on water and wastewater utilities or water and wastewater infrastructure requirements. The Joint Comment and numerous water organizations stated that DOE should analyze the impacts on water and wastewater utilities. The Joint Comment added that because there are widespread problems in water and wastewater infrastructure financing, DOE should commit to conducting such an analysis. The commenters cite the Environmental Protection Agency's (EPA's) 2002 report, *The Clean Water and Drinking Water Infrastructure Gap Analysis* (EPA–816–R–02–020), as evidence of the infrastructure problem. (Joint Comment, No. 29 at p. 4; AWE, AR, AMWA, CUWCC, and TBW, No. 34 at p. 1)

In response to public comments, DOE nevertheless conducted a review of governmental and non-governmental analytical tools that might prove suitable for calculating the impacts of CCW standards on water and wastewater utilities or water and wastewater infrastructure requirements. Specifically, the EPA, the U.S. Geological Survey (USGS), and DOE are conducting or initiating national activities to study water and wastewater issues, including those pertaining to water and wastewater utilities. These tools are discussed below.

The EPA's WaterSense program[85] provides information to enhance the market for water-efficient products, programs, and practices. EPA developed the National Water Saving (NWS) spreadsheet tool to estimate water savings attributable to WaterSense activities. The model examines the effects of WaterSense by tracking the shipments of products that WaterSense designates as water-efficient. It estimates savings based on an accounting analysis of water-using equipment and building stock.[86] Since this tool only permits calculation of water savings, however, it would not add any capabilities that DOE does not already have

With respect to non-governmental efforts, the California Urban Water Conservation Council (CUWCC) and the Pacific Institute have developed two tools for California water utilities. *Avoided Cost Due to Water Efficiency and Conservation*[87] assists California water utilities in calculating avoided costs and developing methods to quantify the environmental benefits and costs associated with implementing water efficiency programs. *The Water to Air Model*[88] helps California water managers quantify the energy and air quality dimensions of water management decisions. Neither of these models would allow estimation of impacts of water savings on water utility infrastructure requirements, however.

In sum, none of these activities has yet produced the necessary data or tools to permit DOE to conduct a water utility impact analysis of the type requested by commenters.

Although DOE cannot yet determine water and wastewater utility impacts at the national level, both the LCC analysis and the NIA do include the economic savings from decreased water and wastewater charges. Such economic savings should include the economic value of any energy savings that may be included in the provision of consumer water and wastewater services.

J. Environmental Assessment

DOE has prepared a draft Environmental Assessment (EA) pursuant to the National Environmental Policy Act and the requirements of 42 U.S.C. 6295(o)(2)(B)(i)(VI) and 6316(a), to determine the environmental impacts of the proposed standards. Specifically, DOE estimated the reduction in power sector emissions of CO_2 using the NEMS–BT computer model. DOE calculated a range of estimates for reduction in oxides of nitrogen (NO_X) emissions and mercury (Hg) emissions using power sector emission rates. However, the Environmental Assessment (see chapter 16 of the TSD accompanying this notice) does not include the estimated reduction in power sector emissions of SO_2, because DOE has determined that due to the presence of national caps on SO_2 emissions as addressed below, any such reduction resulting from an energy conservation standard would not affect the overall level of SO_2 emissions in the United States. Because the operation of gas cooking products and CCWs requires use of fossil fuels and results in emissions of CO_2 and NO_X, DOE also accounted for the reduction in CO_2 and NO_X emissions from standards at the sites where these appliances are used.

The NEMS–BT is run similarly to the *AEO 2008* NEMS, except that cooking product and CCW energy use is reduced by the amount of energy saved (by fuel type) due to the TSLs. DOE obtained the inputs of national energy savings from the NIA spreadsheet model. For the environmental assessment, the output is the forecasted physical emissions. The net benefit of the standard is the difference between emissions estimated by NEMS–BT and the *AEO 2008* Reference Case. The NEMS–BT tracks CO_2 emissions using a detailed module that provides results with broad coverage of all sectors and inclusion of interactive effects. For the final rule, DOE intends to revise the emissions analysis using the *AEO 2009* NEMS model using the process outlined above.

The Clean Air Act Amendments of 1990 set an emissions cap on SO_2 for all power generation. The attainment of this target, however, is flexible among generators and is enforced through the use of emissions allowances and tradable permits. Because SO_2 emissions allowances have value, they will almost certainly be used by generators, although not necessarily immediately or in the same year with and without a standard in place. In other words, with or without a standard, total cumulative SO_2 emissions will always be at or near

[84] Department of Energy—Energy Information Administration, *Annual Energy Outlook 2008 with Projections to 2030* (DOE/EIA–0383) (June 2008) Table A1. Available at: *http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2008).pdf.*

[85] The WaterSense program provides the public with information regarding water efficient products, including available consumer products and general information related to water efficiency. Refer to: *http://www.epa.gov/watersense/.*

[86] McNeil, Michael, Camilla Dunham Whitehead, Virginie Letschert, and Mirka della Cava, *WaterSense® Program: Methodology for National Water Savings Analysis Model Indoor Residential Water Use* (LBNL) (Feb. 2008).

[87] This model is available at: *http://www.cuwcc.com/technical/action.lasso?-database=cuwcc_catalog&-layout=CDML&-response=detailed_results.html&-recordID=34196&-search.*

[88] This model is available at: *http://www.pacinst.org/resources/water_to_air_models/index.htm.*

the ceiling, while there may be some timing differences between year-by-year forecast. Thus, it is unlikely that there will be an SO_2 environmental benefit from electricity savings as long as there is enforcement of the emissions ceilings.

Although there may not be an actual reduction in SO_2 emissions from electricity savings, there still may be an economic benefit from reduced demand for SO_2 emission allowances. Electricity savings decrease the generation of SO_2 emissions from power production, which can decrease the need to purchase or generate SO_2 emissions allowance credits, and decrease the costs of complying with regulatory caps on emissions.

Like SO_2, future emissions of NO_X and Hg would have been subject to emissions caps under the Clean Air Interstate Act (CAIR) and Clean Air Mercury Rule (CAMR). As discussed later in section V.B.6, these rules have been vacated by a Federal court. But the NEMS–BT model used for today's proposed rule assumed that both NO_X and Hg emissions would be subject to CAIR and CAMR emission caps. In the case of NO_X emissions, CAIR would have permanently capped emissions in 28 eastern States and the District of Columbia. Because the NEMS–BT modeling assumed NO_X emissions would be subject to CAIR, DOE established a range of NO_X reductions based on the use of a NO_X low and high emission rates (in metric kilotons (kt) of NO_X emitted per terawatt-hours (TWh) of electricity generated) derived from the *AEO 2008*. To estimate the reduction in NO_X emissions, DOE multiplied these emission rates by the reduction in electricity generation due to the standards considered. For mercury, because the emissions caps specified by CAMR would have applied to the entire country, DOE was unable to use the NEMS–BT model to estimate the physical quantity changes in mercury emissions due to energy conservation standards. To estimate mercury emission reductions due to standards, DOE used an Hg emission rate (in metric tons of Hg per energy produced) based on the *AEO 2008*. Because virtually all mercury emitted from electricity generation is from coal-fired power plants, DOE based the emission rate on the metric tons of mercury emitted per TWh of coal-generated electricity. To estimate the reduction in mercury emissions, DOE multiplied the emission rate by the reduction in coal-generated electricity associated with standards considered.

In comments on the ANOPR, Earth Justice (EJ) stated that DOE must evaluate the economic benefits of the standards' effects on allowance prices, that the exclusion of these benefits from DOE's analysis is arbitrary, and that this exclusion serves only to artificially depress the economic value of stronger efficiency standards. (EJ, No. 31 at pp. 1–2) DOE believes that the impact of any one standard on the allowance credit price is likely small and highly uncertain. However, DOE has attempted to monetize the potential benefit from SO_2 emission reductions resulting from cooking product and CCW standards. The potential impact on SO_2 allowance prices are discussed in section V.B.6. Because the CAIR and CAMR rules have been vacated by the courts, NO_X and Hg allowances are no longer relevant, and therefore, DOE did not estimate the potential impact of standards on NO_X and Hg allowance prices in today's proposed rule.

DOE also received comments from stakeholders on the valuation of CO_2 emissions savings that result from standards. The Joint Comment stated that by not placing an economic value on the benefits from reduced CO_2 emissions, DOE makes it difficult to weigh these benefits in comparison to other benefits and costs resulting from a given standard level. Implicitly, the Joint Comment argued that DOE is arbitrarily valuing pollution reductions at $0, so the best way to avoid this mistake would be to estimate an economic value for pollutant reductions. According to the Joint Comment, voluminous work, both from academia and the business world, exists on the range of potential carbon prices under various regulatory scenarios. (Joint Comment, No. 29 at pp. 10–11) EJ stated that failure to assign an economic value to CO_2 emissions is tantamount to valuing those emissions at zero, an approach that the United States Court of Appeals for the Ninth Circuit recently held in *Center for Biological Diversity* v. *NHTSA,* 508 F.3d 508, 535 (9th Cir. 2007), is arbitrary and capricious. Therefore, EJ reasoned that exclusion of CO_2 emissions reduction benefits from DOE's analysis on the basis of uncertainty about their precise measure would be arbitrary and capricious, arguing that there is considerable agreement that the monetized value of avoided CO_2 is significantly higher than zero. (EJ, No. 31 at p. 2) DOE has made several additions to its monetization of environmental emissions reductions in today's proposed rule, which are discussed in Section V.B.6, but has chosen to continue to report these benefits separately from the net benefits of energy savings. Nothing in EPCA, nor in the National Environmental Policy Act, requires that the economic value of emissions reduction be incorporated in the net present value analysis of the value of energy savings. Unlike energy savings, the economic value of emissions reduction is not priced in the marketplace.

EEI stated that in its analysis of CO_2, SO_2, mercury, and NO_X emissions from electric power generation, DOE should account for the rise in renewable portfolio standards and the possibility of an upcoming CO_2 cap and trade program, both of which would reduce the amount of CO_2 produced per kWh electricity generated. (EEI, No. 25 at p. 4) DOE's estimates of these emissions are based on output from the *AEO 2008* version of NEMS. The emissions projections reflect EIA's best judgment about market factors and policies that affect utility choice of power plants for electricity generation. EIA generally includes only those policies that are already enacted. As the enactment of a CO_2 cap and trade program is uncertain at this point, DOE believes it would be inappropriate to speculate on the nature and timing of such a policy for the purposes of this rulemaking.

DOE also estimated the impacts on emissions at the sites where the appliance products are installed. In addition to electricity, the operation of gas cooking products and CCWs requires use of fossil fuels and results in emissions of CO_2 and NO_X at the sites where the appliances are used. NEMS–BT provides no means for estimating such emissions. Therefore, DOE calculated separate estimates of the effect of the proposed standards on site emissions of CO_2 and NO_X, based on emissions factors derived from the literature. Natural gas was the only fossil fuel accounted for by DOE in its analysis of standards for cooking products and CCWs. Because natural gas combustion does not yield SO_2 emissions, DOE did not report the effect of the proposed standards on site emissions of SO_2. DOE reports the estimates of CO_2 and NO_X site emission savings in its environmental assessment.

EJ stated that DOE has presented no reasoned explanation—nor does one exist—of why environmental benefits that accrue in the future should be devalued. EJ stated that DOE's intention to discount emissions reductions only underscores that emissions reductions are susceptible to evaluation in economic as well as purely environmental terms. If DOE intends to apply strictly monetary concepts like discount rates to its valuation of emissions reductions, then it must incorporate those reductions into its cost/benefit analysis by calculating their

monetary value. (EJ, No. 31 at pp. 2–3) DOE believes that discounted environmental benefits represent a policy perspective wherein benefits farther in the future are less significant than energy savings closer to the present. DOE continues to provide discounted environmental benefits for today's proposed rule.

In its November 2007 ANOPR, DOE stated it would conduct a separate analysis of wastewater discharge impacts as part of the environmental assessment for water-consuming appliances. For today's proposed rule, DOE conducted this analysis for CCWs based on estimates of CCW water use and the typical amount of water retention in a clothes load after a wash cycle. Based on the RMC of the clothes after a wash cycle, DOE estimated that approximately two percent of CCW water use is retained in the clothes load at the baseline efficiency level. The RMC decreases as a function of increasing CCW efficiency, thereby decreasing the amount of water retention in the clothes. But the amount of water use decreases with CCW efficiency as well. Because the rate of water use savings grows at approximately double the rate of water retention, the increased amount of water retained in the clothes as a percentage of the water use savings drops from approximately two percent to one percent over the range of CCW efficiencies considered. Therefore, assuming that water not retained in the clothes load is discharged into the wastewater stream, wastewater discharge savings range from 98 to 99 percent of the water use savings at the baseline and max-tech levels, respectively. Section V.B.6 reports the estimated wastewater discharge savings.

V. Analytical Results

A. Trial Standard Levels

DOE analyzed the benefits and burdens of a number of TSLs for the appliance products that are the subject of today's proposed rule. Trial standard levels are based on efficiency levels explored in the ANOPR and were selected upon consideration of economic factors and current market conditions. The basis for the TSL selection is described for each of the appliance products below. Tables V.1, V.2, V.3, and V.4 present the TSLs and the corresponding product class efficiencies for conventional cooking products, microwave ovens (two tables), and CCWs, respectively.

1. Cooking Products

Table V.1 shows the TSLs for conventional cooking products. As discussed in section III.C.1, DOE conducts a screening analysis to determine the design options that are technologically feasible and can be considered as measures to improve product efficiency. However, as discussed in the November 2007 ANOPR as well as chapters 3 and 4 of the TSD accompanying this notice, there are few design options available for improving the efficiency of these cooking products due to physical limitations on energy transfer to the food load. This is particularly the case for all cooktop and self-cleaning oven product classes. For electric cooktops, DOE was able to identify only a single design change for analysis. For gas cooktops and electric self-cleaning ovens, DOE was able to identify two design options for analysis. And for gas self-cleaning ovens, DOE was able to identify three design options for analysis. Although DOE considered several design options for standard ovens, with the exception of eliminating standing pilots for gas standard ovens, none significantly increased product efficiency. Specifically, eliminating standing pilots reduces overall gas consumption by over 50 percent while all other design options reduce gas consumption by approximately two percent. Therefore, DOE gave further consideration to only four TSLs for conventional cooking products.

TSL 1 represents the elimination of standing pilot ignition systems from gas cooking products. All other product classes are unaffected by TSL 1, including gas self-cleaning ovens, which are not allowed to use standing pilot ignition systems because they already use electricity and come equipped with power cords to enable the self-cleaning cycle. Under TSL 1, DOE's current prescriptive standard of disallowing the use of standing pilot ignition systems in gas cooking pilots equipped with power cords would be extended to all gas cooking products, regardless of whether the appliance is equipped with a power cord. Also, under TSL 1, there would be no need for DOE to regulate the EF of any of the conventional cooking product classes because only standing pilot ignition systems are being affected.

TSL 2 for conventional cooking products consists of the candidate standard levels from each of the product classes that provide a majority of consumers (who are impacted by the standard) with an economic benefit. Based on this criterion, only electric coil cooktops and electric standard ovens have candidate standard levels that differ from those in TSL 1. In other words, for the remaining five product classes (electric smooth cooktops, electric self-cleaning ovens, and all gas cooking product classes), analytical results indicate there is no candidate standard level that provides an economic benefit to a majority of consumers.

TSL 3 for conventional cooking products consists of the same candidate standard levels as TSL 2, with the exception of the gas self-cleaning oven product class. For gas self-cleaning ovens, the design option that provides, on average, a small level of economic benefit to consumers is included.

TSL 4 is the maximum technologically feasible level.

TABLE V.1—TRIAL STANDARD LEVELS FOR CONVENTIONAL COOKING PRODUCTS

Product Classes	TSLs (EF)			
	TSL 1	TSL 2	TSL 3	TSL 4
Electric Coil Cooktops	No Standard (Baseline)	0.769	0.769	0.769
Electric Smooth Cooktops	No Standard (Baseline)	No Standard (Baseline)	No Standard (Baseline)	0.753
Gas Cooktops	No Pilot	No Pilot	No Pilot	0.420
Electric Standard Ovens	No Standard (Baseline)	0.1163	0.1163	0.1209
Electric Self-Cleaning Ovens	No Standard (Baseline)	No Standard (Baseline)	No Standard (Baseline)	0.1123
Gas Standard Ovens	No Pilot	No Pilot	No Pilot	0.0600
Gas Self-Cleaning Ovens	No Change to Existing Standard (Baseline).	No Change to Existing Standard (Baseline).	0.0625	0.0632

As discussed previously in section III.A, DOE has concluded that it is currently technically infeasible to combine cooking efficiency (or EF) into a new efficiency metric with standby power consumption in microwave ovens. As a result, DOE considered two sets of TSLs-one set comprised solely of EF levels (TSLs 1a–4a) and a second set comprised solely of standby power levels (TSLs 1b–4b).

Table V.2 shows the TSLs for the regulation of cooking efficiency or EF. TSLs 1a though 4a correspond to candidate standard levels 1a through 4a, respectively, and affect only the EF. For TSLs 1a through 4a, no standard to limit standby power is specified. TSL 4a corresponds to the maximum feasible EF level. None of these first four TSLs have an LCC lower than the baseline level or an NPV that provides a net economic benefit to the Nation.

TABLE V.2—TRIAL STANDARD LEVELS FOR MICROWAVE OVEN ENERGY FACTOR

	TSLs			
	TSL 1a	TSL 2a	TSL 3a	TSL 4a
EF	0.586	0.588	0.597	0.602

Table V.3 shows the TSLs for the regulation of standby power. TSLs 1b through 4b correspond to candidate standard levels 1b through 4b, respectively, and affect only standby power. For TSLs 1b through 4b, no standard on EF is specified. All four of these TSLs yield LCC savings relative to the baseline level and provide a net economic benefit to the Nation. TSL 3b corresponds to the maximum feasible level for the regulation of standby power, which does not affect the appliance's capability to continually display the time. TSL 4b corresponds to the maximum technologically feasible level for the regulation of standby power, and it also represents the level with the minimum LCC as well as the maximum NPV. However, TSL 4b results in the inability of the appliance to continually display the time.

TABLE V.3— TRIAL STANDARD LEVELS FOR MICROWAVE OVEN STANDBY POWER

	TSLs			
	TSL 1b	TSL 2b	TSL 3b	TSL 4b
Standby Power (W)	2.0	1.5	1.0	0.02

2. Commercial Clothes Washers

Table V.4 shows the TSLs for CCWs. TSLs consist of a combination of MEF and WF for each product class. In all, DOE has considered five TSLs. TSL 1 corresponds to the first candidate standard level from each product class and represents the efficiency level for each class with the least significant design change. For TSL 2, the candidate standard levels for each class are simply incremented to the second candidate standard level and represent the next technological design change for each class. TSL 3 represents the third candidate standard level for top-loading washers (the maximum efficiency level for this class) while keeping front-loading washers at its second candidate standard level. For TSL 3, front-loading washers were held to the second candidate standard level in order to minimize the equipment price difference between the two product classes. For TSL 4, top-loading washers are retained at their maximum efficiency level while front-loading washers are incremented to their third candidate standard level. Finally, TSL 5 corresponds to the maximum technologically feasible level for each product class. In progressing from TSL 1 to TSL 5, the LCC savings, NES, and NPV all increase. TSL 5 represents the level with the minimum LCC and maximum NES and NPV.

TABLE V.4—TRIAL STANDARD LEVELS FOR COMMERCIAL CLOTHES WASHERS

	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Top-Loading:					
MEF	1.42	1.60	1.76	1.76	1.76
WF	9.5	8.5	8.3	8.3	8.3
Front-Loading:					
MEF	1.80	2.00	2.00	2.20	2.35
WF	7.5	5.5	5.5	5.1	4.4

B. Economic Justification and Energy Savings

1. Economic Impacts on Consumers

a. Life-Cycle Cost and Payback Period

To evaluate the net economic impact of standards on consumers, DOE conducted LCC and PBP analyses for each TSL. In general, higher-efficiency products would affect consumers in two ways: (1) annual operating expense would decrease; and (2) purchase price would increase. Section IV.D of this notice discusses the inputs DOE used for calculating the LCC and PBP.

The key outputs of the LCC analysis are a mean LCC savings relative to the baseline product design, as well as a probability distribution or likelihood of LCC reduction or increase, for each TSL and product class. The LCC analysis also estimates the fraction of product consumers for which the LCC will decrease (net benefit), increase (net cost), or exhibit no change (no impact) relative to the base-case equipment forecast. No impacts occur when the

equipment efficiencies of the base-case forecast already equal or exceed the considered TSL efficiency.

Tables V.5 through V.17 show the mean LCC savings and the percent of households with a net cost, no impact, and a net benefit (*i.e.*, positive savings) at each TSL for each product class. The average LCC and its components (the average installed price and the average operating cost) are also presented for each TSL. The tables also show the median and average payback period at each TSL.

Cooking Products. Tables V.5, V.6, and V.7 show the LCC and PBP results for cooktops. For example, in the case of gas cooktops, TSL 1 (pilotless ignition with an efficiency of 0.399 EF) shows an average LCC savings of $13 for the average household. Note that for TSL 1, 93.5 percent of the housing units in 2012 already purchased a gas cooktop with pilotless ignition in the base case and, thus, have zero savings due to the standard. If one compares the LCC of the average household at the baseline level at 0.106 EF ($822) to TSL 1 at 0.399 EF ($559), then the difference in the LCCs of the average household is $263. However, since the base case includes a significant number of households that are not impacted by the standard, the average savings over all of the households is actually $13, not $263. DOE determined the median and average values of the PBPs shown below by excluding the percentage of households not impacted by the standard. For example, in the case of TSL 1 for gas cooktops, 93.5 percent of the households did not factor into the calculation of the median and average PBP.

TABLE V.5—ELECTRIC COIL COOKTOPS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.737	$272	$173	$445	.....	.....	.....	.....	.....	.....
1	0.737	272	173	445	No change from baseline					
2, 3, 4 ...	0.769	276	166	441	$4	29.5	0.0	70.6	7.3	18.1

TABLE V.6—ELECTRIC SMOOTH COOKTOPS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.742	$309	$173	$482	.....	.....	.....	.....	.....	.....
1, 2, 3 ...	0.742	309	173	482	No change from baseline					
4	0.753	550	170	720	−$238	100.0	0.0	0.0	1,512	3,745

TABLE V.7—GAS COOKTOPS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.106	$310	$512	$822	.....	.....	.....	.....	.....	.....
1, 2, 3 ...	0.399	332	227	559	$13	0.2	93.5	6.3	4.5	3.5
4	0.420	361	222	583	−$11	93.9	0.0	6.1	77	271

Similarly, Tables V.8 through V.11 show the LCC and PBP results for ovens (other than microwave ovens.) For example, in the case of gas standard ovens, TSL 1 (pilotless spark ignition with an efficiency of 0.0583 EF) shows an average LCC savings of $6. If one compares the LCC of the base case at 0.0298 EF ($803) to the standards case at 0.0583 EF ($714), then the difference in the LCCs is $89. However, the base case includes a significant number of households that are either at the baseline level or have ovens equipped with pilotless glo-bar ignition (82.3 percent of households). Because the base case includes a significant number of households that are not impacted by the standard, the average savings over all of the households is actually $6, not $289. DOE determined the median and average values of the PBPs shown below by excluding the percentage of households not impacted by the standard. For example, in the case of TSL 1 for gas standard ovens, 82.3 percent of the households did not factor into the calculation of the median and average PBP. Also, the large difference in the average and median values for TSL 4 for all ovens is due to households with excessively long PBPs in the distribution of results. The Monte Carlo simulation for TSL 4 yielded a few results with PBPs in excess of thousands of years. A limited number of

excessively long PBPs produce an average PBP that is very long. Therefore, in these cases, the median PBP is a more representative value to gauge the length of the PBP.

TABLE V.8—ELECTRIC STANDARD OVENS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.1066	$414	$218	$631	.....	.....	.....	.....	.....	.....
1	0.1066	414	218	631	No change from baseline					
2, 3	0.1163	421	201	622	$9	43.9	0.0	56.1	8.0	310
4	0.1209	489	194	683	−$52	95.2	0.0	4.8	61	2,337

TABLE V.9—ELECTRIC SELF-CLEANING OVENS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.1099	$485	$230	$715	.....	.....	.....	.....	.....	.....
1, 2, 3 ...	0.1099	485	230	715	No change from baseline					
4	0.1123	548	226	774	−$143	78.9	0.0	21.1	240	1263

TABLE V.10—GAS STANDARD OVENS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.0298	$430	$373	$803	.....	.....	.....	.....	.....	.....
1, 2, 3 ...	0.0583	464	250	714	$6	6.5	82.3	11.2	9.4	7.3
4	0.0600	507	469	975	−$86	95.0	0.0	5.0	27	473

TABLE V.11—GAS SELF-CLEANING OVENS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.0540	$550	$594	$1,144	.....	.....	.....	.....	.....	.....
1, 2	0.0540	550	594	1,144	No change from baseline					
3	0.0625	566	577	1,143	$1	58.9	0.0	41.1	11	164
4	0.0632	574	576	1,150	−$6	68.8	0.0	31.2	16	279

Tables V.12 and V.13 show the LCC and PBP results for microwave ovens. Two sets of results are presented—one for the TSLs that pertain to EF and another for the TSLs that pertain to standby power. For the TSLs pertaining to standby power, TSL 2b (1.5 W standby power) shows an average LCC savings of $13. Note that for TSL 2b, 19.1 percent of the housing units in 2012 have already purchased a microwave oven at this level and, thus, have zero savings due to the standard. If one compares the LCC of the baseline at 0.557 EF and 4 W standby power ($348) to TSL 2b ($333), then the difference in the LCCs is $15. However, since the base case includes a significant number of households that are not impacted by the standard, the average savings over all the households is actually $13, not $15. DOE determined the median and average values of the PBPs shown below by

excluding the percentage of households not impacted by the standard. For example, in the case of TSL 2b, 19.1 percent of the households did not factor into the calculation of the median and average PBP.

TABLE V.12—MICROWAVE OVENS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS FOR EF

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	0.557	$220	$128	$348	.....	.....	.....	.....	.....	.....
1a	0.586	232	123	356	−$3	42.0	53.7	4.3	29	69
2a	0.588	246	123	369	−10	45.2	53.7	1.1	57	133
3a	0.597	267	122	389	−19	45.9	53.7	0.4	81	190
4a	0.602	294	121	415	−31	46.2	53.7	0.1	115	268

TABLE V.13—MICROWAVE OVENS: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS FOR STANDBY POWER

TSL	EF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	4.0	$220	$128	$348	.....	.....	.....	.....	.....	.....
1b	2.0	220	115	335	6	0.0	53.7	46.3	0.3	0.3
2b	1.5	221	112	333	13	0.0	19.1	80.9	0.6	0.8
3b	1.0	222	102	331	18	0.0	0.0	100.0	1.5	1.6
4b	0.02	228	102	330	19	0.0	0.0	100.0	3.1	3.5

Commercial Clothes Washers. Tables V.14 and V.15 show the LCC and PBP results for both CCW product applications for the top-loading product class while Tables V.16 and V.17 show the LCC and PPB results for the front-loading product class. For example, in the case of the multi-family application for front-loading washers (Table V.16), TSL 2 (2.00 MEF/5.50 WF) shows an average LCC savings of $52. Note that for TSL 2, 88.3 percent of consumers in 2012 are assumed to already be using a CCW in the base case at TSL 2 and, thus, have zero savings due to the standard. If one compares the LCC of the baseline at 1.72 MEF/8.00 WF ($3980) to TSL 2 ($3489), then the difference in the LCCs is $491. However, since the base case includes a significant number of consumers that are not impacted by the standard, the average savings over all of the consumers is actually $52, not $491. DOE determined the median and average values of the PBPs shown below by excluding the percentage of households not impacted by the standard. For example, in the case of TSL 2 for front-loading washers in a multi-family application, 88.3 percent of the consumers did not factor into the calculation of the median and average PBP.

TABLE V.14—COMMERCIAL CLOTHES WASHERS, TOP-LOADING, MULTI-FAMILY APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.26/9.50	$734	$3,034	$3,768	.....	.....	.....	.....	.....	.....
1	1.42/9.50	852	2,934	3,786	−$11.6	45.0	35.7	19.3	10.7	15.6
2	1.60/8.50	940	2,675	3,615	154.5	15.4	2.8	81.7	4.5	5.5
3, 4, 5 ...	1.76/8.30	963	2,560	3,524	243.7	10.0	2.8	87.2	3.8	4.6

TABLE V.15—COMMERCIAL CLOTHES WASHERS, TOP-LOADING, LAUNDROMAT APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.26/9.50	$734	$3,191	$3,925	.....	.....	.....	.....	.....	.....
1	1.42/9.50	852	3,103	3,955	−$19.6	53.4	35.7	10.9	7.4	8.5

TABLE V.15—COMMERCIAL CLOTHES WASHERS, TOP-LOADING, LAUNDROMAT APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS—Continued

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
2	1.60/8.50	940	2,823	3,763	166.4	3.6	2.8	93.6	2.8	3.0
3, 4, 5 ...	1.76/8.30	963	2,712	3,675	252.3	1.1	2.8	96.1	2.4	2.5

TABLE V.16—COMMERCIAL CLOTHES WASHERS, FRONT-LOADING, MULTI-FAMILY APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.72/8.00	$1,316	$2,664	$3,980	.....	.....	.....	.....	.....	.....
1	1.80/7.50	1,316	2,664	3,860	$8.7	0.0	92.7	7.3	0.0	0.0
2, 3	2.00/5.50	1,338	2,544	3,489	51.8	0.0	88.3	11.7	0.4	0.5
4	2.20/5.10	1,376	2,151	3,404	134.4	2.3	2.8	94.9	2.8	3.1
5	2.35/4.40	1,417	2,027	3,302	234.1	1.5	1.5	97.0	2.8	3.0

TABLE V.17—COMMERCIAL CLOTHES WASHERS, FRONT-LOADING, LAUNDROMAT APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.72/8.00	$1,316	$1,885	$4,135	.....	.....	.....	.....	.....	.....
1	1.80/7.50	1,316	2,818	4,005	$9.5	0.0	92.7	7.3	0.0	0.0
2, 3	2.00/5.50	1,338	2,688	3,587	58.0	0.0	88.3	11.7	0.3	0.3
4	2.20/5.10	1,376	2,249	3,502	140.1	0.0	2.8	97.2	1.7	1.8
5	2.35/4.40	1,417	2,126	3,390	250.4	0.0	1.5	98.5	1.6	1.7

b. Consumer Subgroup Analysis

Using the LCC spreadsheet model, DOE determined the impact of the standards on the following consumer subgroups: (1) low-income households and senior-only households for conventional cooking products and microwave ovens, and (2) small business owners and consumers without municipal water and sewer for CCWs.

Cooking Products. For conventional cooking products and microwave ovens, the results for low-income and senior-only households indicate that the LCC impacts on these subgroups and the payback periods are similar to the LCC impacts and payback periods on the full sample of residential consumers. Thus, the proposed standards would have an impact on low-income households and senior-only households that would be similar to their impact on the general population of residential consumers. (See the TSD accompanying this notice, chapter 12.)

Commercial Clothes Washers. For CCWs, the results for consumers without municipal water and sewer indicate that the LCC impacts and payback periods for this subgroup are similar to the LCC impacts and payback periods on the full sample of CCW consumers. But for small business owners, the LCC impacts and payback periods are different than for the general population. For the top-loading product class, Tables V.18 and V.19 show the LCC impacts and payback periods for small multi-family property owners and small laundromats, respectively, while Tables V.20 and V.21 show the same but for the front-loading product class. For all TSLs for both product classes (with exception of TSL 1 for top-loading washers), both sets of small business owners, on average, realize LCC savings similar to the general population. The difference between the small business population and the general population occurs in the percentage of each population that realizes LCC savings from standards. With the exception of TSL 1 for top-loading washers, an overwhelming majority of the small business and general populations benefit from standards at each TSL. But for both product classes, a larger percentage of the general population benefits from standards than small business owners. This occurs because small businesses do not have the same access to capital as larger businesses. As a result, smaller businesses have a higher average discount rate than the industry average. Because of the higher discount rates, smaller businesses do not value future operating costs savings from more efficient CCWs as much as the general population. But to emphasize, in spite of the higher discount rates, a majority of small businesses still benefit from higher CCW standards at all TSLs, with the exception of TSL 1 for the top-loading product class.

TABLE V.18—COMMERCIAL CLOTHES WASHERS, TOP-LOADING, MULTI-FAMILY APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS FOR SMALL BUSINESS OWNERS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.26/9.50	$734	$2,463	$3,197	.....	.....	.....	.....	.....	.....
1	1.42/9.50	852	2,382	3,234	−$23.2	51.3	35.8	12.9	10.7	15.7
2	1.60/8.50	940	2,172	3,112	95.0	23.1	3.1	73.8	4.5	5.5
3, 4, 5 ...	1.72/8.00	963	2,079	3,042	163.1	15.7	3.1	81.2	3.8	4.6

TABLE V.19—COMMERCIAL CLOTHES WASHERS, TOP-LOADING, LAUNDROMAT APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS FOR SMALL BUSINESS OWNERS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.26/9.50	$734	$2,765	$3,499	.....	.....	.....	.....	.....	.....
1	1.42/9.50	852	2,689	3,541	−$26.9	59.4	35.8	4.8	7.4	8.5
2	1.60/8.50	940	2,447	3,387	122.5	7.0	3.1	89.9	2.8	3.0
3, 4, 5 ...	1.72/8.00	963	2,350	3,313	194.0	2.9	3.1	94.0	2.4	2.5

TABLE V.20—COMMERCIAL CLOTHES WASHERS, FRONT-LOADING, MULTI-FAMILY APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS FOR SMALL BUSINESS OWNERS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.72/8.00	$1,316	$2,164	$3,480	.....	.....	.....	.....	.....	.....
1	1.80/7.50	1,316	2,164	3,383	$6.9	0.0	92.9	7.1	0.0	0.0
2, 3	2.00/5.50	1,338	2,067	3,086	41.5	0.0	88.3	11.7	0.4	0.5
4	2.20/5.10	1,376	1,748	3,024	101.5	6.7	2.9	90.4	2.8	3.1
5	2.35/4.40	1,417	1,648	2,950	174.7	5.6	1.4	93.1	2.8	3.0

TABLE V.21—COMMERCIAL CLOTHES WASHERS, FRONT-LOADING, LAUNDROMAT APPLICATION: LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS FOR SMALL BUSINESS OWNERS

TSL	MEF/WF	Life-cycle cost			Life-cycle cost savings				Payback period (years)	
		Average installed price	Average operating cost	Average LCC	Average savings	Households with			Median	Average
						Net cost (percent)	No impact (percent)	Net benefit (percent)		
Baseline	1.72/0	$1,316	$1,533	$3,759	.....	.....	.....	.....	.....	.....
1	1.80/7.50	1,316	2,443	3,646	$8.0	0.0	92.9	7.1	0.0	0.0
2, 3	2.00/5.50	1,338	2,330	3,287	50.0	0.0	88.3	11.7	0.3	0.3
4	2.20/5.10	1,376	1,949	3,219	116.2	0.0	2.9	97.1	1.7	1.8
5	2.35/4.40	1,417	1,843	3,128	206.2	0.0	1.4	98.6	1.6	1.7

c. Rebuttable-Presumption Payback

As discussed above, EPCA establishes a rebuttable presumption that, in essence, an energy conservation standard is economically justified if the increased purchase cost for a product that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. (42 U.S.C. 6295(o)(2)(B)(iii)) DOE calculated a rebuttable-presumption payback period for each TSL to determine whether DOE could presume that a standard at that level is economically justified. Tables V.22 through V.25 show the rebuttable-presumption payback periods for conventional cooking products, microwave ovens, and CCWs, respectively. Because only a single, average value is necessary for establishing the rebuttable-presumption payback period, rather than using distributions for input values, DOE used discrete values. As required by EPCA, DOE based the calculation on the assumptions in the DOE test procedures

for the appliance products. (42 U.S.C. 6295(o)(2)(B)(iii)) As a result, DOE calculated a single rebuttable-presumption payback value, and not a distribution of payback periods, for each TSL.

TABLE V.22—REBUTTABLE-PRESUMPTION PAYBACK PERIODS FOR CONVENTIONAL COOKING PRODUCTS

TSL	Payback period (years)						
	Electric coil cooktops	Electric smooth cooktops	Gas cooktops	Electric standard ovens	Electric self-clean ovens	Gas standard ovens	Gas self-clean ovens
1	NA	NA	3.2	NA	NA	7.3	NA
2	3.2	NA	3.2	2.6	NA	7.3	NA
3	3.2	NA	3.2	2.6	NA	7.3	6.5
4	3.2	664	14	20	95	23	9.1

TABLE V.23—REBUTTABLE-PRESUMPTION PAYBACK PERIODS FOR MICROWAVE OVEN ENERGY FACTOR

TSL	Payback period (years)
1a	16
2a	32
3a	45
4a	64

TABLE V.24—REBUTTABLE-PRESUMPTION PAYBACK PERIODS FOR MICROWAVE OVEN STANDBY POWER

TSL	Payback period (years)
1b	0.2
2b	0.4
3b	0.8
4b	2.1

TABLE V.25—REBUTTABLE-PRESUMPTION PAYBACK PERIODS FOR COMMERCIAL CLOTHES WASHERS

TSL	Payback period (years)			
	Top-Loading		Front-loading	
	Multi-family application	Laundromat application	Multi-family application	Laundromat application
1	303	[a]∞	0	0
2	23.4	201	1.3	1.5
3	17.4	62	1.3	1.5
4	17.4	62	7.6	12.6
5	17.4	62	8.9	15.0

[a] Infinity.

With the exception of TSLs 2 and 3 for electric standard ovens and TSLs 1b to 4b for microwave ovens, and TSLs 1 to 3 for front-loading CCWs, the TSLs in the above tables do not have rebuttable-presumption payback periods of less than three years. DOE can use the rebuttable-presumption payback period as an alternative path for establishing economic justification under the EPCA factors. But DOE believes that the rebuttable-presumption payback period criterion (*i.e.*, a limited payback period) is not sufficient for determining economic justification. Instead, DOE has considered a full range of impacts, including those to consumers, manufacturers, the Nation, and the environment. Section V.C provides a complete discussion of how DOE considered the range of impacts to select its proposed standards.

2. Economic Impacts on Manufacturers

DOE performed an MIA to estimate the impact of new energy conservation standards on cooking product and CCW manufacturers. (See the TSD accompanying this notice, chapter 13.)

a. Industry Cash-Flow Analysis Results

DOE used the INPV in the MIA to compare the financial impacts of different TSLs on cooking product and CCW manufacturers. The INPV is the sum of all net cash flows discounted at the industry's cost of capital (discount rate.) Because the INPV applies only to the industries, the INPV is different from the NPV that DOE used to assess the cumulative benefit or cost of standards to consumers on a national basis. The GRIM estimated cash flows between 2007 and 2042 and found them to be consistent with the cash flows predicted in the national impact analysis.

DOE used the GRIM to compare the INPV of the base case (no new energy conservation standards) to that of each TSL. To evaluate the range of cash-flow impacts on the industries, DOE constructed different scenarios for each industry using different assumptions for

markups and shipments that correspond to the range of product-specific anticipated market responses. Each scenario results in a unique set of cash flows and corresponding industry value at each TSL. These steps allowed DOE to compare the potential impacts on industries as a function of TSLs in the GRIMs. The difference in INPV between the base case and the standards case is an estimate of the economic impacts that implementing that standard level would have on the entire industry.

i. Conventional Cooking Products

Based on conversations with manufacturers, the primary sources of uncertainty relating to the post-standards industry value for conventional cooking products are the post-standards markups and their associated profit margins.

To assess the lower end of the range of potential impacts for the conventional cooking products industry, DOE considered a scenario in which the industry gross margin percentage in the base case is preserved in the standards case (*i.e.*, the markup is held constant for all products at all TSLs). Thus, a manufacturer is able to fully pass on any additional costs due to standards and maintain the percentage margin between COGS and manufacturing selling price. Thus, if unit sales remain constant, the gross margin in absolute dollars will increase after a standard comes into effect.

To assess the higher end of the range of potential impacts for the conventional cooking products industry, DOE considered the scenario reflecting the preservation of industry gross margin in absolute dollars. Under this scenario, DOE assumed that the industry cannot pass on all additional costs due to efficiency-related changes (*i.e.*, the markup decreases for all TSLs in the standards case.) Thus, the absolute gross margin is held constant. This means that the percentage difference between manufacturer production cost and selling price will decrease in the standards case compared to the base case and that the gross margin percentage will be lower. As a result, the industry will make the same gross margin in absolute dollars post-standard in a scenario with constant shipments but the industry will also have a lower INPV since the gross margin percentage is eroding. Table V.26 through Table V.33 show the MIA results for each TSL using both markup scenarios described above for conventional cooking products, including electrical and gas cooktops and ovens.

TABLE V.26—MANUFACTURER IMPACT ANALYSIS FOR ELECTRIC COOKTOPS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	357	357	355	355	434
Change in INPV	(2006 $ millions)		0	(2)	(2)	77
	(%)		0.00%	−0.56%	−0.56%	21.62%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		0.0	9.6	9.6	21.8
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		0.0	0.0	0.0	73.1
Total Investment Required	(2006 $ millions)		0.0	9.6	9.6	94.9

TABLE V.27—MANUFACTURER IMPACT ANALYSIS FOR ELECTRIC COOKTOPS UNDER THE PRESERVATION OF GROSS MARGIN ABSOLUTE DOLLARS MARKUP SCENARIO

Preservation of gross margin absolute dollars markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	357	357	346	346	(26)
Change in INPV	(2006 $ millions)		0	(11)	(11)	(383)
	(%)		0.00%	−3.18%	−3.18%	−107.19%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		0.0	9.6	9.6	21.8
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		0.0	0.0	0.0	73.1
Total Investment Required	(2006 $ millions)		0.0	9.6	9.6	94.9

TABLE V.28—MANUFACTURER IMPACT ANALYSIS FOR GAS COOKTOPS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	287	282	282	282	315
Change in INPV	(2006 $ millions)		(5)	(5)	(5)	28
	(%)		−1.74%	−1.74%	−1.74%	9.83%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		9.4	9.4	9.4	20.8
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		2.2	2.2	2.2	3.3
Total Investment Required	(2006 $ millions)		11.5	11.5	11.5	24.1

TABLE V.29—MANUFACTURER IMPACT ANALYSIS FOR GAS COOKTOPS UNDER THE PRESERVATION OF GROSS MARGIN ABSOLUTE DOLLARS MARKUP SCENARIO

Preservation of gross margin absolute dollars markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	287	275	275	275	146
Change in INPV	(2006 $ millions)		(12)	(12)	(12)	(141)
	(%)		−4.12%	−4.12%	−4.12%	−49.12%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		9.4	9.4	9.4	20.8
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		2.2	2.2	2.2	3.3
Total Investment Required	(2006 $ millions)		11.5	11.5	11.5	24.1

TABLE V.30—MANUFACTURER IMPACT ANALYSIS FOR ELECTRIC OVENS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	793	793	785	785	782
Change in INPV	(2006 $ millions)		0	(8)	(8)	(10)
	(%)		0.00%	−0.99%	−0.99%	−1.27%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		0.0	20.8	20.8	67.6
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		0.0	0.8	0.8	179.8
Total Investment Required	(2006 $ millions)		0.0	21.6	21.6	247.5

TABLE V.31—MANUFACTURER IMPACT ANALYSIS FOR ELECTRIC OVENS UNDER THE PRESERVATION OF GROSS MARGIN ABSOLUTE DOLLARS MARKUP SCENARIO

Preservation of gross margin absolute dollars markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	793	793	773	773	324
Change in INPV	(2006 $ millions)		0	(19)	(19)	(469)
	(%)		0.00%	−2.43%	−2.43%	−59.16%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		0.0	20.8	20.8	67.6
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		0.0	0.8	0.8	179.8
Total Investment Required	(2006 $ millions)		0.0	21.6	21.6	247.5

TABLE V.32 MANUFACTURER IMPACT ANALYSIS FOR GAS OVENS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	466	459	459	460	420
Change in INPV	(2006 $ millions)		(7)	(7)	(6)	(47)
	(%)		−1.57%	−1.57%	−1.38%	−10.04%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		9.4	9.4	18.7	100.3
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		1.8	1.8	7.6	72.0
Total Investment Required	(2006 $ millions)		11.1	11.1	26.4	172.3

TABLE V.33—MANUFACTURER IMPACT ANALYSIS FOR GAS OVENS UNDER THE PRESERVATION OF GROSS MARGIN ABSOLUTE DOLLARS MARKUP SCENARIO

Preservation of gross margin (absolute dollars) markup scenario						
	Units	Base case	TSL			
			1	2	3	4
INPV	(2006 $ millions)	466	457	457	426	285
Change in INPV	(2006 $ millions)		(10)	(10)	(41)	(181)
	(%)		−2.10%	−2.10%	−8.68%	−38.80%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		9.4	9.4	18.7	100.3
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		1.8	1.8	7.6	72.0
Total Investment Required	(2006 $ millions)		11.1	11.1	26.4	172.3

Electric Cooktops. At TSL 1, the impact on INPV and cash flow for electric cooktops is zero. At this level, DOE assumed both electric coil and smooth cooktops would have the same efficiency level as the baseline. Therefore, no impacts are reported at TSL 1.

At TSL 2 and TSL 3, the impact on INPV and cash flow varies depending on manufacturers' ability to maintain gross margins as a percentage of revenues constant as the manufacturing product cost (MPC) increases as a result of standards. DOE estimated the impacts in INPV at TSL 2 and TSL 3 to range from −$2 million to −$11 million, or a change in INPV of −0.56 percent to −3.18 percent. At this level, the industry cash flow would decrease by

approximately 12 percent, to $18.3 million, compared to the base-case value of $20.8 million in the year leading up to the standards. DOE does not expect significant impacts at TSL 2 and TSL 3 because the investments needed to conform to the standards are relatively small compared to overall SG&A and R&D annual costs. In addition, product price increases would benefit manufacturers if they can fully pass along MPC increases to customers. However, overall INPV would decline in all scenarios at these standard levels because, according to manufacturers, the research and engineering costs needed to achieve these levels would exceed the relatively small capital expenditures and incremental costs at this standard level.

At TSL 4, the impact on INPV and cash flow will vary significantly depending on the manufacturers' ability to maintain a constant gross margin percentage as MPCs increase due to standards. DOE estimated the impacts in INPV to range from approximately positive $77 million to −$383 million, or a change in INPV of 21.62 percent to −107.19 percent. At this level, the industry cash flow decreases by approximately 168 percent, to −$14.1 million, compared to the base-case value of $20.8 million in the year leading up to the standards. At this TSL, if manufacturers are able to maintain their gross margin as a percentage of revenues, the impacts of higher manufacturing costs would be negated by the increases in total revenues. However, if manufacturers can only maintain their absolute dollar gross margin, then the impacts at TSL 4 would completely erode manufacturers' profits. According to manufacturers, the energy savings at this level are not economically justified because both consumers and manufacturers will experience negative impacts. Consumers would experience significantly higher prices, while manufacturers will experience decreased profits, lower revenues, and much higher R&D costs.

Gas Cooktops. At TSL 1, TSL 2, and TSL 3, the impact on INPV and cash flow varies depending on manufacturers' ability to fully maintain their gross margins as the MPCs increase as a result of the standards. These TSLs are equivalent to the elimination of standing pilot lights. DOE estimated the impacts in INPV at TSL 1, TSL 2, and TSL 3 to range from −$5 million up to −$12 million, or a change in INPV of −1.74 percent up to −4.12 percent. At this level, the industry cash flow decreases by approximately 19 percent, to $14.3 million, compared to the base case value of $17.6 million in the year leading up to the standards. Since more than 90 percent of the equipment being sold is already at or above this level (*i.e.*, most products do not have standing pilot lights), those manufacturers that do not fall below the efficiency levels specified by TSL 1, TSL 2, and TSL 3 will not have to make additional modifications to their product lines to conform to the amended energy conservation standards. DOE expects the lower end of the impacts to be reached, which indicates that industry revenues and costs will not be significantly negatively impacted as long as manufacturers can maintain their gross margin as a percentage of revenues. Analysis shows that although the elimination of standing pilot lights may not significantly impact large manufacturers, small manufacturers that rely on revenues from these products will be significantly impacted. In MIA interviews, all manufacturers of standing pilot-equipped gas appliances expressed concern about the potential elimination of standing pilots. Two small businesses, which both focus solely on cooking appliances, produce standing pilot-equipped products which comprise nearly half of their total annual gas product shipments and which they consider to be a differentiator from their larger, more-diversified competitors. While all manufacturers of gas cooking appliances affected by today's rule also make comparable cooking appliances with electronic ignition systems, these two small businesses are likely to be disproportionally impacted by a ban on standing pilot ignition systems. DOE contacted both manufacturers multiple times to better understand the potential business impact of a standing pilot ban and believes that, while standing pilot ignition systems are a differentiator, gas cooking products made by these manufacturers are primarily differentiated by non-standard unit widths and other features. Thus, while the potential elimination of standing pilot lights would lead to some decrease in differentiation, the main differentiators, notably non-standard unit sizes, will remain. DOE's discussion of the impacts on the small manufacturers is treated in the regulatory flexibility section of today's notice (see section VI. B.)

At TSL 4, the analysis shows that the impact on INPV and cash flow continues to vary significantly depending on the manufacturers' ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 4 to range from approximately positive $28 million to −$141 million, or a change in INPV of positive 9.83 percent to −49.12 percent. At this level, the industry cash flow decreases by approximately 38 percent, to $10.9 million, compared to the base case value of $17.6 million in the year leading up to the standards. At this level, the component switch also carries substantial redesign costs. Sealed burners affect the design of the entire cooktop, thereby making product conversion and capital conversion costs much greater than a simpler component switch. At this TSL, if manufacturers can maintain their gross margin as a percentage of revenues, the impacts of higher manufacturing costs would be negated by the increases in total revenues. However, if manufacturers can only maintain their absolute dollar gross margin, then the impacts of TSL 4 would significantly erode manufacturers' profits.

Electric Ovens. At TSL 1, the projected impact on INPV and cash flow for electric ovens is zero. At this level, DOE assumed both electric standard and self-cleaning ovens would have the same efficiency level as the baseline. Therefore, DOE reported no impacts at TSL 1.

At TSL 2 and TSL 3, the impact on INPV and cash flow varies depending on manufacturers' ability to maintain gross margin as a percentage of revenues as the MPCs increase as a result of standards. DOE estimated the impacts in INPV at TSL 2 and TSL 3 to range from −$8 million to −$19 million, or a change in INPV of approximately −.99 percent to −2.43 percent. At these levels, the industry cash flow would decrease by approximately 12 percent, to $40.4 million, compared to the base-case value of $46.1 million in the year leading up to the standards. DOE does not expect significant impacts at TSL 2 and TSL 3 because the investments needed to conform to the standards are relatively small in comparison to overall SG&A and R&D annual costs. In addition, product cost increases would benefit manufacturers if they can fully pass along MPC increases to customers.

At TSL 4, the analysis shows that impacts on INPV and cash flow would vary significantly depending on the manufacturers' ability to maintain gross margin as MPCs increase due to standards. DOE estimated the impacts in INPV to range from approximately −$10 million to −$469 million, or a change in INPV of −1.27 percent to −59.16 percent. At this level, the industry cash flow would decrease by approximately 194 percent, to −$43.3 million, compared to the base-case value of $46.1 million in the year leading up to the standards. At this

level, the increase in efficiency also carries substantial redesign costs. Forced convection and reducing conduction losses affect the design of the entire cavity, thereby making product conversion and capital conversion costs much greater than a simpler component switch. In addition, if manufacturers can maintain their gross margin as a percentage of revenues, the impacts of higher manufacturing costs would be relatively small. However, if manufacturers can only maintain their absolute dollar gross margin, then the impacts of TSL 4 would decrease the INPV of the industry by close to half.

Gas Ovens. At TSL 1 and TSL 2, the impact on INPV and cash flow varies depending on manufacturers' ability to fully maintain their gross margins as the MPC increases as a result of standards. These TSLs are equivalent to the elimination of standing pilot lights from gas cooking products. DOE estimated the impacts in INPV at TSL 1 and TSL 2 to range from a −$7 million up to −$10 million, or a change in INPV of −1.57 percent up to −2.10 percent. At this level, the industry cash flow decreases by approximately 11 percent, to $25.6 million, compared to the base case value of $28.8 million in the year leading up to the standards. Since more than 80 percent of the equipment being sold is already at or above this level (*i.e.*, most products do not have standing pilot lights), those manufacturers that do not fall below the efficiency levels specified by TSL 1 and TSL 2 would not have to make additional modifications to their product lines to conform to the amended energy conservation standards. DOE expects the lower end of the impacts to be reached, which indicates that industry revenues and costs are not significantly negatively impacted as long as manufacturers can maintain their gross margin as a percentage of revenues. The analysis shows that although the elimination of standing pilot lights may not significantly impact large manufacturers, small manufacturers that rely on revenues from these products would be impacted significantly. DOE's discussion of the impacts on the small manufacturers is explained in further detail in the regulatory flexibility section of today's notice (see section VI. B.)

At TSL 3, the impact on INPV and cash flow continues to vary depending on the manufacturers' ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 3 to range from approximately −$6 million to −$41 million, or a change in INPV of −1.38 percent to −8.68 percent. At this level, the analysis shows that the industry cash flow decreases by approximately 27 percent, to $20.9 million, compared to the base case value of $28.8 million in the year leading up to the standards.

At TSL 4, the impact on INPV and cash flow varies significantly depending on the manufacturers' ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 4 to range from approximately −$47 million to −$181 million, or a change in INPV of −10.04 percent to −38.80 percent. At this level, the analysis shows that the industry cash flow decreases by approximately 190 percent, to −$26.0 million, compared to the base case value of $28.8 million in the year leading up to the standards. At this TSL, if manufacturers can maintain their gross margin as a percentage of revenues, the projected increase in total revenues negates the impacts of higher manufacturing costs. However, if manufacturers can only maintain their absolute dollar gross margin, then the impacts of TSL 4 would significantly erode manufacturers' profits.

ii. Microwave Ovens

To assess the lower end of the range of potential impacts for the microwave oven industry, DOE considered the scenario reflecting the preservation of gross margin percentage. As production cost increases with efficiency, this scenario implies manufacturers will be able to maintain gross margins as a percentage of revenues. To assess the higher end of the range of potential impacts for the microwave oven industry, DOE considered the scenario reflecting preservation of gross margin in absolute dollars. Under this scenario, DOE assumed that the industry can maintain its gross margins in absolute dollars after the standard effective date. The industry would do so by passing through its increased costs to customers without increasing its gross margin in absolute dollars. Table V.34 and Table V.35 show MIA results related to the energy factor for each TSL using both markup scenarios described above for microwave oven manufacturers.

TABLE V.34—MANUFACTURER IMPACT ANALYSIS FOR MICROWAVE OVENS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO (ENERGY FACTOR)

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1a	2a	3a	4a
INPV	(2006 $ millions)	1,450	1,494	1,567	1,687	1,717
Change in INPV	(2006 $ millions)		44	117	237	267
	(%)		3.04%	8.09%	16.34%	18.44%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		60.0	75.0	90.0	225.0
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		0.0	0.0	0.0	75.0
Total Investment Required	(2006 $ millions)		60.0	75.0	90.0	300.0

TABLE V.35—MANUFACTURER IMPACT ANALYSIS FOR MICROWAVE OVENS UNDER THE PRESERVATION OF GROSS MARGIN ABSOLUTE DOLLARS MARKUP SCENARIO (ENERGY FACTOR)

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1a	2a	3a	4a
INPV	(2006 $ millions)	1,450	1,250	1,064	775	284
Change in INPV	(2006 $ millions)		(199)	(386)	(675)	(1,165)
	(%)		−13.74%	−26.62%	−46.56%	−80.39%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		60.0	75.0	90.0	225.0
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		0.0	0.0	0.0	75.0
Total Investment Required	(2006 $ millions)		60.0	75.0	90.0	300.0

TSL 1a represents an improvement in cooking efficiency from the baseline level of 0.557 EF to 0.586 EF. At TSL 1a, the impact on INPV and cash flow varies greatly depending on the manufacturers and their ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 1a to range from less than $44 million to −$199 million, or a change in INPV of 3.04 percent to −13.74 percent. At this level, the industry cash flow decreases by approximately 18 percent, to $71.7 million, compared to the base-case value of $87.3 million in the year leading up to the standards.

TSL 2a represents an improvement in cooking efficiency from the baseline level of 0.557 EF to 0.588 EF. At TSL 2a, the impact on INPV and cash flow would be similar to TSL 1a and depend on whether manufacturers can fully recover the increases in MPCs from the customer. DOE estimated the impacts in INPV at TSL 2a to range from $117 million to −$386 million, or a change in INPV of 8.09 percent to −26.62 percent. At this level, the industry cash flow decreases by approximately 22 percent, to $67.9 million, compared to the base-case value of $87.3 million in the year leading up to the standards.

TSL 3a represents an improvement in cooking efficiency from the baseline level of 0.557 EF to 0.597 EF. At TSL 3a, the impact on INPV and cash flow continues to vary depending on the manufacturers and their ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 3a to range from approximately $237 million to −$675 million, or a change in INPV of 16.34 percent to −46.56 percent. At this level, the industry cash flow decreases by approximately 27 percent, to $64.0 million, compared to the base-case value of $87.3 million in the year leading up to the standards.

TSL 4a represents an improvement in cooking efficiency from the baseline level of 0.557 EF to 0.602 EF. At TSL 4a, DOE estimated the impacts in INPV to range from approximately $267 million to −$1,165 million, or a change in INPV of 18.44 percent to −80.39 percent. At this level, the industry cash flow decreases by approximately 101 percent, to −$1.0 million, compared to the base-case value of $87.3 million in the year leading up to the standards. At higher TSLs, manufacturers have a harder time fully passing on larger increases in MPCs to the customer.

Due to the similarities in design requirements to meet each TSL, the results for each TSL are dependent on the ability of manufacturers to pass along increases in manufacturer production costs and the additional conversion costs. The engineering analysis assumes that each TSL adds an additional component switch-out. For example, to reach TSL 2, manufacturers must switch the fan in addition to switching the power supply required to meet TSL 1. The high conversion costs associated with these switches drive INPV negative if incremental costs are only partially passed along to consumers. If the incremental costs are fully passed along to consumers, which manufacturers stated was unlikely due to fierce competition in the industry, the higher purchase prices are enough to overcome the high conversion and capital conversion costs, thereby making INPV positive. The magnitude of the positive cash flow impact under the preservation of gross margin percentage scenario and the negative cash flow impact under the preservation of gross margin (absolute dollars) scenario depends on the incremental cost of standards-compliant products. The higher the relative cost, the larger the impact on operating revenue and cash flow in the years following the effective date of the standard. Since higher TSLs correspond to higher relative costs, the impacts of the markup scenarios are greater at higher TSLs.

Table V.36 and Table V.37—show the standby power MIA results for each TSL using both markup scenarios described above for microwave ovens manufacturers.

TABLE V.36—MANUFACTURER IMPACT ANALYSIS FOR MICROWAVE OVENS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO (STANDBY POWER)

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1b	2b	3b	4b
INPV	(2006 $ millions)	1,450	1,428	1,414	1,413	1,415

TABLE V.36—MANUFACTURER IMPACT ANALYSIS FOR MICROWAVE OVENS UNDER THE PRESERVATION OF GROSS MARGIN PERCENTAGE MARKUP SCENARIO (STANDBY POWER)—Continued

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1b	2b	3b	4b
Change in INPV	(2006 $ millions)		(22)	(35)	(37)	(35)
	(%)		−1.50%	−2.44%	−2.52%	−2.40%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		−37.5	67.5	82.5	135.0
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		−3.8	4.1	4.5	7.5
Total Investment Required	(2006 $ millions)		−41.3	71.6	87.0	142.5

TABLE V.37—MANUFACTURER IMPACT ANALYSIS FOR MICROWAVE OVENS UNDER THE PRESERVATION OF GROSS MARGIN ABSOLUTE DOLLARS MARKUP SCENARIO (STANDBY POWER)

Preservation of gross margin percentage markup scenario						
	Units	Base case	TSL			
			1b	2b	3b	4b
INPV	(2006 $ millions)	1,450	1,424	1,402	1,378	1,278
Change in INPV	(2006 $ millions)		(26)	(48)	(71)	(172)
	(%)		−1.77%	−3.28%	−4.92%	−11.87%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		37.5	67.5	82.5	135.0
Amended Energy Conservation Standards Capital Investments	(2006 $ millions)		3.8	4.1	4.5	7.5
Total Investment Required	(2006 $ millions)		41.3	71.6	87.0	142.5

TSL 1b represents an improvement in standby power from the baseline level of 4.0 W to 2.0 W. At TSL 1b, the impact on INPV and cash flow varies depending on the manufacturers' ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 1b to range from less than −$22 million to −$26 million, or a change in INPV of −1.50 percent to −1.77 percent. At this level, the industry cash flow decreases by approximately 13 percent, to $76.1 million, compared to the base-case value of $87.3 million in the year leading up to the standards.

TSL 2b represents an improvement in standby power from the baseline level of 4.0 W to 1.5 W. At TSL 2b, the impact on INPV and cash flow would be similar to TSL 1b and depend on whether manufacturers can fully recover the increases in MPCs from the customer. DOE estimated the impacts in INPV at TSL 2b to range from −$35 million to −$48 million, or a change in INPV of −2.44 percent to −3.28 percent. At this level, the industry cash flow decreases by approximately 22 percent, to $68.2 million, compared to the base-case value of $87.3 million in the year leading up to the standards.

TSL 3b represents an improvement in standby power from the baseline level of 4.0 W to 1.0 W. At TSL 3b, the impact on INPV and cash flow continues to vary depending on the manufacturers and their ability to pass on increases in MPCs to the customer. DOE estimated the impacts in INPV at TSL 3b to range from approximately −$37 million to −$71 million, or a change in INPV of −2.52 percent to −4.92 percent. At this level, the industry cash flow decreases by approximately 27 percent, to $64.1 million, compared to the base-case value of $87.3 million in the year leading up to the standards.

TSL 4b represents an improvement in standby power from the baseline level of 4.0 W to 0.02 W. At TSL 4b, DOE estimated the impacts in INPV to range from approximately −$35 million to −$172 million, or a change in INPV of −2.40 percent to −11.87 percent. At this level, the industry cash flow decreases by approximately 43 percent, to $49.3 million, compared to the base-case value of $87.3 million in the year leading up to the standards. At higher TSLs, manufacturers have a harder time fully passing on larger increases in MPCs to the customer. At TSL 4b, the conversion costs are higher than for TSL 1b, TSL 2b, and TSL 3b because the design of all microwave platforms must be more significantly altered.

For standby power standards, conversion costs increase at higher TSLs as the complexity of further lowering standby power increases, substantially driving up engineering time and also increasing the testing and product development time. If the increased production costs are fully passed on to consumers (the preservation of gross margin percentage scenario), the operating revenue from higher prices is

not enough to overcome the negative impacts from the substantial conversion costs. The incremental costs are small for each TSL, meaning the positive impact on cash flows is small compared to the conversion costs. As a result of the small incremental costs and large conversion expenses, INPV is negative for all TSLs under the preservation of gross margin percentage scenario. If the incremental costs are not fully passed along to customers (the preservation of gross margin (absolute dollars) scenario), the negative impacts on INPV are amplified at each TSL.

iii. Commercial Clothes Washers

For CCWs, the major source of uncertainty voiced by manufacturers during the interviews is the impact of higher standards on the number of CCWs sold. Pricing and profit margin issues were not emphasized as they were for cooking products. Future product sales are particularly important considering the high capital costs (particularly design costs) in comparison to the small number of products sold. In light of the concern over future shipments, DOE modeled two MIA scenarios, based on two shipment projections from the NIA.

To assess the lower end of the range of potential impacts for the CCW industry, DOE considered a scenario wherein unit shipments will not be impacted regardless of new energy conservation standards—this scenario is called the base-case shipments scenario. To assess the higher end of the range of potential impacts for the CCW industry, DOE considered a scenario in which total industry shipments would decrease due to the combined effects of increases in purchase price and decreases in operating costs due to new energy conservation standards—this scenario is called the price elastic of demand scenario. In both scenarios, it is assumed that manufacturers will be able to maintain the same gross margins (as a percentage of revenues) that is currently obtained in the base case.

Table V.38 and Table V.39 show the MIA results for each TSL using both shipment scenarios described above for CCW manufacturers.

TABLE V.38—MANUFACTURER IMPACT ANALYSIS FOR COMMERCIAL CLOTHES WASHERS WITH BASE CASE SHIPMENTS

Preservation of gross margin percentage markup with base case shipments							
	Units	Base case	Trial standard level				
			1	2	3	4	5
INPV	(2006 $ millions)	56	59	52	41	38	26
Change in INPV	(2006 $ millions)		4	(4)	(15)	(18)	(30)
	(%)		6.51%	−6.37%	−26.50%	−32.02%	−53.13%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		0.00	18.00	33.00	36.70	49.50
Amended Energy Conservation Standards Capital Investments.	(2006 $ millions)		0.00	1.60	2.60	3.35	5.90
Total Investment Required.	(2006 $ millions)		0.0	19.6	35.6	40.1	55.4

TABLE V.39—MANUFACTURER IMPACT ANALYSIS FOR COMMERCIAL CLOTHES WASHERS WITH PRICE ELASTICITY OF DEMAND SHIPMENTS

Preservation of gross margin percentage markup with price elasticity of demand shipments							
	Units	Base case	Trial standard level				
			1	2	3	4	5
INPV	(2006 $ millions)	56	58	50	38	35	23
Change in INPV	(2006 $ millions)		3	(6)	(17)	(20)	(32)
	(%)		4.91%	−10.27%	−31.09%	−36.83%	−58.19%
Amended Energy Conservation Standards Product Conversion Expenses.	(2006 $ millions)		0.00	18.00	33.00	36.70	49.50
Amended Energy Conservation Standards Capital Investments.	(2006 $ millions)		0.00	1.60	2.60	3.35	5.90

TABLE V.39—MANUFACTURER IMPACT ANALYSIS FOR COMMERCIAL CLOTHES WASHERS WITH PRICE ELASTICITY OF DEMAND SHIPMENTS—Continued

Preservation of gross margin percentage markup with price elasticity of demand shipments							
	Units	Base case	Trial standard level				
			1	2	3	4	5
Total Investment Required.	(2006 $ millions) ...	.....	0.0	19.6	35.6	40.1	55.4

At TSL 1, the impact on INPV and cash flow varies depending on the manufacturers' ability to maintain revenues as shipments decrease due to the price elasticity. DOE estimated the impacts in INPV at TSL 1 to range from positive $3.6 million to positive $2.7 million, or a change in INPV of 6.51 percent to 4.91 percent. At this level, the industry cash flow does not decrease from the base-case value of $3.8 million in the year leading up to the standards. Since all manufacturers have top-loading and front-loading washers already above this level, DOE assumed that there would be no product conversion or conversion capital costs.

At TSL 2, DOE estimated the impacts in INPV to range from −$3.5 million to −$5.7 million, or a change in INPV of −6.37 percent to −10.27 percent. At this level, the industry cash flow decreases by approximately 153 percent, to −$2.0 million, compared to the base-case value of $3.8 million in the year leading up to the standards. To conform to the standards at TSL 2, DOE estimated that at least one manufacturer will need to redesign and retool a line of top-loading washers that falls below this standard level. Since over 88 percent of front-loading washers exceed this level, DOE assumed that there would be relatively small product conversion and conversion capital costs for these washers.

At TSL 3, DOE estimated the impacts in INPV to range from −$14.7 million to −$17.3 million, or a change in INPV of −26.5 percent to −31.09 percent. At this level, the industry cash flow decreases by approximately 320 percent, to −$8.3 million, compared to the base case value of $3.8 million in the year leading up to the standards. Since over 88 percent of front-loading washers exceed this level, DOE assumed that there would be relatively small product conversion and conversion capital costs for these washers. However, at TSL 3 manufacturers stated that significant product redesigns and line retooling would be required to conform to the top-loading standard. Beyond the concerns captured in the GRIM model, other issues were raised by manufacturers at TSL 3. For top-loading CCWs, multiple manufacturers stated that customers could see a reduction in wash quality or reject new designs based on a perceived reduction in wash quality. As a consequence they believe that a significant portion of the industry could potentially shift from top-loading designs to front-loading designs. For manufacturers that do not produce large volumes of front-loading washers this would require significant capital to expand front-loading production lines and may force them to redesign their current models to reduce cost. The uncertainty in product class shifting adds to the perceived financial risks of adopting a TSL 3 for front-loading washers. The Department seeks comment on the possible magnitude of this shift.

At TSL 4, DOE estimated the impacts in INPV at TSL 4 to range from −$17.8 million to −$20.5 million, or a change in INPV of −32.02 percent to −36.83 percent. At this level, the industry cash flow decreases by approximately 367 percent, to −$10.0 million, compared to the base-case value of $3.8 million in the year leading up to the standards. As with TSL 3, the top-loading standard remains at max-tech at TSL 4, and the impacts as previously stated for this product class. Currently, 97 percent of front-loading washers shipped do not meet TSL 4, resulting in multiple manufacturers having to also redesign existing front-loading products to conform to the standard. The $8.1 million in product conversion and capital conversion costs to redesign and retool for the front-loading standard, while not appearing that substantial on a nominal basis, are significant for manufacturers due to low volumes of front-loading washers. Adjusting for shipment volumes, investing $8.1 million in front-loading washers is equivalent to investing over $26 million in top-loading washers. These investment costs are also high compared to the industry value of $19 million for front-loading washers. Consequently, it could be difficult for manufactures to justify the investments necessary to reach TSL 4 for front-loading washers.

At TSL 5, DOE estimated the impacts in INPV to range from −$29.5 million to −$32.3 million, or a change in INPV of −53.13 percent to −58.19 percent. At this level, the industry cash flow decreases by approximately 527 percent, to −$16.1 million, compared to the base-case value of $3.8 million in the year leading up to the standards. The top-loading standard remains at max tech at TSL 5. Almost all front-loading washers currently sold do not meet TSL 5. Since most manufacturers do not have existing washers that are close to meeting TSL 5, the redesign and tooling costs drive INPV extremely negative. At TSL 5, manufactures would have to invest $23.4 million in front-loading washer in an industry valued at $19 million. It could be difficult for manufactures to justify the investments necessary to reach max tech for both top-loading and front-loading washers.

b. Impacts on Employment

To quantitatively assess the impacts of energy conservation standards on cooking products and CCW manufacturing employment, DOE used the GRIM to estimate the domestic labor expenditures and number of employees in the base case and at each TSL from 2007 through 2042 for the conventional cooking products, microwave oven, and CCW industries. DOE used statistical data from the U.S. Census Bureau's 2006 Annual Survey of Manufactures [89] (2006 ASM) and 2006 Current Industry Report [90] (2006 CIR), the results of the engineering analysis, and interviews with manufacturers to estimate the inputs necessary to calculate industry-wide labor expenditures and domestic employment levels. Labor expenditures are a function of the labor intensity of the equipment, the sales volume, and an implicit assumption that wages remain fixed in real terms over time. (DOE

[89] The 2006 Annual Survey of Manufacturers is available at: *http://www.census.gov/mcd/asmhome.html.*

[90] The 2006 Current Industry Report is available at *http://www.census.gov/cir/www/alpha.html.*

notes that the MIA's analysis detailing impacts on employment focuses specifically on the production workers manufacturing the covered products in question, rather than a manufacturer's broader operations. Thus, the estimated number of impacted employees in the MIA is separate and distinct from the total number of employees used to determine whether a manufacturer is a small business for purposes of analysis under the Regulatory Flexibility Act.)

The estimates of production workers in this section only cover workers up to and including the line-supervisor level that are directly involved in fabricating and assembling a product within the original equipment manufacturer (OEM) facility. In addition, workers that perform services that are closely associated with production operations are included. Employees above the working-supervisor level are excluded from the count of production workers. Thus, the labor associated with non-production functions (*e.g.*, factory supervision, advertisement, sales) is explicitly not covered.[91] In addition, DOE's estimates only account for production workers that manufacture the specific products covered by this rulemaking. For example, a worker on a clothes dryer production line would not be included in the estimate of the number of CCW production workers. Finally, this analysis also does not factor in the dependence by some manufacturers on production volume to make their operations viable. For example, should a major line of business cease or move, a production facility may no longer have the manufacturing scale to obtain volume discounts on its purchases nor be able to justify maintaining major capital equipment. Thus, the impact on a manufacturing facility due to a line closure may affect more employees than just the production workers, but again this analysis focuses on the production workers directly impacted.

i. Conventional Cooking Products

Using the GRIM, DOE estimates that there are 2,146 U.S. production workers in the conventional cooking products industry. Using the CIR data, DOE estimates that approximately 27 percent of conventional cooking products sold in the U.S. are manufactured domestically. Today's notice estimates the impacts on U.S. production workers in the conventional cooking products industry as a result of the trial energy conservation standards as show in Table V.40.

TABLE V.40—CHANGE IN TOTAL NUMBER OF DOMESTIC PRODUCTION EMPLOYEES IN 2012 IN THE CONVENTIONAL COOKING PRODUCTS INDUSTRY

	Baseline	TSL 1	TSL 2	TSL 3	TSL 4
Total Number of Domestic Production Workers in 2012	2,146	2,153	2,163	2,181	2,731
Change in Total Number of Domestic Production Workers in 2012		7	17	35	585

DOE expects no significant direct employment impacts among conventional cooking products manufacturers for TSL 1 through TSL 3. Generally, DOE expects that there would be positive employment impacts among domestic conventional cooking products manufacturers for TSL 1 through TSL 3. Because production employment expenditures are assumed to be a fixed percentage of COGS and the MPCs increase with more efficient products, labor tracks the increased prices in the GRIM. The GRIM predicts a gradual increase in domestic employment after standards. Because there are large price increases for TSL 4, the GRIM predicts an increase in employment. However, it is likely that the positive impacts in employment due to the incremental cost increase overstate the impacts that would result from increased shipments over time. This overstatement is caused by the assumption of constant labor content as a percentage of revenue. For TSL 4 in particular, the design options involve component substitution which substantially increase the cost of purchase parts but should not result in a proportionate increase in labor costs.

DOE reached this conclusion independent of the employment impacts from the broader U.S. economy, which are documented in chapter 15 of the TSD accompanying this notice. The employment conclusions do not account for the possible relocation of domestic jobs to lower-labor-cost countries because the potential relocation of U.S. jobs is uncertain and highly speculative. Because the labor impacts in the GRIM do not take relocation into account, the labor impacts would be different if manufacturers chose to relocate to lower-cost countries. The relatively small capital costs at TSL 1 through TSL 3 make relocation less likely. However, at all TSLs, manufacturers face significant product conversion costs that correspond to redesigning products and testing components on all platforms. These significant conversion costs put pressure on manufacturers at all TSLs to cut costs. At TSL 4, manufacturers face both significant capital and product conversion costs, which put even greater pressure on cost reduction that could ultimately lead to relocation.

ii. Microwave Ovens

Using the GRIM, DOE estimates that there are 229 U.S. production workers in the microwave oven industry. Using the CIR data, DOE estimates that approximately four percent of microwave ovens sold in the U.S. are manufactured domestically. Today's notice estimates the impacts on U.S. production workers in the microwave oven industry as a result of the trial energy conservation and standby power standards as show in Table V.41 and Table V.42.

[91] The 2006 ASM provides the following definition: 'The 'production workers' number includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (*e.g.*, power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.''

TABLE V.41—CHANGE IN TOTAL NUMBER OF DOMESTIC PRODUCTION EMPLOYEES IN 2012 IN THE MICROWAVE OVEN INDUSTRY FOR ENERGY FACTOR STANDARDS

	Baseline	TSL 1	TSL 2	TSL 3	TSL 4
Total Number of Domestic Production Workers in 2012	229	246	264	292	327
Change in Total Number of Domestic Production Workers in 2012		17	34	62	98

TABLE V.42—CHANGE IN TOTAL NUMBER OF DOMESTIC PRODUCTION EMPLOYEES IN 2012 IN THE MICROWAVE OVEN INDUSTRY FOR STANDBY POWER STANDARDS

	Baseline	TSL 1	TSL 2	TSL 3	TSL 4
Total Number of Domestic Production Workers in 2012	229	230	230	232	239
Change in Total Number of Domestic Production Workers in 2012		0	1	2	9

For all energy factor and standby power TSLs, the GRIM calculates an increase in domestic employment due to energy conservation standards because production labor expenditures are assumed to be a fixed percentage of COGS and MPCs increase with more-efficient products. For all TSLs, the GRIM employment results agree with the bottom-up analysis in the engineering analysis. The incremental costs for more efficient components at all TSLs are relatively small. In response to standards, domestic manufacturers would most likely not alter employment levels much because inserting a more efficient component does not necessarily require more labor.

DOE reached this conclusion independent of the employment impacts from the broader U.S. economy, which are documented in chapter 15 of the TSD accompanying this notice. The employment conclusions do not account for the possible relocation of domestic jobs to lower-labor-cost countries because the potential relocation of U.S. jobs is uncertain and highly speculative. Since more than 95 percent of microwave ovens are already imported and the employment impacts in the GRIM are small, the actual impacts on domestic employment would depend on whether any U.S. manufacturer decided to shift remaining U.S. production to lower-cost countries.

iii. Commercial Clothes Washers

Using the GRIM, DOE calculates that there are 178 U.S. production workers in the commercial clothes washer industry. Using the CIR data, DOE estimates that approximately 81 percent of CCW sold in the U.S. are manufactured domestically. Today's notice estimates the impacts on U.S. production workers in the CCW industry impacted by energy conservation standards as show in Table V.43.

TABLE V.43—CHANGE IN TOTAL NUMBER OF DOMESTIC PRODUCTION EMPLOYEES IN 2012 IN THE CCW INDUSTRY

	Baseline	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Total Number of Domestic Production Workers in 2012	178	196	216	222	224	227
Change in Total Number of Domestic Production Workers in 2012		18	38	44	46	48

DOE expects that there would be positive employment impacts among domestic commercial clothes washer manufacturers for TSL 1 through TSL 5. Because production employment expenditures are assumed to be a fixed percentage of COGS and the MPCs increase with more efficient products, labor tracks the increased prices in the GRIM. The GRIM predicts a steady level of domestic employment after standards at a level based on the increase in relative price.

DOE reached this conclusion independent of the employment impacts from the broader U.S. economy, which are documented in chapter 15 of the TSD accompanying this notice. The employment conclusions do not account for the possible relocation of domestic jobs to lower-labor-cost countries because the potential relocation of U.S. jobs is uncertain and highly speculative. The GRIM shows the employment levels rising at higher TSLs. If all standards-compliant CCWs are produced in the United States, the employment levels would be expected to be reasonably accurate. More-efficient washers are more complex and require more labor. However, approximately 80 percent of CCWs are currently produced domestically. The actual impacts on domestic employment after standards would be different if any U.S. manufacturer decided to shift remaining U.S. production to lower-cost countries. Due to the uncertainty in the business decisions of where to manufacture washers after standards, DOE presents a range of potential employment impacts if the potential for relocation is considered. The proposed standard could result in adding 44 production workers (if all manufacturers continue to produce washers in their existing U.S. facilities) to losing 178 production workers (if all U.S. manufacturers source standards-compliant washers or shift U.S. production abroad).

Based on the commercial washer revenues reported in Appendix 13–A and using the employment assumptions in section IV.G, DOE estimates there are approximately 150 production workers at the LVM manufacturing products directly covered by this rulemaking. In addition, DOE estimates that there are 20 non-production employees attributable to CCWs at the facility. The domestic facility also manufactures residential top-loading washers, standard dryers, front-loading residential washers, washer-extractors, and tumbler dryers. If the LVM decided

to no longer produce any soft-mount washers or standard dryers at the facility because it could not sell dryers without selling washers, approximately 292 production and 40 non-production jobs would be lost. Including all production workers involved in covered and non-covered products, the closure of the LVM domestic manufacturing plant would equate to a loss of approximately 600 factory employees.

A further discussion of the LVM and the potential impacts of relocation on employment for the CCW industry at other TSLs is presented in Chapter 13 of the TSD.

c. Impacts on Manufacturing Capacity

i. Conventional Cooking Products

According to the manufacturers of gas cooking products, amended energy conservation standards should not significantly affect production capacity, except at the max-tech levels. For example, in interviews, all manufacturers of cooking products with standing pilot lights stated they also manufacture products that do not use this type of ignition. Since manufacturers of gas cooking appliances with standing pilot ignitions typically also sell otherwise-identical appliances with electronic ignition systems, manufacturers stated that they expected impacts on manufacturing capacity due to changes in the ignition systems to be minimal. Thus, DOE believes manufacturers will be able to maintain manufacturing capacity levels and continue to meet market demand under amended energy conservation standards. For most other products and efficiencies, manufacturers can modify existing equipment to accommodate redesigned products with more efficient components without significantly impacting production volumes.

However, max-tech levels for standard electric ovens and standard gas ovens strand some existing manufacturing equipment and tooling, and would require substantial product development and retooling. DOE believes setting a standard at this level could lead to short term capacity problems for these products if manufacturers cannot make the tooling changes in time to meet the standard. For the other efficiencies, manufacturers will be able to retool without causing capacity constraints.

ii. Microwave Ovens

According to the majority of microwave oven manufacturers, new energy conservation standards will not significantly affect production capacity. As with conventional cooking products, any necessary microwave oven redesigns involve component switches that will not change the fundamental assembly of the equipment. However, manufacturers anticipate significant changes to tooling for TSL 4 for energy factor standards and minor changes to tooling at all TSLs for standby power standards. For all efficiency levels for energy factor and standby power standards, the most significant conversion costs are the research and development (R&D), testing, and certification of products with more-efficient components, which does not affect production line capacity. Thus, DOE believes manufacturers will be able to maintain manufacturing capacity levels and continue to meet market demand under new energy conservation standards.

iii. Commercial Clothes Washers

According to the majority of CCW manufacturers, new energy conservation standards could potentially impact manufacturers' production capacity depending on the efficiency level required. Necessary redesigns of front-loading and top-loading CCWs will not change the fundamental assembly of the product or cause a drastic increase in the volume requirements of one type of washer. Thus, DOE believes manufacturers will be able to maintain manufacturing capacity levels and continue to meet market demand under new energy conservation standards as long as manufacturers continue to offer top-loading and front-loading washers.

However, a very high efficiency standard for top-loading clothes washers could cause a manufacturer to abandon further manufacture of top-loading clothes washers after the effective date (due to concerns about wash quality, for example). Instead of manufacturing top-loading clothes washers, the manufacturers could elect to switch its entire production over to front-loading clothes washers. Since top-loading and front-loading clothes washers share few, if any parts, are built on completely separate assembly lines, and are built at very different production volumes, a manufacturer may not be able to make a platform switch from top-loading to front-loading washers without significant impacts on product development and capital expenses, along with capacity constraints.

For example, multiple manufacturers stated during interviews that front-loading CCWs represent a relatively small segment of their total production volumes. Thus, their front-loading production capacity may need to be substantially expanded to meet the demand that their top-loading production lines used to meet. This expansion could possibly affect capacity until new production lines come on line to service demand. In addition, manufacturers stated that the higher prices of front-loading washers could lead to a decrease in shipments. This could lead to a permanently lower production capacity as machines are repaired and the product lifetime of existing washers is extended.

d. Impacts on Subgroups of Manufacturers

As discussed above, using average cost assumptions to develop an industry cash flow estimate is not adequate for assessing differential impacts among subgroups of manufacturers. Small manufacturers, niche players, or manufacturers exhibiting a cost structure that differs significantly from the industry average could be affected differently. DOE used the results of the industry characterization to group manufacturers exhibiting similar characteristics.

As outlined earlier, two small cooking appliance businesses and a low-volume manufacturer of CCWs will be affected disproportionately by any energy efficiency regulation in their respective industries. These businesses are focused on one specific market segment and are orders of magnitude smaller than their diversified competitors. Due to this combination of market concentration and size, all of them are at risk of material harm to their business, depending on the TSL chosen.

For the small cooking appliance businesses, the primary issue is whether an amended standard would continue to allow gas-fired appliances with standing pilots to be sold. Two small businesses indicated that 25 percent or more of their entire production consists of such niche products, now that most manufacturers have switched to electronic ignition in their gas-fired cooking appliances. See section VI.B of this notice for detail discussion of possible impacts on small cooking appliance businesses.

The CCW LVM indicated that it could not manufacture top-loading washers above an MEF of 1.42 (TSL 1). If DOE sets a standard above TSL 1, the LVM would be forced to design a new top-loading washer, offer only front-loading washers, or choose to exit the CCW market altogether. Due to its small size, the investment required for the LVM to design a more efficient top-loading washer would put the company at a competitive disadvantage. If the LVM no longer offers top-loading washers and has to expand its front-loading production lines, it would likely cause

it to cease CCW production altogether, resulting in significant impacts to the industry. Currently, the LVM's top-loading washers account for more than half of the company's CCW revenues and three-quarters of its CCW shipments. To shift all top-loading CCWs to front-loading washers at current production volumes would require substantial investments that the company may not be able to justify. In addition, the LVM derives 87 percent of its clothes washer revenue from CCWs, so its sales in the RCW market would be too low to justify continuing any top-loading clothes washer manufacturing. While the LVM currently manufactures a front-loading clothes washer, it does so at a cost disadvantage compared to its competitors. The potential investment and risk required to develop a cost-competitive clothes washer that deviates significantly from its traditional top-loader agitator design could be too great for the LVM's current owners. The LVM could decide to exit the market rather than take this risk which could cause employment impacts in the CCW industry. Further detail and separate analysis of impacts on the LVM are found in Chapter 13 of the TSD accompanying this notice.

e. Cumulative Regulatory Burden

One aspect of assessing manufacturer burden is the cumulative impact of multiple DOE standards and the regulatory actions of other Federal agencies and States that affect the manufacturers of a covered product or equipment. DOE believes that a standard level is not economically justified if it contributes to an unacceptable cumulative regulatory burden. While any one regulation may not impose a significant burden on manufacturers, the combined effects of several existing or impending regulations may have serious consequences for some manufacturers, groups of manufacturers, or an entire industry. Assessing the impact of a single regulation may overlook this cumulative regulatory burden.

Companies that produce a wider range of regulated products may be faced with more capital and product development expenditures than their competitors. This can prompt those companies to exit the market or reduce their product offerings, potentially reducing competition. Smaller companies can be especially affected, since they have lower sales volumes over which to amortize the costs of compliance with new regulations.

In addition to DOE's energy conservation regulations for cooking products and CCWs, several other existing Federal regulations and pending regulations apply to these products and other equipment produced by the same manufacturers. DOE recognizes that each regulation can significantly impact manufacturers' financial operations. Multiple regulations affecting the same manufacturer can quickly strain its profits and possibly cause it to exit from the market. The most significant of these additional regulations include the standby power requirements, several additional Federal and State energy conservation standards, the Restriction of Hazardous Substance Directive (RoHS), and international energy conservation standards and test procedures.

Additional investments necessary to meet regulations in addition to the standards prescribed by this rulemaking could have significant impacts on manufacturers of cooking products and CCWs. For this NOPR, DOE also identified other regulations these manufacturers are facing for these and other products and equipment they manufacture within three years prior to and three years after the anticipated effective date of the amended energy conservation standards for cooking products and CCWs.

Most manufacturers interviewed for this rulemaking are already compliant with the RoHS directive. The most significant cumulative regulatory burden for gas cooking appliance manufacturers is a State-by-State restriction on mercury,[92] which affects the gas valves used in their appliances. Most gas cooking appliance manufacturers have already eliminated mercury switches or already have plans in place to do so. However, all appliance manufacturers are concerned about potential restrictions of other hazardous substances in the future, such as fire protection materials, which could be costly to remove from existing products.

Most manufacturers interviewed also sell products to other countries with energy conservation and standby standards. Manufacturers may incur a substantial cost to the extent that there are overlapping testing and certification requirements in other markets besides the United States. However, since DOE only has the authority to set standards on products sold in the United States, DOE only accounts for domestic compliance costs in its calculation of product conversion expenses for products covered in this rulemaking. For more details, see chapter 13 of the TSD accompanying this notice.

3. National Impact Analysis

a. Significance of Energy Savings

To estimate the energy savings through 2042 that would be expected to result from amended energy conservation standards, DOE compared the energy consumption of the appliance products under the base case to energy consumption of these products under the TSLs. Tables V.44 through V.47 show the forecasted national energy savings at each TSL for conventional cooking products, microwave ovens (two tables), and CCWs, respectively. For conventional cooking products, summing the energy savings for all products classes across each TSL considered in this rulemaking would result in significant energy savings, with the amount of savings increasing with higher efficiency standards. The same is true for microwave ovens and CCWs. For CCWs, summing the energy and water savings for both product classes across each TSL considered would result in significant energy and water savings. Chapter 11 of the TSD accompanying this notice provides additional details on the NES values reported below, as well as discounted NES results (and discounted national water savings results for CCWs) based on discount rates of three and seven percent. DOE reports both undiscounted and discounted values of energy savings. Discounted energy savings represent a policy perspective wherein energy savings farther in the future are less significant than energy savings closer to the present.[93]

[92] For example, the Interstate Mercury Education & Reduction Clearinghouse (IMERC) is a coalition of northeast states coordinating the banning of products containing mercury (see *http://www.newmoa.org/prevention/mercury/imerc.cfm*).

[93] Consistent with Executive Order 12866, ''Regulatory Planning and Review,'' 58 FR 51735 (Oct. 4, 1993), DOE follows the guidance of OMB regarding methodologies and procedures for regulatory impact analysis that affect more than one agency. In reporting energy and environmental benefits from energy conservation standards, DOE will report both discounted and undiscounted (*i.e.*, zero discount-rate) values.

TABLE V.44—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR CONVENTIONAL COOKING PRODUCTS

	National energy savings (quads)							
TSL	Electric coil cooktops	Electric smooth cooktops	Gas cooktops	Electric standard ovens	Electric self-clean ovens	Gas standard ovens	Gas self-clean ovens	Total
1	0.00	0.00	0.10	0.00	0.00	0.05	0.00	0.14
2	0.04	0.00	0.10	0.05	0.00	0.05	0.00	0.23
3	0.04	0.00	0.10	0.05	0.00	0.05	0.09	0.32
4	0.04	0.02	0.15	0.07	0.04	0.09	0.10	0.50

TABLE V.45—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR MICROWAVE OVENS (ENERGY FACTOR)

TSL	National energy savings (quads)
1a	0.08
2a	0.09
3a	0.11
4a	0.12

TABLE V.46—SUMMARY OF CUMULATIVE NATIONAL ENERGY SAVINGS FOR MICROWAVE OVENS (STANDBY POWER)

TSL	National energy savings (quads)
1b	0.23
2b	0.33
3b	0.45
4b	0.69

TABLE V.47—SUMMARY OF CUMULATIVE NATIONAL ENERGY AND WATER SAVINGS FOR COMMERCIAL CLOTHES WASHERS

TSL	Top-Loading		Front-Loading		Total	
	National energy savings (quads)	National water savings (trillion gallons)	National energy savings (quads)	National water savings (trillion gallons)	National energy savings (quads)	National water savings (trillion gallons)
1	0.05	0.00	0.00	0.00	0.05	0.00
2	0.11	0.15	0.00	0.01	0.11	0.16
3	0.15	0.18	0.00	0.01	0.15	0.19
4	0.15	0.18	0.01	0.03	0.16	0.21
5	0.15	0.18	0.02	0.06	0.17	0.24

b. Net Present Value

The NPV analysis is a measure of the cumulative benefit or cost of energy conservation standards to the Nation. In accordance with the OMB's guidelines on regulatory analysis (OMB Circular A–4, section E, September 17, 2003), DOE calculated NPV using both a seven-percent and a three-percent real discount rate. The seven-percent rate is an estimate of the average before-tax rate of return on private capital in the U.S. economy, and reflects the returns on real estate and small business capital as well as corporate capital. DOE used this discount rate to approximate the opportunity cost of capital in the private sector, since recent OMB analysis has found the average rate of return to capital to be near this rate. DOE also used the three-percent rate to capture the potential effects of standards on private consumption (*e.g.*, through higher prices for equipment and the purchase of reduced amounts of energy). This rate represents the rate at which society discounts future consumption flows to their present value. This rate can be approximated by the real rate of return on long-term government debt (*i.e.*, yield on Treasury notes minus annual rate of change in the Consumer Price Index), which has averaged about three percent on a pre-tax basis for the last 30 years.

Tables V.48 through V.51 show the forecasted NPV at each TSL for conventional cooking products, microwave ovens, and CCWs.

TABLE V.48—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR CONVENTIONAL COOKING PRODUCTS (IMPACTS FOR UNITS SOLD FROM 2012 TO 2042)

TSL	NPV (billion 2006$)															
	Electric coil cooktops		Electric smooth cooktops		Gas cooktops		Electric standard ovens		Electric self-clean ovens		Gas standard ovens		Gas self-clean ovens		Total	
	Discount rate		Discount rate		Discount rate		Discount rate		Discount rate		Discount rate		Discount rate		Discount rate	
	7%	3%	7%	3%	7%	3%	7%	3%	7%	3%	7%	3%	7%	3%	7%	3%
1	0.00	0.00	0.00	0.00	0.19	0.50	0.00	0.00	0.00	0.00	0.02	0.11	0.00	0.00	0.21	0.61
2	0.07	0.23	0.00	0.00	0.19	0.50	0.11	0.34	0.00	0.00	0.02	0.11	0.00	0.00	0.39	1.19
3	0.07	0.23	0.00	0.00	0.19	0.50	0.11	0.34	0.00	0.00	0.02	0.11	−0.01	0.19	0.38	1.37
4	0.07	0.23	−7.26	−13.89	−0.73	−1.11	−0.81	−1.37	−2.77	−5.21	−0.91	−1.76	−0.14	−0.04	−12.55	−23.14

TABLE V.49—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR MICROWAVE OVEN ENERGY FACTOR (IMPACTS FOR UNITS SOLD FROM 2012 TO 2042)

TSL	NPV (billion 2006$)	
	7% Discount rate	3% Discount rate
1a	−0.61	−1.07
2a	−1.60	−2.96
3a	−3.06	−5.72
4a	−4.94	−9.28

TABLE V.50—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR MICROWAVE OVEN STANDBY POWER (IMPACTS FOR UNITS SOLD FROM 2012 TO 2042)

TSL	NPV (billion 2006$)	
	7% Discount rate	3% Discount rate
1b	0.91	2.03
2b	1.25	2.79
3b	1.56	3.52
4b	1.61	3.90

TABLE V.51—SUMMARY OF CUMULATIVE NET PRESENT VALUE FOR COMMERCIAL CLOTHES WASHERS (IMPACTS FOR UNITS SOLD FROM 2012 TO 2042)

TSL	NPV (billion 2006$)					
	Top-Loading		Front-Loading		Total	
	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate
1	−0.006	0.03	0.004	0.01	−0.001	0.04
2	0.29	0.77	0.03	0.06	0.32	0.83
3	0.43	1.10	0.03	0.06	0.46	1.16
4	0.43	1.10	0.07	0.16	0.50	1.27
5	0.43	1.10	0.12	0.29	0.55	1.39

c. Impacts on Employment

In addition to considering the direct employment impacts for the manufacturers of products covered by this rulemaking (discussed above), DOE also develops estimates of the indirect employment impacts of proposed standards in the economy in general. As noted previously, DOE expects energy conservation standards for the appliance products that are the subject of this rulemaking to reduce energy bills for consumers, with the resulting net savings being redirected to other forms of economic activity. DOE also realizes that these shifts in spending and economic activity could affect the demand for labor. To estimate these effects, DOE used an input/output model of the U.S. economy using BLS data (described in section IV.H). (See the TSD accompanying this notice, chapter 15.)

This input/output model suggests the proposed standards are likely to slightly increase the net demand for labor in the economy. Neither the BLS data nor the input/output model DOE uses includes the quality or wage level of the jobs. As Table V.52 shows, DOE estimates that net indirect employment impacts from the proposed standards are likely to be

small. The net increase in jobs is so small that it would be imperceptible in national labor statistics and might be offset by other, unanticipated effects on employment.

TABLE V.52—NET NATIONAL CHANGE IN INDIRECT EMPLOYMENT, JOBS IN 2042

[Net National Change in Jobs (thousands)]

Trial standard level	Conventional cooking products	Trial standard level	Microwave oven EF	Trial standard level	Microwave oven standby	Trial standard level	Commercial clothes washers
1	0.25	1a	0.77	1b	2.19	1	0.07
2	0.81	2a	0.78	2b	3.14	2	0.51
3	0.90	3a	0.93	3b	4.30	3	0.63
4	0.99	4a	0.96	4b	6.51	4	0.68
NA	NA	NA	NA	NA	NA	5	0.76

4. Impact on Utility or Performance of Products

For the reasons stated above in Section III.E.1.d., DOE believes that for purposes of 42 U.S.C. 6295(o)(2)(B)(i)(IV), none of the efficiency levels considered in this notice reduces the utility or performance of the appliance products under consideration in this rulemaking.

5. Impact of Any Lessening of Competition

In weighing the promulgation of any proposed standards, DOE is required to consider any lessening of competition that is likely to result from the adoption of those standards. The determination of the likely competitive impacts stemming from a proposed standard is made by the Attorney General, who transmits this determination, along with an analysis of the nature and extent of the impact, to the Secretary of Energy. (See 42 U.S.C. 6295(o)(2)(B)(i)(V) and (B)(ii).)

To assist the Attorney General in making such a determination, DOE has provided DOJ with copies of this notice and the TSD for review. DOE will consider DOJ's comments on the proposed rule in preparing the final rule.

6. Need of the Nation To Conserve Energy

An improvement in the energy efficiency of cooking products and CCWs addressed in this notice is likely to improve the security of the Nation's energy system by reducing overall demand for energy, and, thus, reducing the Nation's reliance on foreign sources of energy. Reduced demand also is likely to improve the reliability of the electricity system, particularly during peak-load periods. As a measure of this reduced demand, DOE expects the proposed standards covered under this rulemaking to eliminate the need for the construction of new power plants with approximately 404 MW electricity generation capacity in 2042.

Enhanced energy efficiency also produces environmental benefits. The expected energy savings from higher standards for the products covered by this rulemaking will reduce the emissions of air pollutants and greenhouse gases associated with energy production and household and building use of fossil fuels. Table V.53 shows cumulative CO_2, NO_X, and Hg (mercury) emissions reductions for the products under consideration in this rulemaking over the analysis period. The expected energy savings from cooking product and CCW standards will reduce the emissions of greenhouse gases associated with energy production, and may reduce the cost of maintaining nationwide emissions standards and constraints.

TABLE V.53—SUMMARY OF EMISSIONS REDUCTIONS (CUMULATIVE REDUCTIONS FOR PRODUCTS SOLD FROM 2012 TO 2042)

	TSL				
	1	2	3	4	NA
Emissions Reductions for Conventional Cooking Products:					
CO_2 (Mt)	14.62	16.62	25.08	37.54	NA
NO_X (kt)	6.32–12.06	6.39–13.71	10.11–20.55	14.99–30.65	NA
Hg (t)	0–0.20	0–0.26	0–0.37	0–0.56	NA
	1a	2a	3a	4a	NA
Emissions Reductions for Microwave Ovens Energy Factor:					
CO_2 (Mt)	11.49	16.95	27.54	38.51	NA
NO_X (kt)	0.58–14.25	0.85–20.85	1.37–33.74	1.91–47.04	NA
Hg (t)	0–0.25	0–0.37	0–0.60	0–0.84	NA
	1b	2b	3b	4b	NA
Emissions Reductions for Microwave Ovens Standby Power:					
CO_2 (Mt)	23.15	35.19	50.48	82.12	NA
NO_X (kt)	1.23–30.30	1.87–46.02	2.67–65.96	4.35–107.23	NA
Hg (t)	0–0.50	0–0.76	0–1.09	0–1.77	NA

TABLE V.53—SUMMARY OF EMISSIONS REDUCTIONS (CUMULATIVE REDUCTIONS FOR PRODUCTS SOLD FROM 2012 TO 2042)—Continued

	TSL				
	1	2	3	4	NA
	1	2	3	4	5
Emissions Reductions for Commercial Clothes Washers:					
CO_2 (Mt)	3.79	8.30	11.55	12.28	12.73
NO_X (kt)	1.43–3.25	3.04–7.13	4.25–9.93	4.51–10.56	4.67–10.95
Hg (t)	0–0.05	0–0.12	0–0.17	0–0.18	0–0.19

Mt = million metric tons.
kt = thousand metric tons.
t = metric tons.

The estimated cumulative CO_2, NO_X, and Hg emissions reductions for the proposed standards range up to a maximum of 38 Mt for CO_2, 15 kt to 31 kt for NO_X, and 0 t to 0.6 t for Hg for conventional cooking products over the period from 2012 to 2042. For microwave oven EF, cumulative emission reductions range up to a maximum of 39 Mt for CO_2, 2 kt to 47 kt for NO_X, and 0 t to 0.8 t for Hg, while for microwave oven standby, cumulative emission reductions range up to a maximum of 82 Mt for CO_2, 4 kt to 107 kt for NO_X, and 0 t to 1.8 t for Hg. For CCWs, cumulative emission reductions range up to a maximum of 13 Mt for CO_2, 5 kt to 11 kt for NO_X, and 0 t to 0.2 t for Hg. However, DOE's analyses show that TSL 4 for conventional cooking products, TSL 4a and TSL 4b for microwave ovens, and TSL 5 for CCWs provides the greatest reduction of emissions of all the TSLs considered. In the environmental assessment (chapter 16 of the TSD), DOE reports estimated annual changes in CO_2, NO_X, and Hg emissions attributable to each TSL. As discussed in section IV.J, DOE does not report SO_2 emissions reduction from power plants because reductions from an energy conservation standard would not affect the overall level of SO_2 emissions in the United States due to the emissions caps for SO_2.

The NEMS–BT modeling assumed that NO_X would be subject to the Clean Air Interstate Rule (CAIR) issued by the U.S. Environmental Protection Agency on March 10, 2005.[94] 70 FR 25162 (May 12, 2005). On July 11, 2008, the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) issued its decision in *North Carolina* v. *Environmental Protection Agency,*[95] in which the court vacated the CAIR. If left in place, the CAIR would have permanently capped emissions of NO_X in 28 eastern States and the District of Columbia. As with the SO_2 emissions cap, a cap on NO_X emissions would have meant that energy conservation standards are not likely to have a physical effect on NO_X emissions in States covered by the CAIR caps. While the caps would have meant that physical emissions reductions in those States would not have resulted from the energy conservation standards that DOE is proposing today, the standards might have produced an environmental-related economic impact in the form of lower prices for emissions allowance credits, if large enough. DOE notes that the estimated total reduction in NO_X emissions, including projected emissions or corresponding allowance credits in States covered by the CAIR cap was insignificant and too small to affect allowance prices for NO_X under the CAIR.

Even though the D.C. Circuit vacated the CAIR, DOE notes that the D.C. Circuit left intact EPA's 1998 NO_X SIP Call rule, which capped seasonal (summer) NO_X emissions from electric generating units and other sources in 23 jurisdictions and gave those jurisdictions the option to participate in a cap and trade program for those emissions. 63 FR 57356, 57359 (Oct. 27, 1998).[96] DOE notes that the SIP Call rule may provide a similar, although smaller in extent, regional cap and may limit actual reduction in NO_X emissions from revised standards occurring in States participating in the SIP Call rule. However, the possibility that the SIP Call rule may have the same effect as CAIR is highly uncertain. Therefore, DOE established a range of NO_X reductions due to the standards being considered in today's proposed rule. DOE's low estimate was based on the emission rate of the cleanest new natural gas combined-cycle power plant available for electricity generation based on the assumption that efficiency standards would result in only the cleanest available fossil-fueled generation being displaced. DOE used the emission rate, specified in kt of NO_X emitted per TWh of electricity generated, associated with an advanced natural gas combined-cycle power plant, as specified by NEMS–BT. The emission rate specified by NEMS–BT is 0.0341 thousand short tons per TWh. To estimate the reduction in NO_X emissions, DOE multiplied this emission rate by the reduction in electricity generation due to the standards considered. DOE's high estimate was based on the use of a nationwide NO_X emission rate for all electrical generation. Use of such an emission rate assumes that future efficiency standards would result in displaced electrical generation mix that is equivalent to today's mix of power plants (*i.e.*, future power plants displaced are no cleaner than what are being used currently to generate electricity). In addition, under the high estimate assumption, standards would have little to no effect on the generation

[94] See *http://www.epa.gov/cleanairinterstaterule/*.

[95] Case No. 05–1244, 2008 WL 2698180 at *1 (D.C. Cir. July 11, 2008).

[96] In the NO_X SIP Call rule, EPA found that sources in the District of Columbia and 22 ''upwind'' States (States) were emitting NO_X (an ozone precursor) at levels that significantly contributed to ''downwind'' States not attaining the ozone NAAQS or at levels that interfered with states in attainment maintaining the ozone NAAQS. In an effort to ensure that ''downwind'' states attain or continue to attain the ozone NAAQS, EPA established a region-wide cap for NO_X emissions from certain large combustion sources and set a NO_X emissions budget for each State. Unlike the cap that CAIR would have established, the NO_X SIP Call Rule's cap only constrains seasonal (summer time) emissions. In order to comply with the NO_X SIP Call Rule, States could elect to participate in the NO_X Budget Trading Program. Under the NO_X Budget Trading Program, each emission source is required to have one allowance for each ton of NO_X emitted during the ozone season. States have flexibility in how they allocate allowances through their State Implementation Plans but States must remain within the EPA-established budget. Emission sources are allowed to buy, sell and bank NO_X allowances as appropriate. It should be noted that, on April 16, 2008, EPA determined that Georgia is no longer subject to the NO_X SIP Call rule. 73 FR 21528 (April 22, 2008).

mix. Based on the AEO 2008 for a recent year (2006) in which no regulatory or non-regulatory measures were in effect to limit NO_X emissions, DOE derived a high-end NO_X emission rate of 0.842 thousand short tons per TWh. To estimate the reduction in NO_X emissions, DOE multiplied this emission rate by the reduction in electricity generation due to the standards considered. DOE is considering whether changes are needed to its plan for addressing the issue of NO_X reduction. DOE invites public comment on how the agency should address this issue, including how it might value NO_X emissions for States now that the CAIR has been vacated.[97]

As noted above in section IV.J, with regard to mercury emissions, DOE is able to report an estimate of the physical quantity changes in mercury emissions associated with an energy conservation standard. As opposed to using the NEMS-BT model, DOE used a range of emission rates to estimate the mercury emissions that could be reduced from standards. DOE's low estimate was based on the assumption that future standards would displace electrical generation from natural gas-fired power plants resulting in an effective emission rate of zero. The low-end emission rate is zero because virtually all mercury emitted from electricity generation is from coal-fired power plants. Based on an emission rate of zero, no emissions would be reduced from standards. DOE's high estimate was based on the use of a nationwide mercury emission rate from the *AEO 2008*. Because power plant emission rates are a function of local regulation, scrubbers, and the mercury content of coal, it is extremely difficult to come up with a precise high-end emission rate. Therefore, DOE believes the most reasonable estimate is based on the assumption that all displaced coal generation would have been emitting at the average emission rate for coal generation as specified by the *AEO 2008*. As noted previously, because virtually all mercury emitted from electricity generation is from coal-fired power plants, DOE based the emission rate on the tons of mercury emitted per TWh of coal-generated electricity. Based on the emission rate for a recent year (2006), DOE derived a high-end emission rate of 0.0253 short tons per TWh. To estimate the reduction in mercury emissions, DOE multiplied the emission rate by the reduction in coal-generated electricity due to the standards considered. These changes in Hg emissions, as shown in Table V.53, are extremely small with a range of between 0.04 and 0.11 percent for conventional cooking products, 0.05 and 0.34 percent for microwave ovens, and 0.01 and 0.04 percent for CCWs of national base case emissions (as determined by the *AEO 2008*) depending on TSL.

The NEMS–BT model used for today's proposed rule could not be used to estimate Hg emission reductions due to standards as it assumed that Hg emissions would be subject to EPA's Clean Air Mercury Rule[98] (CAMR), which would have permanently capped emissions of mercury for new and existing coal-fired plants in all States by 2010. Similar to SO_2 and NO_X, DOE assumed that under such a system, energy conservation standards would result in no physical effect on these emissions, but might result in an environmental-related economic benefit in the form of a lower price for emissions allowance credits, if large enough. DOE estimated that the change in the Hg emissions from standards would not be large enough to influence allowance prices under CAMR.

On February 8, 2008, the D.C. Circuit issued its decision in *New Jersey* v. *Environmental Protection Agency,*[99] in which the Court, among other actions, vacated the CAMR referenced above. Accordingly, DOE is considering whether changes are needed to its plan for addressing the issue of mercury emissions in light of the D.C. Circuit's decision. DOE invites public comment on addressing mercury emissions in this rulemaking.

In today's proposed rule, DOE is taking into account a monetary benefit of CO_2 emission reductions associated with this rulemaking. To put the potential monetary benefits from reduced CO_2 emissions into a form that is likely to be most useful to decisionmakers and stakeholders, DOE used the same methods used to calculate the net present value of consumer cost savings: the estimated year-by-year reductions in CO_2 emissions were converted into monetary values and these resulting annual values were then discounted over the life of the affected appliances to the present using both 3 percent and 7 percent discount rates.

The estimates discussed below are based on an assumption of no benefit to an average benefit value reported by the IPCC.[100] It is important to note that the IPCC estimate used as the upper bound value was derived from an estimate of the mean value of worldwide impacts from potential climate impacts caused by CO_2 emissions, and not just the effects likely to occur within the United States. As DOE considers a monetary value for CO_2 emission reductions, the value should be restricted to a representation of those costs/benefits likely to be experienced in the United States. As DOE expects that such values would be lower than comparable global values, however, there currently are no consensus estimates for the U.S. benefits likely to result from CO_2 emission reductions. However, DOE believes it is appropriate to use U.S. benefit values, where available, and not world benefit values, in its analysis.[101] Because U.S. specific estimates are not available, and DOE did not receive any additional information that would help serve to narrow the proposed range as a representative range for domestic U.S. benefits, DOE believes it is appropriate to propose the global mean value as an appropriate upper bound U.S. value for purposes of sensitivity analysis.

As already discussed in section IV.J, DOE received comments on the ANOPR in the present rulemaking for estimating the value of CO_2 emissions reductions. Both the Joint Comment and EJ argued for assigning an economic value to CO_2 emissions. DOE's approach for assigning a range to the dollars per ton of CO_2 emissions recognizes and addresses the concerns of the Joint Comment and EJ.

[97] In anticipation of CAIR replacing the NO_X SIP Call Rule, many States adopted sunset provisions for their plans implementing the NO_X SIP Call Rule. The impact of the NO_X SIP Call Rule on NO_X emissions will depend, in part, on whether these implementation plans are reinstated.

[98] 70 FR 28606 (May 18, 2005).

[99] No. 05–1097, 2008 WL 341338, at *1 (D.C. Cir. Feb. 8, 2008).

[100] During the preparation of its most recent review of the state of climate science, the Intergovernmental Panel on Climate Change (IPCC) identified various estimates of the present value of reducing carbon-dioxide emissions by one ton over the life that these emissions would remain in the atmosphere. The estimates reviewed by the IPCC spanned a range of values. In the absence of a consensus on any single estimate of the monetary value of CO_2 emissions, DOE used the estimates identified by the study cited in Summary for Policymakers prepared by Working Group II of the IPCC's Fourth Assessment Report to estimate the potential monetary value of CO_2 reductions likely to result from standards finalized in this rulemaking. According to IPCC, the mean social cost of carbon (SCC) reported in studies published in peer-reviewed journals was $43 per ton of carbon. This translates into about $12 per ton of carbon dioxide. The literature review (Tol 2005) from which this mean was derived did not report the year in which these dollars were denominated. However, we understand this estimate was denominated in 1995 dollars. Updating that estimate to 2007 dollars yields a SCC of $15 per ton of carbon dioxide.

[101] In contrast, most of the estimates of costs and benefits of increasing the efficiency of residential cooking products and commercial clothes washers include only economic values of impacts that would be experienced in the U.S. For example, in determining impacts on manufacturers, DOE generally does not consider impacts that occur solely outside of the United States.

Given the uncertainty surrounding estimates of the societal cost of carbon (SCC), relying on any single study may be inadvisable since its estimate of the SCC will depend on many assumptions made by its authors. The Working Group II's contribution to the Fourth Assessment Report of the IPCC notes that:

> The large ranges of SCC are due in the large part to differences in assumptions regarding climate sensitivity, response lags, the treatment of risk and equity, economic and non-economic impacts, the inclusion of potentially catastrophic losses, and discount rates.[102]

Because of this uncertainty, DOE is relying on Tol (2005), which was presented in the IPCC's Fourth Assessment Report, and was a comprehensive meta-analysis of estimates for the value of SCC. As a result, DOE is relying on the Tol study reported by the IPCC as the basis for its analysis.

DOE continues to believe that the most appropriate monetary values for consideration in the development of efficiency standards are those drawn from studies that attempt to estimate the present value of the marginal economic benefits likely to result from reducing greenhouse gas emissions, rather than estimates that are based on the market value of emission allowances under existing cap and trade programs or estimates that are based on the cost of reducing emissions—both of which are largely determined by policy decisions that set the timing and extent of emission reductions and do not necessarily reflect the benefit of reductions. DOE also believes that the studies it relies upon generally should be studies that were the subject of a peer review process and were published in reputable journals.

In today's NOPR, DOE is essentially proposing to rely on a range of values based on the values presented in Tol (2005). Additionally, DOE has applied an annual growth rate of 2.4% to the value of SCC, as suggested by the IPCC Working Group II (2007, p. 822), based on estimated increases in damages from future emissions reported in published studies. Because the values in Tol (2005) were presented in 1995 dollars, DOE is assigning a range for the SCC of $0 to $20 ($2007) per ton of CO_2 emissions.

DOE is proposing to use the median estimated social cost of CO_2 as an upper bound of the range. This value is based on Tol (2005), which reviewed 103 estimates of the SCC from 28 published studies, and concluded that when only peer-reviewed studies published in recognized journals are considered, ''that climate change impacts may be very uncertain but [it] is unlikely that the marginal damage costs of carbon dioxide emissions exceed $50 per ton carbon [comparable to a 2007 value of $20 per ton carbon dioxide when expressed in 2007 U.S. dollars with a 2.4% growth rate].''

In proposing a lower bound of $0 for the estimated range, DOE agrees with the IPCC Working Group II (2007) report that ''significant warming across the globe and the locations of significant observed changes in many systems consistent with warming is very unlikely to be due solely to natural variability of temperatures or natural variability of the systems'' (pp. 9), and, thus, tentatively concludes that a global value of zero for reducing emissions cannot be justified. However, DOE also believes that it is reasonable to allow for the possibility that the U.S. portion of the global cost of carbon dioxide emissions may be quite low. In fact, some of the studies looked at in Tol (2005) reported negative values for the SCC. DOE is using U.S. benefit values, and not world benefit values, in its analysis, and, further, DOE believes that U.S. domestic values will be lower than the global values. Additionally, the statutory criteria in EPCA do not require consideration of global effects. Therefore, DOE is proposing to use a lower bound of $0 per ton of CO_2 emissions in estimating the potential benefits of today's proposed rule.

The resulting estimates of the potential range of net present value benefits associated with the reduction of CO_2 emissions are reflected in Table V.54.

TABLE V.54—ESTIMATES OF SAVINGS FROM CO_2 EMISSIONS REDUCTIONS UNDER TRIAL STANDARD LEVELS AT 7% DISCOUNT RATE AND 3% DISCOUNT RATE

Conventional cooking product TSL	Estimated cumulative CO_2 (Mt) emission reductions	Value of estimated CO_2 emission reductions (million 2007$) at 7% discount rate	Value of estimated CO_2 emission reductions (million 2007$) at 3% discount rate
1	14.62	$0 to $114	$0 to $256.
2	16.62	$0 to $129	$0 to $290.
3	25.08	$0 to $192	$0 to $438.
4	37.54	$0 to $286	$0 to $654.
Microwave oven energy factor TSL	**Estimated cumulative CO_2 (Mt) emission reductions**	**Value of estimated CO_2 emission reductions (million 2007$) at 7% discount rate**	**Value of Estimated CO_2 emission reductions (million 2007$) at 3% discount rate**
1a	11.49	$0 to $90	$0 to $201.
2a	16.95	$0 to $131	$0 to $296.
3a	27.54	$0 to $212	$0 to $481.
4a	38.51	$0 to $295	$0 to $672.
Microwave oven energy factor TSL	**Estimated cumulative CO_2 (Mt) emission reductions**	**Value of estimated CO_2 emission reductions (million 2007$) at 7% discount rate**	**Value of estimated CO_2 emission reductions (million 2007$) at 3% discount rate**
1b	23.51	$0 to $186	$0 to $406.
2b	35.19	$0 to $281	$0 to $617.
3b	50.48	$0 to $403	$0 to $885.

[102] *Climate Change 2007—Impacts, Adaptation and Vulnerability* Contribution of Working Group II to the Fourth Assessment Report of the IPCC, 17. *Available at http://www.ipcc-wg2.org* (last accessed Aug. 7, 2008).

Microwave oven energy factor TSL	Estimated cumulative CO_2 (Mt) emission reductions	Value of estimated CO_2 emission reductions (million 2007$) at 7% discount rate	Value of estimated CO_2 emission reductions (million 2007$) at 3% discount rate
4b	82.12	$0 to $654	$0 to $1,440.
Commercial clothes washer TSL	**Estimated cumulative CO_2 (Mt) emission reductions**	**Value of estimated CO_2 emission reductions (million 2007$) at 7% discount rate**	**Value of estimated CO_2 emission reductions (million 2007$) at 3% discount rate**
1	3.79	$0 to $29	$0 to $64.
2	8.30	$0 to $64	$0 to $141.
3	11.55	$0 to $89	$0 to $196.
4	12.28	$0 to $94	$0 to $209.
5	12.73	$0 to $98	$0 to $217.

DOE also investigated the potential monetary impact resulting from the impact of today's efficiency standards on SO_2, NO_X, and Hg emissions. As previously stated, DOE's initial analysis assumed the presence of nationwide emission caps on SO_2 and Hg, and caps on NO_X emissions in the 28 States covered by the CAIR caps. In the presence of emission caps, DOE concluded that no physical reductions in power sector emissions would likely occur; however, the lower generation requirements associated with standards could potentially put downward pressure on the prices of emissions allowances in cap-and-trade markets. Estimating this effect is very difficult because of factors such as credit banking, which can change the trajectory of prices. DOE has further concluded that the effect from standards on SO_2 allowance prices is likely to be negligible, based upon runs of the NEMS–BT model. See chapter 16 (Environmental Assessment) of the TSD accompanying this notice for further details regarding SO_2 allowance price impacts.

As discussed earlier, with respect to NO_X the CAIR rule has been vacated by the courts, so projected annual NO_X allowances from NEMS–BT are no longer relevant. In DOE's subsequent analysis, NO_X emissions are not controlled by a nationwide regulatory system. For the range of NO_X reduction estimates and Hg reduction estimates, DOE estimated the national monetized benefits of emissions reductions from today's proposed rule based on environmental damage estimates from the literature. Available estimates suggest a very wide range of monetary values for NO_X emissions, ranging from $370 per ton to $3,800 per ton of NO_X from stationary sources, measured in 2001$ [103] or a range of $421 per ton to $4,326 per ton in 2006$. As discussed above, with the D.C. Circuit vacating the CAIR, DOE is considering how it should address the issue of NO_X reduction and corresponding monetary valuation. DOE invites public comment on how the agency should address this issue, including how to value NO_X emissions for States in the absence of the CAIR.

DOE has already conducted research for today's proposed rule and determined that the basic science linking mercury emissions from power plants to impacts on humans is considered highly uncertain. However, DOE identified two estimates of the environmental damages of mercury based on two estimates of the adverse impact of childhood exposure to methyl mercury on IQ for American children, and subsequent loss of lifetime economic productivity resulting from these IQ losses. The high-end estimate is based on an estimate of the current aggregate cost of the loss of IQ in American children that results from exposure to mercury of U.S. power plant origin ($1.3 billion per year in 2000$), which translates to $31.7 million per ton emitted per year (2006$).[104] The low-end estimate was $664,000 per ton emitted in 2004$ or $709,000 per ton in 2006$, which DOE derived from a published evaluation of mercury control using different methods and assumptions from the first study, but also based on the present value of the lifetime earnings of children exposed.[105] DOE invites public comment on how the agency should address this issue, including how to value mercury emissions in the absence of the CAMR. The resulting estimates of the potential range of the present value benefits associated with the national reduction of NO_X and national reductions in Hg emissions are reflected in Table V.55 and Table V.56.

TABLE V.55—PRELIMINARY ESTIMATES OF MONETARY SAVINGS FROM REDUCTIONS OF Hg AND NO_X BY TRIAL STANDARD LEVEL AT A 7% DISCOUNT RATE

Conventional cooking product TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1	6.32 to 12.06	0.7 to 13.9	0 to 0.20	0 to 1.8.
2	6.39 to 13.71	0.7 to 15.7	0 to 0.26	0 to 2.2.
3	10.11 to 20.55	1.0 to 23.0	0 to 0.37	0 to 3.1.
4	14.99 to 30.65	1.5 to 33.7	0 to 0.56	0 to 4.6.

[103] Office of Management and Budget Office of Information and Regulatory Affairs, ''2006 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities,'' (2006).

[104] Trasande, L., *et al., Applying Cost Analyses to Drive Policy that Protects Children,* 1076 ANN. N.Y. ACAD. SCI. 911 (2006).

[105] Ted Gayer and Robert Hahn, *Designing Environmental Policy: Lessons from the Regulation of Mercury Emissions,* Regulatory Analysis 05–01 (AEI-Brookings Joint Center For Regulatory Studies) p. 31 (2004). A version of this paper was published in the *Journal of Regulatory Economics* in 2006. The estimate was derived by back-calculating the annual benefits per ton from the net present value of benefits reported in the study.

Microwave oven energy factor TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1a	0.58 to 14.25	0.1 to 17.6	0 to 0.25	0 to 2.0.
2a	0.85 to 20.85	0.1 to 25.3	0 to 0.37	0 to 2.9.
3a	1.37 to 33.74	0.2 to 40.4	0 to 0.60	0 to 4.6.
4a	1.91 to 47.04	0.2 to 55.9	0 to 0.84	0 to 6.4.
Microwave oven standby power TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1b	1.23 to 30.30	0.2 to 38.9	0 to 0.50	0 to 4.0.
2b	1.87 to 46.02	0.2 to 58.9	0 to 0.76	0 to 6.1.
3b	2.67 to 65.96	0.3 to 84.2	0 to 1.09	0 to 8.7.
4b	4.35 to 107.23	0.5 to 136.4	0 to 1.77	0 to 14.2.
Commercial clothes washer TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1	1.43 to 3.25	0.2 to 3.7	0 to 0.06	0 to 0.4.
2	3.04 to 7.13	0.3 to 8.0	0 to 0.13	0 to 0.9.
3	4.25 to 9.93	0.5 to 11.2	0 to 0.19	0 to 1.3.
4	4.51 to 10.56	0.5 to 11.9	0 to 0.20	0 to 1.4.
5	4.67 to 10.95	0.5 to 12.3	0 to 0.21	0 to 1.4.

TABLE V.56—PRELIMINARY ESTIMATES OF MONETARY SAVINGS FROM REDUCTIONS OF Hg AND NO_X BY TRIAL STANDARD LEVEL AT A 3% DISCOUNT RATE

Conventional cooking product TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1	6.32 to 12.06	1.4 to 28.2	0 to 0.20	0 to 3.5.
2	6.39 to 13.71	1.4 to 32.0	0 to 0.26	0 to 4.5.
3	10.11 to 20.55	2.2 to 47.4	0 to 0.37	0 to 6.4.
4	14.99 to 30.65	3.3 to 70.3	0 to 0.56	0 to 9.5.
Microwave oven energy factor TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1a	0.58 to 14.25	0.1 to 34.3	0 to 0.25	0 to 4.2.
2a	0.85 to 20.85	0.2 to 49.7	0 to 0.37	0 to 6.1.
3a	1.37 to 33.74	0.3 to 80.1	0 to 0.60	0 to 9.9.
4a	1.91 to 47.04	0.4 to 111.2	0 to 0.84	0 to 13.8.
Microwave oven standby power TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1b	1.23 to 30.30	0.3 to 74.1	0 to 0.50	0 to 8.4.
2b	1.87 to 46.02	0.4 to 112.4	0 to 0.76	0 to 12.8.
3b	2.67 to 65.96	0.6 to 160.9	0 to 1.09	0 to 18.3.
4b	4.35 to 107.23	1.0 to 261.2	0 to 1.77	0 to 29.8.
Commercial clothes washer TSL	Estimated cumulative NO_X (kt) emission reductions	Value of estimated NO_X emission reductions (million 2006$)	Estimated cumulative Hg (t) emission reductions	Value of estimated Hg emission reductions (million 2006$)
1	1.43 to 3.25	0.3 to 7.5	0 to 0.06	0 to 0.9.
2	3.04 to 7.13	0.7 to 16.6	0 to 0.13	0 to 2.0.
3	4.25 to 9.93	1.0 to 23.0	0 to 0.19	0 to 2.8.
4	4.51 to 10.56	1.0 to 24.5	0 to 0.20	0 to 3.0.
5	4.67 to 10.95	1.0 to 25.4	0 to 0.21	0 to 3.1.

Table V.57 presents the estimated wastewater discharge reductions due to the TSLs for CCWs. In chapter 16 of the TSD accompanying this notice, DOE reports annual changes in wastewater discharge attributable to each TSL.

TABLE V.57—SUMMARY OF WASTEWATER DISCHARGE REDUCTIONS (CUMULATIVE REDUCTIONS FOR PRODUCTS SOLD FROM 2012 TO 2042)

	TSL				
	1	2	3	4	5
Wastewater Discharge Reductions for Commercial Clothes Washers: Wastewater (trillion gallons)	0.00	0.16	0.19	0.20	0.23

C. Proposed Standards

1. Overview

Under 42 U.S.C. 6295(o)(2)(A) and 6316(a), EPCA requires that any new or amended energy conservation standard for any type (or class) of covered product shall be designed to achieve the maximum improvement in energy efficiency that the Secretary determines is technologically feasible and economically justified. In determining whether a standard is economically justified, the Secretary must determine whether the benefits of the standard exceed its burdens to the greatest extent practicable, in light of the following seven factors:

(1) The economic impact of the standard on manufacturers and consumers of the products or equipment subject to the standard;

(2) The savings in operating costs throughout the estimated average life of the covered products or equipment 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 or equipment 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 considers relevant.

(42 U.S.C. 6295(o)(2)(B)(i) and 6316(a))

The new or amended standard also must ''result in significant conservation of energy.'' (42 U.S.C. 6295(o)(3)(B) and 6316(a))

In selecting the proposed energy conservation standards for cooking products and CCWs for consideration in today's NOPR, DOE started by examining the maximum technologically feasible levels, and determined whether those levels were economically justified. If DOE determined that the maximum technologically feasible level was not justified, DOE then analyzed the next lower TSL to determine whether that level was economically justified. DOE repeated this procedure until it identified an economically justified TSL.

To aid the reader in understanding the benefits and/or burdens of each TSL, the following tables summarize the quantitative analytical results for each TSL, based on the assumptions and methodology discussed above. These tables present the results—or, in some cases, a range of results—for each TSL. The range of values reported in these tables for industry impacts represents the results for the different markup scenarios that DOE used to estimate manufacturer impacts.

In addition to the quantitative results, DOE also considers other burdens and benefits that affect economic justification. In the case of conventional cooking products, DOE considered the burden that would be imposed on the industry to comply with performance standards. Currently, conventional cooking products are not rated for efficiency because DOE has promulgated only prescriptive standards for gas cooking products. Therefore, any proposed performance standards would require the industry to test, rate, and label these cooking products, a significant burden that the industry currently does not bear. DOE has also considered harmonization of standby power standards for microwave ovens with international standby power programs such as Korea's e-standby program,[106] Australia's standby program,[107] and Japan's Top Runner Program.[108] These programs seek to establish standby power efficiency ratings through the International Energy Agency (IEA)'s One-Watt program, which seeks to lower standby power below 1 W for microwave ovens.[109] Both Korea and Australia will be publishing mandatory standby power standards of 1 W by 2010 and 2012, respectively. In accordance with Japan's Top Runner Program, Japanese appliance manufacturers made a voluntary declaration to reduce standby power of microwave ovens without a timer as close to zero as possible and that of microwave ovens with a timer to 1 W or lower.

In sum, the proposed standard levels for the products/equipment that are the subject of this rulemaking reflect DOE's careful balancing of the relevant statutory factors under EPCA. After considering public comments on this NOPR, DOE will publish a final rule that either adopt the proposed TSL, one of the higher or lower TSLs, or some value in between.

2. Conclusion

a. Conventional Cooking Products

Table V.58 presents a summary of the quantitative results for each conventional cooking product TSL. These results indicate the energy savings and economic impacts due to increasing the efficiency of conventional cooking products.

TABLE V.58—SUMMARY OF RESULTS FOR CONVENTIONAL COOKING PRODUCTS

Category	TSL 1	TSL 2	TSL 3	TSL 4
Primary Energy Saved (quads)	0.14	0.23	0.32	0.50

[106] Refer to: *http://www.kemco.or.kr/eng/*.

[107] Refer to: *http://www.energyrating.gov.au/standby.html*.

[108] Refer to: *http://www.eccj.or.jp/top_runner/index.html*.

[109] IEA Energy Information Centre, *Standby Power Use and the IEA ''1-Watt Plan''*. Available at: *http://www.iea.org/textbase/subjectqueries/standby.asp*.

TABLE V.58—SUMMARY OF RESULTS FOR CONVENTIONAL COOKING PRODUCTS—Continued

Category	TSL 1	TSL 2	TSL 3	TSL 4
7% Discount Rate	0.04	0.06	0.08	0.12
3% Discount Rate	0.08	0.12	0.17	0.26
Generation Capacity Reduction (GW)**	0.056	0.074	0.109	0.167
NPV (2006$ billion):				
7% Discount Rate	0.215	0.393	0.381	(12.548)
3% Discount Rate	0.609	1.186	1.374	(23.141)
Industry Impacts:				
Gas Cooktops				
Industry NPV (2006$ million)	(5)–(12)	(5)–(12)	(5)–(12)	28–(141)
Industry NPV (% Change)	(2)–(4)	(2)–(4)	(2)–(4)	10–(49)
Electric Cooktops				
Industry NPV (2006$ million)	0	(2)–(11)	(2)–(11)	77–(383)
Industry NPV (% Change)	0	(1)–(3)	(1)–(3)	22–(107)
Gas Ovens				
Industry NPV (2006$ million)	(7)–(10)	(7)–(10)	(6)–(41)	(47)–(181)
Industry NPV (% Change)	(2)	(2)	(1)–(9)	(10)–(39)
Electric Ovens				
Industry NPV (2006$ million)	0	(8)–(19)	(8)–(19)	(10)–(469)
Industry NPV (% Change)	0	(1)–(2)	(1)–(2)	(1)–(59)
Cumulative Emissions Impacts†:				
CO_2 (Mt)	14.62	16.62	25.08	37.54
NO_X (kt)	6.32–12.06	6.39–13.71	10.11–20.55	14.99–30.65
Hg (t)	0–0.20	0–0.26	0–0.37	0–0.56
Mean LCC Savings* (2006$):				
Gas Cooktop/Conventional Burners	13	13	13	(11)
Electric Cooktop/Low or High Wattage Open (Coil) Elements	.....	4	4	4
Electric Cooktop/Smooth Elements	.....	.....	.....	(283)
Gas Oven/Standard Oven with or without a Catalytic Line	6	6	6	(86)
Gas Oven/Self-Clean Oven	.....	.....	1	(6)
Electric Oven/Standard Oven with or without a Catalytic Line	.....	9	9	(52)
Electric Oven/Self-Clean Oven	.....	.....	.....	(143)
Median PBP (years):				
Gas Cooktop/Conventional Burners	4.5	4.5	4.5	77.1
Electric Cooktop/Low or High Wattage Open (Coil) Elements	.....	7.3	7.3	7.3
Electric Cooktop/Smooth Elements	.....	.....	.....	1512
Gas Oven/Standard Oven with or without a Catalytic Line	9.4	9.4	9.4	26.9
Gas Oven/Self-Clean Oven	.....	.....	11.4	16.4
Electric Oven/Standard Oven with or without a Catalytic Line	.....	8.0	8.0	60.6
Electric Oven/Self-Clean Oven	.....	.....	.....	240
LCC Results:				
Gas Cooktop/Conventional Burners				
Net Cost (%)	0.2	0.2	0.2	93.9
No Impact (%)	93.5	93.5	93.5	0.0
Net Benefit (%)	6.3	6.3	6.3	6.1
Electric Cooktop/Low or High Wattage Open (Coil) Elements				
Net Cost (%)	.....	29.4	29.4	29.4
No Impact (%)	.....	0.0	0.0	0.0
Net Benefit (%)	.....	70.6	70.6	70.6
Electric Cooktop/Smooth Elements				
Net Cost (%)	.....	.....	.....	100.0
No Impact (%)	.....	.....	.....	0.0
Net Benefit (%)	.....	.....	.....	0.0
Gas Oven/Standard Oven with or without a Catalytic Line				
Net Cost (%)	6.5	6.5	6.5	95.0
No Impact (%)	82.3	82.3	82.3	0.0
Net Benefit (%)	11.2	11.2	11.2	5.0
Gas Oven/Self-Clean Oven				
Net Cost (%)	.....	.....	58.9	68.8
No Impact (%)	.....	.....	0.0	0.0
Net Benefit (%)	.....	.....	41.1	31.2
Electric Oven/Standard Oven with or without a Catalytic Line				
Net Cost (%)	.....	43.9	43.9	95.2
No Impact (%)	.....	0.0	0.0	0.0
Net Benefit (%)	.....	56.1	56.1	4.8
Electric Oven/Self-Clean Oven				
Net Cost (%)	.....	.....	.....	78.9
No Impact (%)	.....	.....	.....	0.0
Net Benefit (%)	.....	.....	.....	21.1

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Changes in installed generation capacity by 2042 based on *AEO 2008* Reference Case.
† CO_2 emissions impacts include physical reductions at power plants and at households. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps.

First, DOE considered TSL 4, the max-tech level. TSL 4 would likely save 0.50 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.12 quads. For the Nation as a whole, DOE projects that TSL 4 would result in a net decrease of $12.5 billion in NPV, using a discount rate of seven percent. The emissions reductions at TSL 4 are 37.54 Mt of CO_2, 14.99 kt to 30.65 kt of NO_X, and 0 t to 0.56 t of Hg. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.167 gigawatts (GW) under TSL 4.

At TSL 4, DOE projects that the average conventional cooking product consumer will experience an increase in LCC, with the exception of consumers of electric coil cooktops. In the case of electric coil cooktops, the average consumer will save only $4 in LCC due to TSL 4. With the exception of electric coil cooktop consumers, DOE estimated LCC increases for at least 68 percent of consumers in the Nation that purchase conventional cooking products. The median payback period of each product class at TSL 4, with the exception of electric coil cooktops and gas self-cleaning ovens, is projected to be substantially longer than the mean lifetime of the equipment.

Although TSL 4 for electric coil cooktops yields LCC savings and provides relatively short paybacks for average consumers, DOE estimates that the technology needed to attain the efficiency level (improved contact conductance) may not provide energy savings under field conditions, for the reasons below. (See section IV.B for more details.) Measured efficiency gains from improved contact conductance have been obtained under test procedure conditions using the aluminum test block. To ensure consistent and repeatable testing, an aluminum test block is used to establish cooktop efficiency by measuring the increased heat content of the block during a test measurement. Because the test block is much flatter than actual cooking vessels, thereby allowing for a higher degree of thermal contact between the block and coil element, DOE believes that the efficiency gains with an actual cooking vessel likely will not be as large or may not even be achievable. Therefore, DOE has significant doubt that electric cooktop consumers may actually realize economic savings with products at TSL 4.

DOE estimated the projected change in INPV at TSL 4 for each of the following four general categories of conventional cooking products: gas cooktops, electric cooktops, gas ovens, and electric ovens. The projected change in INPV ranges from an increase of $28 million to a decrease of $141 million for gas cooktops, an increase of $77 million to a decrease of $383 million for electric cooktops, a decrease of $47 million to a decrease of $181 million for gas ovens, and a decrease of $10 million to a decrease of $469 million for electric ovens. At TSL 4, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 4 could result in a net loss of 49 percent in INPV to gas cooktop manufacturers, a net loss of 107 percent in INPV to electric cooktop manufacturers, a net loss of 39 percent to gas oven manufacturers, and a net loss of 59 percent to electric oven manufacturers.

After carefully considering the analysis and weighing the benefits and burdens of TSL 4, the Secretary has reached the following initial conclusion: At TSL 4, the benefits of energy savings and emissions reductions would be outweighed by the potential multi-million dollar negative net economic cost to the Nation, the economic burden on consumers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

Next, DOE considered TSL 3, which yielded primary energy savings estimated at 0.32 quads of energy through 2042, an amount which DOE considers to be significant. Discounted at seven percent, the energy savings through 2042 would be 0.08 quads. For the Nation as a whole, DOE projects that TSL 3 would result in a net increase of $381 million in NPV, using a discount rate of seven percent. The emissions reductions are projected to be 25.08 Mt of CO_2, 10.11 kt to 20.55 kt of NO_X, and 0 t to 0.37 t of Hg. Total generating capacity in 2042 under TSL 3 is estimated to decrease by 0.109 GW.

At TSL 3, DOE projects that the impacts of amended energy conservation standards on average consumers of conventional cooking products will decrease their LCC. For electric smooth cooktops and electric self-cleaning ovens, TSL 3 does not increase the efficiency beyond baseline levels because none of the candidate standard levels for these products provide economic savings to consumers. At TSL 3, average gas and electric coil cooktop consumers will save $13 and $4 in LCC, respectively. Average consumers of gas standard ovens, gas self-cleaning ovens, and electric standard ovens will realize LCC savings of $6, $1, and $9, respectively. The median payback period of each product class impacted by TSL 3 is projected to be at least 40 percent shorter than the mean lifetime of the products, 19 years. For example, at TSL 3 the projected payback period is 4.5 years for average consumers of gas cooktops, whereas the projected payback period is 11.4 years for average consumers of gas self-cleaning ovens.

Although TSL 3 provides LCC savings to the average consumer, DOE estimates a significant percentage of consumers of gas self-cleaning ovens and electric standard ovens will be burdened by the standard (*i.e.*, experience increases in their LCC). DOE estimates that 59 percent of consumers of gas self-cleaning ovens and 44 percent of consumers of electric standard ovens will be burdened by TSL 3. In the case of electric standard ovens, although a majority of consumers still benefit from the standard, almost 50 percent of consumers would be burdened. By comparison, a majority of non-impacted gas cooktop and non-impacted gas standard oven consumers would realize LCC savings due to TSL 3. Specifically, in the case of gas cooktops, 93.5 percent of consumers are not impacted by TSL 3 (*i.e.*, 93.5 percent of consumers already purchase cooktops at TSL 3). Of the remaining 6.5 percent of gas cooktop consumers who are impacted by TSL 3, over 96 percent realize LCC savings. For gas standard ovens, 82.3 percent consumers are not impacted by TSL 3. Of the remaining 17.7 percent of gas standard oven consumers who are impacted by TSL 3, over 63 percent realize LCC savings. In the case of electric coil cooktops, although DOE estimates that over 70 percent of consumers would decrease their LCC, the efficiency gain achieved at TSL 3 would be achieved through the same technological change as TSL 4 (improved contact conductance). As noted for TSL 4, DOE has significant doubt that electric cooktop consumers will actually realize economic savings at TSL 3.

At TSL 3, the projected change in INPV for each of the four general categories of conventional cooking products range from a decrease of $5 million to a decrease of $12 million for gas cooktops, a decrease of $2 million to a decrease of $11 million for electric cooktops, a decrease of $6 million to a decrease of $41 million for gas ovens, and a decrease of $8 million to a decrease of $19 million for electric ovens. At TSL 3, DOE recognizes the risk of negative impacts if manufacturers' expectations about

reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 3 could result in maximum net losses of up to 4 percent in INPV for gas cooktop manufacturers, three percent for electric cooktop manufacturers, nine percent for gas oven manufacturers, and two percent for electric oven manufacturers.

Although DOE recognizes the increased economic benefits to the Nation that could result from TSL 3, DOE has tentatively concluded that the benefits of a Federal standard at TSL 3 would still be outweighed by the economic burden on conventional cooking product consumers. For example, DOE believes the economic savings realized by average consumers are outweighed by the significant percentage of gas self-cleaning oven and electric standard oven consumers who are burdened by the standard. Considering that TSL 3 also adversely impacts manufacturers' INPV, DOE believes the benefits of energy savings and emissions impacts are not significant enough to outweigh the burdens of the standard.

DOE considered TSL 2 next. DOE projects that TSL 2 would save 0.23 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.06 quads. For the Nation as a whole, DOE projects TSL 2 to result in net savings in NPV of $393 million. The estimated emissions reductions are 16.62 Mt of CO_2, 6.39 kt to 13.71 kt of NO_X, and 0 t to 0.26 t of Hg. Total generating capacity in 2042 under TSL 2 would likely decrease by 0.074 GW.

The candidate standard levels for each of the product classes that comprise TSL 2 are the same as TSL 3 except for gas self-cleaning ovens. DOE did not increase the efficiency for gas self-cleaning ovens beyond the baseline level for TSL 2 because, as described for TSL 3, efficiency levels greater than the baseline level do not yield LCC savings to a majority of gas self-cleaning consumers. For all other product classes, the impacts to consumers at TSL 3 are identical to TSL 2.

At TSL 2, the projected change in INPV for each of the four general categories of conventional cooking products range from a decrease of $5 million to a decrease of $12 million for gas cooktops, a decrease of $2 million to a decrease of $11 million for electric cooktops, a decrease of $7 million to a decrease of $10 million for gas ovens, and a decrease of $8 million to a decrease of $19 million for electric ovens. At TSL 2, DOE recognizes the risk of negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 2 could result in a net loss of 4 percent in INPV to gas cooktop manufacturers, a net loss of three percent in INPV to electric cooktop manufacturers, a net loss of two percent to gas oven manufacturers, and a net loss of two percent to electric oven manufacturers.

Although DOE recognizes the increased economic benefits to the Nation that could result from TSL 2, DOE concludes that the benefits of a Federal standard at TSL 2 would still be outweighed by the economic burden that would be placed upon conventional cooking product consumers. Under TSL 2, DOE would no longer impose a standard for gas self-cleaning ovens, thereby reducing the economic burden to the Nation. The decreased economic burden under TSL 2 is evident from the change in NPV as net savings to the Nation increases to $393 million from the $381 million realized under TSL 3. Even so, DOE believes the economic savings realized by average consumers are outweighed by the significant percentage of electric standard oven consumers who are still burdened by the standard. A TSL 2 standard would also adversely impact manufacturer INPV. Consequently, DOE believes the benefits of energy savings and emissions impacts of TSL 2 are not significant enough to outweigh the burdens that would be created by the standard.

DOE considered TSL 1 next. DOE projects that TSL 1 would save 0.14 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.04 quads. For the Nation as a whole, DOE projects TSL 1 to result in net savings in NPV of $215 million. The estimated emissions reductions are 14.62 Mt of CO_2, 6.32 kt to 12.06 kt of NO_X, and 0 t to 0.20 t of Hg. Total generating capacity in 2042 under TSL 1 would likely decrease by 0.056 GW.

At TSL 1, only amended energy conservation standards consisting of prescriptive requirements to eliminate standing pilots for gas cooktops and gas standard ovens would be promulgated by DOE. DOE projects the impacts of amended energy conservation standards on average consumers of gas cooktops and gas standard ovens will decrease their LCC. At TSL 1, average gas cooktop and gas standard oven consumers will save $13 and $6 in LCC, respectively. DOE estimates that 93.5 percent of gas cooktops consumers and 82.3 percent of gas standard oven consumers already purchase products at TSL 1. Of the non-impacted consumers (*i.e.*, consumers already purchasing products at TSL 1), DOE estimates that over 96 percent of gas cooktop consumers and over 63 percent of gas standard oven consumers realize LCC savings due to the elimination of standing pilots. The median payback period is projected to be 4.5 years for the average gas cooktop consumer and 9.4 years for the average gas standard oven consumer.

DOE recognizes that there are subgroups in the Nation that use gas cooking products but are without household electricity. Under TSL 1, these subgroups (approximately 0.01 percent of the total U.S. household population) are likely to be impacted because they would be required to use an electrical source for cooking products to operate the ignition system. However, DOE market research shows that battery-powered electronic ignition systems have been implemented in other products, such as instantaneous gas water heaters, barbeques, furnaces, and other appliances, and the use of such products is not expressly prohibited by applicable safety standards. Therefore, DOE believes that households that use gas for cooking and are without electricity will likely have technological options that would enable them to continue to use gas cooking if standing pilot ignition systems are eliminated.

At TSL 1, the projected change in INPV ranges from a decrease of $5 million to a decrease of $12 million for gas cooktops and a decrease of $7 million to a decrease of $10 million for gas ovens. At TSL 1, DOE recognizes the risk of negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 1 could result in a net loss of 4 percent in INPV to gas cooktop manufacturers and a net loss of two percent to gas oven manufacturers. Although DOE estimates that TSL 1 will lead to some net loss in INPV to gas cooktop and gas oven manufacturers, because TSL 1 is comprised of prescriptive requirements, the industry would not be burdened with the additional costs associated with complying with performance requirements. Currently, only prescriptive standards for conventional cooking products are in effect requiring that gas cooking products with an electrical supply cord not be equipped with a constant burning pilot. As a result, conventional cooking product manufacturers are not burdened with

the costs of testing the rated performance of their products to label and comply with performance-based energy conservation standards. Because TSL 1 effectively extends the existing prescriptive requirement to all gas cooking products, regardless of whether the products have an electrical supply cord, DOE avoids burdening manufacturers with testing, labeling, and compliance costs that they currently do not bear.

After considering the analysis and weighing the benefits and the burdens, DOE has tentatively concluded that the benefits of a TSL 1 standard outweigh the burdens. In particular, the Secretary has tentatively concluded that TSL 1 saves a significant amount of energy and is technologically feasible and economically justified. Therefore, DOE today proposes to adopt the energy conservation standards for conventional cooking products at TSL 1. Table V.59 demonstrates the proposed energy conservation standards for all product classes of conventional cooking products.

TABLE V.59—PROPOSED ENERGY CONSERVATION STANDARDS FOR CONVENTIONAL COOKING PRODUCTS

Product class	Proposed energy conservation standards
Gas Cooktop/Conventional Burners	No Constant Burning Pilot Lights.
Electric Cooktop/Low or High Wattage Open (Coil) Elements	No Standard.
Electric Cooktop/Smooth Elements	No Standard.
Gas Oven/Standard Oven with or without a Catalytic Line	No Constant Burning Pilot Lights.
Gas Oven/Self-Clean Oven	No Change to Existing Standard.
Electric Oven/Standard Oven with or without a Catalytic Line	No Standard.
Electric Oven/Self-Clean Oven	No Standard.

b. Microwave Ovens

Table V.60 presents a summary of the quantitative results for the four microwave oven TSLs pertaining to the EF.

TABLE V.60—SUMMARY OF RESULTS FOR MICROWAVE OVEN ENERGY FACTOR

Category	TSL 1a	TSL 2a	TSL 3a	TSL 4a
Primary Energy Saved (quads)	0.08	0.09	0.11	0.12
7% Discount Rate	0.02	0.02	0.03	0.03
3% Discount Rate	0.05	0.05	0.06	0.07
Generation Capacity Reduction (GW)**	0.063	0.097	0.160	0.227
NPV (2006$ billion):				
7% Discount Rate	(0.61)	(1.60)	(3.06)	(4.94)
3% Discount Rate	(1.07)	(2.96)	(5.72)	(9.28)
Industry Impacts:				
Industry NPV (2006$ million)	44–(199)	117–(386)	237–(675)	267–(1165)
Industry NPV (% Change)	3–(14)	8–(27)	16–(47)	18–(80)
Cumulative Emissions Impacts †:				
CO_2 (Mt)	11.49	16.95	27.54	38.51
NO_X (kt)	0.58–14.25	0.85–20.85	1.37–33.74	1.91–47.04
Hg (t)	0–0.25	0–0.37	0–0.60	0–0.84
Mean LCC Savings* (2006$)	(3)	(10)	(19)	(31)
Median PBP (years)	29.4	57.1	81.4	114.6
LCC Results:				
Net Cost (%)	42.0	45.2	45.9	46.2
No Impact (%)	53.7	53.7	53.7	53.7
Net Benefit (%)	4.3	1.1	0.4	0.1

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Changes in installed generation capacity by 2042 based on *AEO 2008* Reference Case.
† CO_2 emissions impacts include physical reductions at power plants. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps.

First, DOE considered TSL 4a, the max-tech level for microwave oven cooking efficiency. TSL 4a would likely save 0.12 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.03 quads. For the Nation as a whole, DOE projects that TSL 4a would result in a net decrease of $4.94 billion in NPV, using a discount rate of seven percent. The emissions reductions at TSL 4a are 38.51 Mt of CO_2, 1.91 kt to 47.04 kt of NO_X, and 0 t to 0.84 t of Hg. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.227 gigawatts (GW) under TSL 4a.

At TSL 4a, DOE projects that the average microwave oven consumer will experience an increase in LCC. Although DOE estimates that all microwave oven consumers purchase products with an EF at the baseline level, 54 percent of consumers are estimated to purchase microwave ovens with standby power consumption lower than the baseline standby consumption. As a result, the associated annual energy use for the 54 percent of consumers with low microwave oven standby power is lower than the annual energy consumption of products meeting TSL 4a. Therefore, the 54 percent of consumers purchasing low standby power consuming microwave ovens are not impacted by TSL 4a. For the

microwave oven consumers in the Nation impacted by TSL 4a, DOE estimates that nearly all will be burdened with LCC increases. The median payback period of the average consumer is projected to be substantially longer than the mean lifetime of the equipment.

DOE estimated the projected change in INPV ranges at TSL 4a from an increase of $267 million to a decrease of $1,165 million. At TSL 4a, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 4a could result in a net loss of 80 percent in INPV to microwave oven manufacturers.

After carefully considering the analysis and weighing the benefits and burdens of TSL 4a, the Secretary has reached the following initial conclusion: At TSL 4a, the benefits of energy savings and emissions reductions would be outweighed by the potential multi-billion dollar negative net economic cost to the Nation, the economic burden on consumers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

DOE considered TSL 3a next. Primary energy savings are estimated at 0.11 quads of energy through 2042, which DOE considers significant. Discounted at seven percent, the energy savings through 2042 would be 0.03 quads. For the Nation as a whole, DOE projects that TSL 3a would result in a net decrease of $3.06 billion in NPV, using a discount rate of seven percent. The emissions reductions are projected to be 27.54 Mt of CO_2, 1.37 kt to 33.74 kt of NO_X, and 0 t to 0.60 t of Hg. Total generating capacity in 2042 under TSL 3a is estimated to decrease by 0.160 GW.

At TSL 3a, DOE projects that the average microwave oven consumer will experience an increase in LCC. Although DOE estimates that all microwave oven consumers purchase products with an EF at the baseline level, 54 percent of consumers are estimated to purchase microwave ovens with standby power consumption lower than the baseline standby consumption. As a result, the associated annual energy use for the 54 percent of consumers with low microwave oven standby power is lower than the annual energy consumption of products meeting TSL 3a. Therefore, the 54 percent of consumers purchasing low standby power consuming microwave ovens are not impacted by TSL 3a. For the microwave oven consumers in the Nation impacted by TSL 3a, DOE estimates that nearly all will be burdened with LCC increases. The median payback period of the average consumer is projected to be substantially longer than the mean lifetime of the equipment.

DOE estimated the projected change in INPV ranges from an increase of $237 million to a decrease of $675 million. At TSL 3a, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 3a could result in a net loss of 47 percent in INPV to microwave oven manufacturers.

After carefully considering the analysis and weighing the benefits and burdens of TSL 3a, the Secretary has reached the following initial conclusion: At TSL 3a, the benefits of energy savings and emissions reductions would be outweighed by the potential multi-billion dollar negative net economic cost to the Nation, the economic burden on consumers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

DOE considered TSL 2a next. DOE projects that TSL 2a would save 0.09 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.02 quads. For the Nation as a whole, DOE projects TSL 2 to result in net cost in NPV of $1.60 billion. The estimated emissions reductions are 16.95 Mt of CO_2, 0.85 kt to 20.85 kt of NO_X, and 0 t to 0.37 t of Hg. Total generating capacity in 2042 under TSL 2 would likely decrease by 0.097 GW.

At TSL 2a, DOE projects that the average microwave oven consumer will experience an increase in LCC. Although DOE estimates that all microwave oven consumers purchase products with an EF at the baseline level, 54 percent of consumers are estimated to purchase microwave ovens with standby power consumption lower than the baseline standby consumption. As a result, the associated annual energy use for the 54 percent of consumers with low microwave oven standby power is lower than the annual energy consumption of products meeting TSL 2a. Therefore, the 54 percent of consumers purchasing low standby power consuming microwave ovens are not impacted by TSL 2a. For the microwave oven consumers in the Nation impacted by TSL 2a, DOE estimates that almost 98 percent will be burdened with LCC increases. The median payback period of the average consumer is projected to be substantially longer than the mean lifetime of the equipment.

At TSL 2a, the projected change in INPV range from an increase of $117 million to a decrease of $386 million. At TSL 2a, DOE recognizes the risk of negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 2a could result in a net loss of 27 percent in INPV to microwave oven manufacturers.

After carefully considering the analysis and weighing the benefits and burdens of TSL 2a, the Secretary has reached the following initial conclusion: At TSL 2a, the benefits of energy savings and emissions reductions would be outweighed by the potential negative net economic cost (over a billion dollars) to the Nation, the economic burden on consumers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

DOE considered TSL 1a next. DOE projects that TSL 1a would save 0.08 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.02 quads. For the Nation as a whole, DOE projects TSL 1a to result in net cost in NPV of $610 million. The estimated emissions reductions are 11.49 Mt of CO_2, 0.58 kt to 14.25 kt of NO_X, and 0 t to 0.25 t of Hg. Total generating capacity in 2042 under TSL 1a would likely decrease by 0.063 GW.

At TSL 1a, DOE projects that the average microwave oven consumer will experience an increase in LCC. Although DOE estimates that all microwave oven consumers purchase products with an EF at the baseline level, 54 percent of consumers are estimated to purchase microwave ovens with standby power consumption lower than the baseline standby consumption. As a result, the associated annual energy use for the 54 percent of consumers with low microwave oven standby power is lower than the annual energy consumption of products meeting TSL 1a. Therefore, the 54 percent of consumers purchasing low standby power consuming microwave ovens are not impacted by TSL 2a. For the microwave oven consumers in the Nation impacted by TSL 1a, DOE estimates that almost 91 percent will be burdened with LCC increases. The median payback period of the average consumer is projected to be substantially longer than the mean lifetime of the equipment.

At TSL 1a, the projected change in INPV range from a decrease of $44 million to a decrease of $199 million. At TSL 1a, DOE recognizes the risk of

negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 1a could result in a net loss of 14 percent in INPV to microwave oven manufacturers.

After carefully considering the analysis and weighing the benefits and burdens of TSL 1a, the Secretary has reached the following initial conclusion: At TSL 1a, the benefits of energy savings and emissions reductions would be outweighed by the potential multi-million dollar negative net economic cost to the Nation, the economic burden on consumers, and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

Based upon the available information, DOE has tentatively concluded that none of the TSLs for microwave oven cooking efficiency are economically justified. Therefore, DOE proposes no standards for microwave cooking efficiency or EF.

Table V.61 presents a summary of the quantitative results for the four microwave oven TSLs pertaining to standby power.

TABLE V.61—SUMMARY OF RESULTS FOR MICROWAVE OVEN STANDBY POWER

Category	TSL 1b	TSL 2b	TSL 3b	TSL 4b
Primary Energy Saved (quads)	0.23	0.33	0.45	0.69
7% Discount Rate	0.06	0.09	0.12	0.19
3% Discount Rate	0.13	0.18	0.25	0.38
Generation Capacity Reduction (GW)**	0.145	0.222	0.320	0.525
NPV (2006$ billion):				
7% Discount Rate	0.91	1.25	1.56	1.61
3% Discount Rate	2.03	2.79	3.52	3.90
Industry Impacts:				
Industry NPV (2006$ million)	(22)–(26)	(35)–(48)	(37)–(71)	(35)–(172)
Industry NPV (% Change)	(1.50)–(1.77)	(2.44)–(3.28)	(2.52)–(4.92)	(2.40)–(11.87)
Cumulative Emissions Impacts †				
CO_2 (Mt)	23.15	35.19	50.48	82.12
NO_X (kt)	1.23–30.30	1.87–46.02	2.67–65.96	4.35–107.23
Hg (t)	0–0.50	0–0.76	0–1.09	0–1.77
Mean LCC Savings* (2006$):	6	13	18	19
Median PBP (years):	0.3	0.6	1.5	3.1
LCC Results:				
Net Cost (%)	0.0	0.0	0.0	0.0
No Impact (%)	53.7	19.1	0.0	0.0
Net Benefit (%)	43.3	80.9	100.0	100.0

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Changes in installed generation capacity by 2042 based on *AEO 2008* Reference Case.
† CO_2 emissions impacts include physical reductions at power plants. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps.

First, DOE considered TSL 4b, the max-tech level which affects only the standby power consumption of microwave ovens. TSL 4b would likely save 0.69 quads of energy through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy savings through 2042 would be 0.19 quads. For the Nation as a whole, DOE projects that TSL 4b would result in a net increase of $1.61 billion in NPV, using a discount rate of seven percent. The emissions reductions at TSL 4b are 82.12 Mt of CO_2, 4.35 kt to 107.23 kt of NO_X, and 0 t to 1.77 t of Hg. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.525 gigawatts (GW) under TSL 4b.

At TSL 4b, DOE projects that the average microwave oven consumer will experience a decrease in LCC of $19. DOE also estimates all consumers in the Nation that purchase microwave ovens will realize some level of LCC savings. The median payback period of the average consumer at TSL 4b is projected to be 3.1 years, substantially shorter than the lifetime of the product.

Although DOE estimates that all microwave ovens consumers would benefit economically from TSL 4b, the reduction in standby power consumption at that level would result in the loss of certain functions which provide utility to consumers, specifically the continual display of the time of day. Because it is uncertain as to how greatly this function is valued by consumers, DOE is concerned that TSL 4b may result in significant loss of consumer utility.

DOE estimated the projected change in INPV ranges from a decrease of $35 million to a decrease of $172 million. At TSL 4b, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 4b could result in a net loss of 11.87 percent in INPV to microwave oven manufacturers.

After carefully considering the analysis and weighing the benefits and burdens of TSL 4b, the Secretary has reached the following initial conclusion: At TSL 4b, the benefits of energy savings, economic benefit, and emissions reductions would be outweighed by the potential economic burden on consumers from loss of product utility and the large capital conversion costs that could result in a reduction in INPV for manufacturers.

DOE considered TSL 3b next. Primary energy savings are estimated at 0.45 quads of energy through 2042, which DOE considers significant. Discounted at seven percent, the energy savings through 2042 would be 0.12 quads. For the Nation as a whole, DOE projects that TSL 3b would result in a net increase of $1.56 billion in NPV, using a discount rate of seven percent. The emissions reductions are projected to be 50.48 Mt of CO_2, 2.67 kt to 65.96 kt of NO_X, and 0 t to 1.09 t of Hg. Total generating capacity in 2042 under TSL 3b is estimated to decrease by 0.320 GW.

At TSL 3b, DOE projects that the average microwave oven consumer will experience a decrease in LCC of $18. DOE also estimates all consumers in the Nation that purchase microwave ovens would realize some level of LCC savings. The median payback period of

the average consumer at TSL 3b is projected to be 1.5 years, substantially shorter than the lifetime of the product.

TSL 3b not only economically benefits all consumers, but DOE estimates that the reduction in standby power consumption (down to a level of no great than 1.0 watt) would not impact consumer utility. For example, the continual display of time which would be lost under TSL 4b is retained at TSL 3b.

DOE estimated the projected change in INPV ranges from a decrease of $37 million to a decrease of $71 million. At TSL 3b, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 3b could result in a net loss of 4.92 percent in INPV to microwave oven manufacturers.

After considering the analysis and weighing the benefits and the burdens, DOE has tentatively concluded that the benefits of a TSL 3b standard outweigh the burdens. In particular, the Secretary has tentatively concluded that TSL 3b saves a significant amount of energy and is technologically feasible and economically justified. Therefore, DOE today proposes to adopt the energy conservation standards for microwave ovens at TSL 3b. Table V.62 demonstrates the proposed energy conservation standards for microwave ovens.

TABLE V.62—PROPOSED ENERGY CONSERVATION STANDARDS FOR MICROWAVE OVEN STANDBY POWER CONSUMPTION

Product class	Proposed energy conservation standards
Microwave Oven with or without Thermal Elements.	Maximum Standby Power = 1.0 Watt.

c. Commercial Clothes Washers

Table V.63 presents a summary of the quantitative results for each CCW TSL.

TABLE V.63—SUMMARY OF RESULTS FOR COMMERCIAL CLOTHES WASHERS

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5
Primary Energy Saved (quads)	0.05	0.11	0.15	0.16	0.17
7% Discount Rate	0.01	0.03	0.04	0.04	0.04
3% Discount Rate	0.03	0.06	0.08	0.09	0.09
Primary Water Saved (trillion gallons)	0.00	0.16	0.19	0.21	0.24
7% Discount Rate	0.00	0.04	0.05	0.05	0.06
3% Discount Rate	0.00	0.09	0.10	0.11	0.13
Generation Capacity Reduction (GW)**	0.009	0.020	0.028	0.030	0.031
NPV (2006$ billion):					
7% Discount Rate	(0.001)	0.32	0.46	0.50	0.55
3% Discount Rate	0.04	0.83	1.16	1.27	1.39
Industry Impacts:					
Industry NPV (2006$ million)	4–3	(4)–(6)	(15)–(17)	(18)–(20)	(30)–(32)
Industry NPV (% Change)	6.5–4.9	(6.4)–(10.3)	(26.5)–(31.1)	(32.0)–(36.8)	(53.1)–(58.2)
Cumulative Emissions Impacts †					
CO_2 (Mt)	3.79	8.30	11.55	12.28	12.73
NO_X (kt)	1.43–3.25	3.04–7.13	4.25–9.93	4.51–10.56	4.67–10.95
Hg (t)	0–0.05	0–0.12	0–0.17	0–0.18	0–0.19
Wastewater Discharge Impacts (trillion gallons)	0.00	0.16	0.19	0.20	0.23
Mean LCC Savings* (2006$):					
Top-Loading, Multi-Family	(11.6)	154	244	244	244
Top-Loading, Laundromat	(19.6)	166	252	252	252
Front-Loading, Multi-Family	8.7	52	52	134	234
Front-Loading, Laundromat	9.5	58	58	140	250
Median PBP (years):					
Top-Loading, Multi-Family	10.7	4.5	3.8	3.8	3.8
Top-Loading, Laundromat	7.4	2.8	2.4	2.4	2.4
Front-Loading, Multi-Family	0.0	0.4	0.4	2.8	2.8
Front-Loading, Laundromat	0.0	0.3	0.3	1.7	1.6
LCC Results:					
Top-Loading					
Multi-Family					
Net Cost (%)	45.0	15.4	10.0	10.0	10.0
No Impact (%)	35.7	2.8	2.8	2.8	2.8
Net Benefit (%)	19.3	81.7	87.2	87.2	87.2
Laundromat					
Net Cost (%)	53.4	3.6	1.1	1.1	1.1
No Impact (%)	35.7	2.8	2.8	2.8	2.8
Net Benefit (%)	10.9	93.6	96.1	96.1	96.1
Front-Loading					
Multi-Family					
Net Cost (%)	0.0	0.0	0.0	2.3	1.5
No Impact (%)	92.7	88.3	88.3	2.8	1.5
Net Benefit (%)	7.3	11.7	11.7	94.9	97.0
Laundromat					
Net Cost (%)	0.0	0.0	0.0	0.0	0.0
No Impact (%)	92.7	88.3	88.3	2.8	1.5
Net Benefit (%)	7.3	11.7	11.7	97.2	98.5

* Parentheses indicate negative (−) values. For LCCs, a negative value means an increase in LCC by the amount indicated.
** Changes in installed generation capacity by 2042 based on *AEO 2008* Reference Case.

† CO_2 emissions impacts include physical reductions at power plants and at commercial buildings. NO_X emissions impacts include physical reductions at power plants as well as production of emissions allowance credits where NO_X emissions are subject to emissions caps.

First, DOE considered TSL 5, the max-tech level. TSL 5 would likely save 0.17 quads of energy and 0.24 trillion gallons of water through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy and water savings through 2042 would be 0.04 quads and 0.06 trillion gallons, respectively. For the Nation as a whole, DOE projects that TSL 5 would result in a net increase of $0.55 billion in NPV, using a discount rate of seven percent. The emissions reductions at TSL 5 are 12.73 Mt of CO_2, 4.67 kt to 10.95 kt of NO_X, and 0 t to 0.19 t of Hg. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.031 gigawatts (GW) under TSL 5.

At TSL, 5, DOE projects that the average top-loading CCW consumer would experience a decrease in LCC of $244 in multi-family applications and $252 in laundromats. DOE also estimates an LCC decrease for an overwhelming majority of consumers in the Nation that purchase top-loading CCWs—87 percent of consumers in multi-family applications and 96 percent of consumers in laundromats. The median payback period of the average consumer at TSL 5 in multi-family applications and in laundromats is projected to be 3.8 years and 2.4 years, respectively.

At TSL 5, DOE projects that the average front-loading CCW consumer would experience a decrease in LCC of $234 in multi-family applications and $250 in laundromats. DOE also estimates an LCC decrease for an overwhelming majority of consumers in the Nation that purchase front-loading CCWs—97 percent of consumers in multi-family applications and 99 percent of consumers in laundromats. The median payback period of the average consumer at TSL 5 in multi-family applications and in laundromats is projected to be 2.8 years and 1.6 years, respectively.

At TSL 5, DOE estimated the projected change in INPV ranges from a total decrease of $29.5 million for both product classes to a total decrease of $32.3 million. At TSL 5, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 5 could result in a net loss of 58 percent in INPV to CCW manufacturers. Also, DOE is especially sensitive to the potentially severe impacts to the LVM of CCWs. Since the LVM's clothes washer revenue is so dependent on CCW sales, DOE is concerned that TSL 5 will disproportionately impact it.

Although DOE recognizes the increased economic benefits to the Nation that could result from TSL 5, DOE has tentatively concluded that the benefits of a Federal standard at TSL 5 would be outweighed by the potential for disincentivizing consumers from purchasing more efficient front-loading washers. At TSL 5, front-loading washers are highly efficient but have a purchase price estimated to be $455 more expensive than top-loading washers. With such a large price differential between the two types of CCWs, and with less than two percent of the front-loading market at TSL 5, DOE is concerned that significant numbers of potential consumers of front-loading washers would choose to purchase a less efficient top-loading washer.

If potential front-loading washer consumers did decide to switch to less expensive top-loading washers, the NES and NPV realized from TSL 5 would be diminished. DOE notes that in developing the energy savings and water savings estimates in Table V.63, the agency held constant the ratio of front-loading to top-loading CCW shipments across the various TSLs. Particularly at TSL 3 to TSL 5, the differences in these estimates are small, especially at a seven percent discount rate. DOE requests comment as to whether it should account for the price elasticity of demand when calculating the anticipated energy and water savings at the different TSLs. DOE also seeks relevant data or other information on this topic. The Department believes that the values currently in Table V.63 represent the high end of the potential energy and water savings for these TSLs. Taking into account price elasticity of demand could affect the anticipated energy and water savings of the various TSLs, and it could potentially result in a change in the TSL with the highest projected energy/water savings level.

In addition, TSL 5 would adversely impact manufacturers' INPV to a significant extent. Not only does the industry face a potential loss in industry INPV, but manufacturers would also need to make significant capital investments for both types of CCWs in order to produce both top-loading and front-loading washers at the maximum technologically feasible levels. After carefully considering the analysis and weighing the benefits and burdens of TSL 5, the Secretary has reached the following initial conclusion: At TSL 5, the benefits of energy savings, economic benefit, and emissions reductions would be outweighed by the potential for disincentivizing consumers to purchase high-efficiency front-loading CCWs and the large capital conversion costs that could result in a substantial reduction in INPV for manufacturers.

Next, DOE considered TSL 4. TSL 4 would likely save 0.16 quads of energy and 0.21 trillion gallons of water through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy and water savings through 2042 would be 0.04 quads and 0.05 trillion gallons, respectively. For the Nation as a whole, DOE projects that TSL 4 would result in a net increase of $0.50 billion in NPV, using a discount rate of seven percent. The emissions reductions at TSL 4 are 12.28 Mt of CO_2, 4.51 kt to 10.56 kt of NO_X, and 0 t to 0.18 t of Hg. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.030 gigawatts (GW) under TSL 4.

At TSL 4, top-loading CCWs have the same efficiency as TSL 5. Therefore, top-loading CCW consumers will experience the same LCC impacts and payback periods as TSL 5. At TSL 4 for front-loading CCWs, DOE projects that the average front-loading CCW consumer would experience a decrease in LCC of $134 in multi-family applications and $140 in laundromats. DOE also estimates an LCC decrease for an overwhelming majority of consumers in the Nation that purchase front-loading CCWs—95 percent of consumers in multi-family applications and 97 percent of consumers in laundromats. The median payback period of the average consumer at TSL 5 in multi-family applications and in laundromats is projected to be 2.8 years and 1.7 years, respectively.

DOE estimated the projected change in INPV ranges from a decrease of $18 million to a decrease of $20 million. At TSL 4, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 4 could result in a net loss of 37 percent in INPV to CCW manufacturers. Also, DOE is especially sensitive to the potentially severe impacts to the LVM of CCWs. Since the LVM's clothes washer revenue is so dependent on CCW sales, DOE is

concerned that TSL 4 will disproportionately impact it.

Although DOE recognizes the increased economic benefits to the Nation that could result from TSL 4, DOE has the same concerns regarding TSL 4 as for TSL 5. Namely, DOE has concerns as to the potential of TSL 4 to disincentivize consumers from purchasing more-efficient front-loading washers. As a result, DOE has tentatively concluded that the benefits of a Federal standard at TSL 4 would be outweighed by this potential adverse impact. At TSL 4, front-loading CCWs are highly efficient but have a purchase price estimated to be $414 more expensive than top-loading washers. With such a price differential between the two types of CCWs, and with less than four percent of the front-loading market meeting TSL 4, DOE is concerned that significant numbers of potential consumers of front-loading CCWs would be more likely choose to purchase a less-efficient top-loading CCW. If potential front-loading washer consumers did decide to switch to less expensive top-loading washers, the NES and NPV realized from TSL 4 would be diminished. In addition, TSL 4 would adversely impact manufacturers' INPV to a significant extent. Not only does the industry face a potential loss in industry INPV, but manufacturers would also need to make significant capital investments for both types of CCWs in order to produce both top-loading washers at the maximum technologically feasible level and front-loading washers at a level which only three percent of the market currently meets. After carefully considering the analysis and weighing the benefits and burdens of TSL 4, the Secretary has reached the following initial conclusion: At TSL 4, the benefits of energy savings, economic benefit, and emissions reductions would be outweighed by the potential for disincentivizing consumers to purchase high-efficiency front-loading CCWs and the large capital conversion costs that could result in a substantial reduction in INPV for manufacturers.

Next, DOE considered TSL 3. TSL 3 would likely save 0.15 quads of energy and 0.19 trillion gallons of water through 2042, an amount DOE considers significant. Discounted at seven percent, the projected energy and water savings through 2042 would be 0.04 quads and 0.05 trillion gallons, respectively. For the Nation as a whole, DOE projects that TSL 3 would result in a net increase of $0.46 billion in NPV, using a discount rate of seven percent. The emissions reductions at TSL 3 are 11.55 Mt of CO_2, 4.25 kt to 9.93 kt of NO_X, and 0 t to 0.17 t of Hg. Total generating capacity in 2042 is estimated to decrease compared to the reference case by 0.028 gigawatts (GW) under TSL 3.

At TSL 3, top-loading CCWs have the same efficiency as TSL 5. Therefore, top-loading CCW consumers would experience the same LCC impacts and payback periods as TSL 5. At TSL 3 for front-loading CCWs, DOE projects that the average front-loading CCW consumer would experience a decrease in LCC of $52 in multi-family applications and $58 in laundromats. DOE also estimates an LCC decrease for all consumers that do not already purchase front-loading CCWs with an efficiency meeting TSL 3. The median payback period of the average consumer at TSL 3 in multi-family applications and in laundromats is projected to be 0.4 years and 0.3 years, respectively.

DOE estimated the projected change in INPV ranges from a decrease of $15 million to a decrease of $17 million. At TSL 3, DOE recognizes the risk of very large negative impacts if manufacturers' expectations about reduced profit margins are realized. In particular, if the high end of the range of impacts is reached as DOE expects, TSL 3 could result in a net loss of 31 percent in INPV to CCW manufacturers. Also, DOE is especially sensitive to the potential adverse impacts to the LVM of CCWs. Since the LVM's clothes washer revenue is so dependent on CCW sales, DOE is concerned that TSL 3 will disproportionately impact it.

DOE recognizes the increased economic benefits to the Nation that could result from TSL 3 but still has concerns of the potential for disincentivizing consumers from purchasing more-efficient front-loading washers. But at TSL 3, the price difference between front-loading and top-loading CCWs drops to $375. More importantly, over 88 percent of the front-loading market already meets TSL 3. With such a large front-loading market share at TSL 3, it indicates the current cost-effectiveness to consumers of this TSL. Therefore, DOE believes that the remaining 12 percent of front-loading CCW consumers not already purchasing washers at TSL 3 would likely to do so if standards are set at TSL 3. DOE notes that TSL 3 adversely impacts manufacturers' INPV. But because such a large percent of the front-loading market is at TSL 3, manufacturers would likely not need to make significant capital investments for front-loading CCWs. Therefore, significant capital investments would only be required in order to produce top-loading washers at TSL 3.

After considering the analysis and weighing the benefits and the burdens, DOE has tentatively concluded that the benefits of a TSL 3 standard outweigh the burdens. In particular, the Secretary has tentatively concluded that TSL 3 saves a significant amount of energy and is technologically feasible and economically justified. Therefore, DOE today proposes to adopt the energy conservation standards for CCWs at TSL 3. Table V.64 demonstrates the proposed energy conservation standards for CCWs. Even though DOE is proposing amended energy conservation standards for CCWs at TSL 3, DOE recognizes the potential adverse impacts to the LVM and the likelihood that adverse impacts may be significant for CCW market competition. Therefore, DOE will carefully consider the Department of Justice's review of the proposed standards for CCWs before issuing its final rule for this product.

TABLE V.64—PROPOSED ENERGY CONSERVATION STANDARDS FOR COMMERCIAL CLOTHES WASHERS

Product class	Proposed energy conservation standards
Top-Loading ..	1.76 Modified Energy Factor/ 8.3 Water Factor.
Front-Loading	2.00 Modified Energy Factor/ 5.5 Water Factor.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

DOE has determined today's regulatory action is a ''significant regulatory action'' under section 3(f)(1) of Executive Order 12866, ''Regulatory Planning and Review.'' 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget.

The Executive Order requires that each agency identify in writing the specific market failure or other specific problem and that it intends to address that warrants new agency action, as well as to assess the significance of the problem to determine whether any new regulation is warranted. Executive Order 12866, section 1(b)(1).

With the exception of electric and some gas cooking products, DOE's preliminary analysis for some residential gas cooking products, microwave ovens, and CCWs explicitly quantifies and accounts for the percentage of consumers that already purchase more-efficient equipment and

takes these consumers into account when determining the national energy savings associated with various TSLs. The preliminary analysis suggests that accounting for the market value of energy savings alone (*i.e.*, excluding any possible additional ''externality'' benefits such as those noted below) would produce enough benefits to yield net benefits across a wide array of products and circumstances. In its ANOPR, DOE requested additional data (including the percentage of consumers purchasing more-efficient cooking products and the extent to which consumers of all product types will continue to purchase more-efficient equipment), in order to test the existence and extent of these consumer actions. DOE received no such data from interested parties in response to the ANOPR but continues to request these data in today's proposed rule.

DOE believes that there is a lack of consumer information and/or information processing capability about energy efficiency opportunities in the home appliance market. If this is the case, DOE would expect the energy efficiency for home appliances to be randomly distributed across key variables such as energy prices and usage levels. With the exception of some cooking products, DOE has already identified the percentage of consumers that already purchase more-efficient products. However, DOE does not correlate the consumer's usage pattern and energy price with the efficiency of the purchased product. In its ANOPR, DOE sought data on the efficiency levels of existing home appliances by how often they are used (*e.g.*, how many times or hours the product is used) and their associated energy prices (and/or geographic regions of the country). DOE received no such data from interested parties in response to the ANOPR but continues to request these data in today's proposed rule. If DOE does receive data, it plans to use these data to test the extent to which purchasers of this equipment behave as if they are unaware of the costs associated with their energy consumption. Also, DOE seeks comment on consumer knowledge of the Federal ENERGY STAR program, and on the program's potential as a resource for increasing knowledge of the availability and benefits of energy-efficient appliances in the home appliance consumer market.

A related issue is asymmetric information (one party to a transaction has more and better information than the other) and/or high transactions costs (costs of gathering information and effecting exchanges of goods and services). In many instances, the party responsible for an appliance purchase may not be the one who pays the cost to operate it. For example, home builders in large-scale developments often make decisions about appliances without input from home buyers and do not offer options to upgrade those appliances. Also, apartment owners normally make decisions about appliances, but renters often pay the utility bills. If there were no transactions costs, it would be in the home builders' and apartment owners' interest to install appliances that buyers and renters would choose. For example, one would expect that a renter who knowingly faces higher utility bills from low-efficiency appliances would be willing to pay less in rent, and the apartment owner would indirectly bear the higher utility cost. However, this information is not readily available, and it may not be in the renter's interest to take the time to develop it, or, in the case of the landlord who installs a high-efficiency appliance, to convey that information to the renter.

To the extent that asymmetric information and/or high transactions costs are problems, one would expect to find certain outcomes for appliance energy efficiency. For example, all things being equal, one would not expect to see higher rents for apartments with high-efficiency appliances. Conversely, if there were symmetric information, one would expect appliances with higher energy efficiency in rental units where the rent includes utilities compared to those where the renter pays the utility bills separately. Similarly, for single-family homes, one would expect higher energy efficiency levels for replacement units than appliances installed in new construction. Within the new construction market, one would expect to see appliances with higher energy efficiency levels in custom-built homes (where the buyer has more say in appliance choices) than in comparable homes built in large-scale developments.

In addition, this rulemaking is likely to yield certain external benefits resulting from improved energy efficiency of cooking products and CCWs that are not captured by the users of such equipment. These benefits include externalities related to environmental protection and energy security that are not reflected in energy prices, such as reduced emissions of greenhouse gases. The emissions reductions in today's proposed rule are projected to be 76.6 Mt of CO_2 and 16.1 kt of NO_X. DOE invites comments on the weight that DOE should place on these factors in its determination of the maximum energy efficiency level at which the total benefits are likely to exceed the total burdens resulting from an amended standard.

As previously stated, DOE continues to seek data that might enable it to test for market failures or other specific problems for the products under consideration in this rulemaking. Given adequate data, there are ways to test for the extent of market failure for CCWs, for example. One would expect the owners of CCWs who also pay for their energy and water consumption to purchase machines that use less energy and water compared to machines whose owners do not pay for energy and water, other things being equal. To test for this form of market failure, DOE needs data on energy efficiency and water consumption of such units and whether the owner of the equipment is also the operator. DOE is also interested in other potential tests of market failure and data that would enable such tests.

As noted above, DOE conducted a regulatory impact analysis and, under the Executive Order, was subject to review by the Office of Information and Regulatory Affairs (OIRA) in the OMB. DOE presented to OIRA the draft proposed rule and other documents prepared for this rulemaking, including the RIA, and has included these documents in the rulemaking record. They are available for public review in the Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC 20024, (202) 586–9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

The RIA is contained as chapter 17 in the TSD prepared for the rulemaking. The RIA consists of: (1) A statement of the problem addressed by this regulation, and the mandate for government action; (2) a description and analysis of the feasible policy alternatives to this regulation; (3) a quantitative comparison of the impacts of the alternatives; and (4) the national economic impacts of the proposed standard.

The RIA calculates the effects of feasible policy alternatives to energy conservation standards for residential cooking products and CCWs, and provides a quantitative comparison of the impacts of the alternatives. DOE evaluated each alternative in terms of its ability to achieve significant energy savings at reasonable costs, and compared it to the effectiveness of the proposed rule. DOE analyzed these alternatives using a series of regulatory scenarios as input to the NIA Spreadsheets for the two appliance products, which it modified to allow

inputs for voluntary measures. For more details on how DOE modified the NIA spreadsheets to determine the impacts due to the various non-regulatory alternatives to standards, refer to chapter 17 of the TSD accompanying this notice.

As shown in Table VI.1 below, DOE identified the following major policy alternatives for achieving increased energy efficiency in residential cooking products and CCWs:

- No new regulatory action;
- Financial incentives;
- Consumer rebates;
- Consumer tax credits;
- Manufacturer tax credits;
- Voluntary energy efficiency targets;
- Bulk government purchases;
- Early replacement; and
- The proposed approach (national performance and prescriptive standards).

TABLE VI.1—NON-REGULATORY ALTERNATIVES TO STANDARDS

Policy alternatives	Energy Savings* (quads)	Water savings (trillion gallons)	Net present value** (billion $)	
			7% discount rate	3% discount rate
Conventional Cooking Products***				
No New Regulatory Action	0	NA	0	0
Consumer Rebates	0.12	NA	0.17	0.52
Consumer Tax Credits	0.05	NA	0.07	0.23
Manufacturer Tax Credits	0.01	NA	0.02	0.06
Early Replacement	0.01	NA	0.07	0.12
Today's Standards at TSL 1	0.14	NA	0.21	0.61
Microwave Ovens:				
No New Regulatory Action	0	NA	0	0
Consumer Rebates	0.07	NA	0.27	0.60
Consumer Tax Credits	0.02	NA	0.07	0.16
Manufacturer Tax Credits	0.01	NA	0.04	0.09
Voluntary Energy Efficiency Targets	0.35	NA	1.22	2.82
Early Replacement	0.02	NA	0.10	0.15
Bulk Government Purchases	0.01	NA	0.02	0.05
Today's Standards at TSL 3b	0.45	NA	1.56	3.52
Commercial Clothes Washers:				
No New Regulatory Action	0	0	0	0
Consumer Rebates	0.08	0.08	0.20	0.53
Consumer Tax Credits	0.01	0.02	0.04	0.09
Manufacturer Tax Credits	0.01	0.01	0.03	0.07
Voluntary Energy Efficiency Targets†	0.03	0.03	0.08	0.21
Early Replacement	0.01	0.01	0.14	0.22
Bulk Government Purchases†	0.01	0.01	0.03	0.08
Today's Standards at TSL 3	0.15	0.19	0.46	1.16

* Energy savings are in source quads.

** Net present value is the value in the present of a time series of costs and savings. DOE determined the net present value from 2012 to 2042 in billions of 2006 dollars.

*** Voluntary energy efficiency target and bulk government purchase alternatives are not considered because the percentage of the market at TSL 1 (today's proposed standard) is well over the market adoption target level that each alternative strives to attain.

† Voluntary energy efficiency target and bulk government purchase alternatives are not considered for front-loading washers because the percentage of the market at TSL 3 (today's proposed standard) is well over the market adoption target level that each alternative strives to attain.

The net present value amounts shown in Table VI.1 refer to the NPV for consumers. The costs to the government of each policy (such as rebates or tax credits) are not included in the costs for the NPV since, on balance, consumers would be both paying for (through taxes) and receiving the benefits of the payments. The following paragraphs discuss each of the policy alternatives listed in Table VI.1. (See the TSD accompanying this notice, chapter 17.)

No New Regulatory Action. The case in which no regulatory action is taken with regard to cooking products and CCWs constitutes the ''base case'' (or ''No Action'') scenario. In this case, between 2012 and 2042, conventional cooking products are expected to use 10.3 quads of primary energy, microwave ovens 5.2 quads, and CCWs 0.97 quads along with 2.2 trillion gallons of water. Since this is the base case, energy savings and NPV are zero by definition.

Consumer Rebates. Consumer rebates cover a portion of the incremental installed cost difference between products meeting baseline efficiency levels and those meeting higher efficiency levels, which generally result in a higher percentage of consumers purchasing more-efficient models. DOE utilized market penetration curves from a study that analyzed the potential of energy efficiency in California.[110] The penetration curves are a function of benefit-cost ratio (*i.e.*, lifetime operating costs savings divided by increased total installed costs) to estimate the increased market share of more-efficient products given incentives by a rebate program. Using specific rebate amounts, DOE calculated, for each of the considered products, the benefit-cost ratio of the more-efficient appliance with and without the rebate to project the increased market penetration of the product due to a rebate program.

For conventional cooking products meeting the efficiency levels in TSL 1 (*i.e.*, gas cooking products without constant burning pilot lights), DOE estimated that the annual increase in consumer purchases of these products due to consumer rebates would be 7.8 percent. DOE selected the portion of the incremental costs covered by the rebate (*i.e.*, 100 percent) using data from rebate programs conducted by 88 gas utilities, electric utilities, and other State

[110] Rufo, M. and F. Coito, *California's Secret Energy Surplus: The Potential for Energy Efficiency* (prepared for The Energy Foundation and The Hewlett Foundation by Xenergy, Inc.) (2002).

government agencies.[111] DOE estimated that the impact of this policy would be to permanently transform the market so that the increased market share seen in the first year of the program would be maintained throughout the forecast period. At the estimated participation rates, consumer rebates would be expected to provide 0.12 quads of national energy savings and an NPV of $0.17 billion (at a seven-percent discount rate).

For microwave ovens meeting the efficiency levels at TSL 3b (*i.e.*, maximum standby power consumption of 1.0 watt), DOE estimated that the percentage of consumers purchasing more-efficient products due to consumer rebates would increase annually by 9.9 percent. DOE assumed that the rebate would cover the entire incremental cost for this product since that cost is so small. DOE estimated that the impact of this policy would be to permanently transform the market so that the increased market share seen in the first year of the program would be maintained throughout the forecast period. At the estimated participation rates, consumer rebates would be expected to provide 0.07 quads of national energy savings and an NPV of $0.27 billion (at a seven-percent discount rate).

For CCWs meeting TSL 3, DOE estimated that the percentage of consumers purchasing the more-efficient products due to consumer rebates would increase annually by 40.2 percent for top-loading washers and 4.0 percent for front-loading washers. DOE selected the rebate amount using data from rebate programs for CCWs conducted by 24 gas, electric, and water utilities and other agencies. DOE estimated that the impact of this policy would be to permanently transform the market so that the increased market share seen in the first year of the program would be maintained throughout the forecast period. At the estimated participation rates, consumer rebates would be expected to provide 0.08 quads of national energy savings, 85 billion gallons of national water savings, and an NPV of $0.20 billion (at a seven-percent discount rate).

Although DOE estimated that consumer rebates would provide national benefits for conventional cooking products, microwave ovens, and CCWs, these benefits would be smaller than the benefits resulting from national performance standards at the proposed levels. Thus, DOE rejected consumer rebates as a policy alternative to national performance standards.

Consumer Tax Credits. Consumer tax credits cover a percentage of the incremental installed cost difference between products meeting baseline efficiency levels and those with higher efficiencies. Consumer tax credits are considered a viable non-regulatory market transformation program as evidenced by the inclusion of Federal consumer tax credits in EPACT 2005 for various residential appliances. (section 1333 of EPACT 2005; codified at 26 U.S.C. 25C) DOE reviewed the market impact of tax credits offered by the Oregon Department of Energy (ODOE) (ODOE, No. 35 at p. 1) and Montana Department of Revenue (MDR) (MDR, No. 36 at p. 1) to estimate the effect of a national tax credit program. To help estimate the impacts from such a program, DOE also reviewed analyses prepared for the California Public Utilities Commission,[112] the Northwest Energy Efficiency Alliance,[113] and the Energy Foundation/Hewlett Foundation.[114] For each of the appliance products considered for this rulemaking, DOE estimated that the market effect of a tax credit program would gradually increase over a time period until it reached its maximum impact. Once the tax credit program attained its maximum effect, DOE assumed the impact of the policy would be to permanently transform the market at this level.

For conventional cooking products, DOE estimated that the market share of efficient products meeting TSL 1 would increase by 0.7 percent in 2012 and increase over a six-year period to an annual maximum of 2.8 percent in 2020. At these estimated participation rates, consumer tax credits would be expected to provide 0.05 quads of national energy savings and an NPV of $0.07 billion (at a seven-percent discount rate). For microwave ovens, DOE estimated that the market share of efficient products meeting TSL 3b would increase by 0.7 percent in 2012, and increase over a nine-year period to an annual maximum of 2.8 percent in 2020.[115] At these estimated participation rates, consumer tax credits would be expected to provide 0.02 quads of national energy savings and an NPV of $0.07 billion (at a seven-percent discount rate).

For CCWs, DOE estimated that consumer tax credits would induce an increase of 1.3 percent in 2012 in the purchase of products meeting TSL 3 and eventually increase to a maximum of 5.8 percent in 2020 for both top-loading and front-loading washers.[116] At the estimated participation rates, consumer tax credits would be expected to provide 0.01 quads of national energy savings, 16 billion gallons of national water savings, and an NPV of $0.04 billion (at a seven-percent discount rate).

DOE estimated that while consumer tax credits would yield national benefits for conventional cooking products, microwave ovens, and CCWs, these benefits would be much smaller than the benefits from the proposed national performance standards. Thus, DOE rejected consumer tax credits as a policy alternative to national performance standards.

Manufacturer Tax Credits. Manufacturer tax credits are considered a viable non-regulatory market transformation program as evidenced by the inclusion of Federal tax credits in EPACT 2005 for manufacturers of residential appliances. (Section 1334 of EPACT 2005; codified at 26 U.S.C. 45M) Similar to consumer tax credits, manufacturer tax credits would effectively result in lower product prices to consumers by an amount that covered part of the incremental price difference between products meeting baseline efficiency levels and those meeting higher efficiency levels. Because these tax credits would go to manufacturers instead of consumers, research indicates that fewer consumers would be affected by a manufacturer tax credit program than by consumer tax credits.[117] [118] Although consumers

[111] Because DOE was not able to identify consumer rebate programs specific to conventional cooking products, rebate amounts for another kitchen appliance, dishwashers, were used to estimate the impact from a rebate program providing incentives for more-efficient cooking products.

[112] Itron and KEMA, *2004/2005 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation* (prepared for the California Public Utilities Commission, Pacific Gas And Electric Company, San Diego Gas And Electric Company, Southern California Edison, Southern California Gas Company, CPUC–ID#: 1115–04) (2007).

[113] KEMA, *Consumer Product Market Progress Evaluation Report 3* (prepared for Northwest Energy Efficiency Alliance, Report #07–174) (2007).

[114] Rufo, M. and F. Coito, *op. cit.*

[115] Because DOE was not able to identify consumer tax credit programs specific to conventional cooking products and microwave ovens, increased market penetrations for another kitchen appliance, dishwashers, were used to estimate the impact from a tax credit program providing incentives for more-efficient conventional cooking products and microwave ovens.

[116] Because DOE was not able to identify consumer tax credit programs specific to commercial clothes washers, increased market penetrations for residential clothes washers were used to estimate the impact from a tax credit program providing incentives for more-efficient commercial clothes washers.

[117] K. Train, *Customer Decision Study: Analysis of Residential Customer Equipment Purchase*

Continued

would benefit from price reductions passed through to them by the manufacturers, research demonstrates that approximately half the consumers who would benefit from a consumer tax credit program would be aware of the economic benefits of more efficient technologies included in an appliance manufacturer tax credit program. In other words, research estimates that half of the effect from a consumer tax credit program is due to publicly available information or promotions announcing the benefits of the program. This effect, referred to as the ''announcement effect,'' is not part of a manufacturer tax credit program. Therefore, DOE estimated that the effect of a manufacturer tax credit program would be only half of the maximum impact of a consumer tax credit program.

For conventional cooking products, the percentage of consumers purchasing products meeting TSL 1 would be expected to increase by 0.6 percent due to a manufacturer tax credit program.[119] For microwave ovens, DOE estimated the percentage of consumers purchasing products at TSL 3b would be expected to increase by 1.4 percent. For CCWs, DOE estimated the percentage of consumers purchasing products at TSL 3 would be expected to increase by 2.9 percent for both top-loading and front-loading washers. For all of the considered products, DOE assumed that the impact of the manufacturer tax credit policy would be to permanently transform the market so that the increased market share seen in the first year of the program would be maintained throughout the forecast period.

At the above estimated participation rates, manufacturer tax credits would provide 0.01 quads of national energy savings and an NPV of $0.02 billion (at a seven-percent discount rate) for conventional cooking products, 0.01 quads of national energy savings and an NPV of $0.04 billion (at a seven-percent discount rate) for microwave ovens, and 0.01 quads of national energy savings, 12 billion gallons of national water savings, and an NPV of $0.03 billion (at a seven-percent discount rate) for CCWs.

DOE estimated that while manufacturer tax credits would yield national benefits for conventional cooking products, microwave ovens, and CCWs, these benefits would be much smaller than the benefits from national performance standards. Thus, DOE rejected manufacturer tax credits as a policy alternative to the proposed national performance standards.

Voluntary Energy Efficiency Targets. DOE estimated the impact of voluntary energy efficiency targets by reviewing the historical and projected market transformation performance of past and current ENERGY STAR programs.

To estimate the impacts from a voluntary energy efficiency program targeting the adoption of microwave ovens meeting TSL 3b, DOE evaluated the ENERGY STAR program's experience with cathode ray tube (CRT) televisions,[120] as well as other consumer electronics products.[121] Over a 10-year period spanning 1998–2007, the ENERGY STAR program estimated the annual market share increases of CRT televisions and other consumer electronics meeting qualifying efficiency levels due to the ENERGY STAR program which increased to a maximum of 58 percent. DOE applied this same pattern of market share increase to microwave ovens beginning in 2012. Because CRT televisions and microwave ovens have similar characteristics (*i.e.*, electronic or electric appliance with an overwhelming majority of households owning the product), DOE believes it is reasonable to estimate the impacts of the ENERGY STAR program for microwave ovens with the impacts that have been realized for CRT televisions. After attaining this maximum market share after 10 years, DOE's analysis maintained that market share throughout the remainder of the forecast period. DOE estimated that voluntary energy efficiency targets would be expected to provide 0.35 quads of national energy savings and an NPV of $1.22 billion (at a seven-percent discount rate). Although this program would provide national benefits, DOE's analysis indicates that they would be smaller than the benefits resulting from the proposed national performance standards. Thus, DOE rejected the use of voluntary energy efficiency targets as a policy alternative to national performance standards.

To estimate the impacts from a voluntary energy efficiency program targeting the adoption of top-loading CCWs meeting TSL 3, DOE evaluated the potential impacts of expanding the Federal government's existing ENERGY STAR program for CCWs. DOE modeled the voluntary efficiency program based on the ENERGY STAR program's experience with RCWs.[122] [123] Over the period spanning 2007–2025, ENERGY STAR projected that the market share of RCWs meeting target efficiency levels due to ENERGY STAR will increase to a maximum of 28 percent. DOE estimated that an expanded voluntary program would increase their market share by half of these projected annual amounts for the existing ENERGY STAR program, reaching a maximum of 14 percent increased market share. For CCWs, DOE assumed that the impacts of the existing ENERGY STAR program were already incorporated in the base case, and applied the same pattern of market share increase from an expanded voluntary program to CCWs beginning in 2012. After attaining its maximum market share of 14 percent in the year 2030, DOE's analysis maintained that market share throughout the remainder of the forecast period. DOE estimated that an expanded program of voluntary energy efficiency targets would be expected to provide 0.03 quads of national energy savings, 33 billion gallons of national water savings, and an NPV of $0.08 billion (at a seven-percent discount rate). Although this program would provide national benefits, they were estimated to be smaller than the benefits resulting from the proposed national performance standards. Thus, DOE rejected the use of voluntary energy efficiency targets as a policy alternative to national performance standards.

DOE did not analyze the potential impacts of voluntary energy efficiency targets for front-loading CCWs or conventional cooking products because a vast majority of products already meet the proposed standards. In the case of front-loading CCWs, over 88 percent of the market meets TSL 3, while in the case of conventional cooking products, over 85 percent of the gas range market already meets TSL 1. The ENERGY STAR program typically targets products where a maximum of approximately 25 percent of the existing market meets the target efficiency

Decisions (prepared for Southern California Edison by Cambridge Systematics, Pacific Consulting Services, The Technology Applications Group, and California Survey Research Services) (1994).

[118] Lawrence Berkeley National Laboratory, End-Use Forecasting Group. *Analysis of Tax Credits for Efficient Equipment (1997).* Available at: *http://enduse.lbl.gov/Projects/TaxCredits.html.* (Last accessed April 24, 2008.)

[119] DOE assumed that the manufacturer tax credit program would affect only consumers of gas cooking products, who did not need electric outlets installed; therefore the increased percentage impact includes only those consumers.

[120] The efficiency gains of CRT televisions, like those of microwaves, come from reducing standby losses.

[121] Sanchez, M.C., C.A. Webber, R. Brown, and G.K. Homan, *2007 Status Report—Savings Estimates for the ENERGY STAR® Voluntary Labeling Program* (Lawrence Berkeley National Laboratory, LBNL–56380) (2007).

[122] Data were not available on the market impacts of the CCW program.

[123] Sanchez *et al., op. cit.*

level.[124] Since the markets for front-loading CCWs and gas ranges are well above the 25 percent threshold, DOE did not consider this approach for conventional cooking products.

Early Replacement. The early replacement policy alternative envisions a program to replace old, inefficient units with models meeting efficiency levels higher than baseline equipment. Under an early replacement program, State governments or electric and gas utilities would provide financial incentives to consumers to retire the appliance early in order to hasten the adoption of more-efficient products. For all of the considered products, DOE modeled this policy by applying a four percent increase in the replacement rate above the natural rate of replacement for failed equipment. DOE based this percentage increase on program experience with the early replacement of appliances in the State of Connecticut.[125] DOE assumed the program would continue for as long as it would take to ensure that the eligible existing stock in the year that the program began (2012) was completely replaced.

For conventional cooking products, this policy alternative would replace old, inefficient units with models meeting the efficiency levels in TSL 1. DOE estimated that such an early replacement program would be expected to provide 0.04 quads of national energy savings and an NPV of $0.07 billion (at a seven-percent discount rate). For microwave ovens, this policy alternative would replace old, inefficient units with models meeting the efficiency levels in TSL 3b. DOE estimated that such an early replacement program would be expected to provide 0.02 quads of national energy savings and an NPV of $0.10 billion (at a seven-percent discount rate). For CCWs, this policy alternative would replace old, inefficient top-loading and front-loading units with models meeting the efficiency levels in TSL 3. DOE estimated that such an early replacement program would be expected to provide 0.01 quads of national energy savings, 14 billion gallons of national water savings, and an NPV of $0.14 billion (at a seven-percent discount rate).

Although DOE estimated that the above early replacement programs for each of the considered products would provide national benefits, they would be much smaller than the benefits resulting from national performance standards. Thus, DOE rejected early replacement incentives as a policy alternative to national performance standards.

Bulk Government Purchases. Under this policy alternative, the government sector would be encouraged to shift their purchases to products that meet the target efficiency levels above baseline levels. Aggregating public sector demand could provide a market signal to manufacturers and vendors that some of their largest customers sought suppliers with products that met an efficiency target at favorable prices. This program also could induce ''market pull'' impacts through manufacturers and vendors achieving economies of scale for high-efficiency products. DOE assumed that Federal, State, and local government agencies could administer such a program. At the Federal level, such a program would add microwave ovens to the products for which FEMP has energy efficient procurement specifications and would modify the existing FEMP specifications for CCWs. DOE modeled this program by assuming an increase in the installation of equipment meeting higher efficiency levels for those households where government agencies purchase or influence the purchase of appliances.

For microwave ovens, this program would encourage the government sector to shift their purchases to units that meet the efficiency levels in TSL 3b. Based on data from the 2005 AHS, there are approximately two million housing units that are publicly owned, representing about 1.6 percent of all U.S. households.[126] Per RECS 2001, 76 percent of Federally owned housing units have microwave ovens.[127] Therefore, DOE estimated that 1.2 million publicly owned housing units have microwave ovens. Based on research of the effectiveness of bulk government purchasing programs, DOE estimated that the market share of more-efficient microwave ovens in publicly owned housing would increase at a rate of eight percent per year over a 10-year period (2012–2021) and remain at the 2021 level for the remainder of the forecast period.[128] DOE estimated that bulk government purchases of microwave ovens would be expected to provide 0.01 quads of national energy savings and an NPV of $0.02 billion (at a seven-percent discount rate), benefits which would be much smaller than those estimated for the proposed national performance standards. Thus, DOE rejected bulk government purchases as a policy alternative to national performance standards.

For CCWs, this program would encourage the government sector to shift its purchases to top-loading units that meet the efficiency levels in TSL 3. DOE estimated that this policy would apply to multifamily buildings that are government-owned. Based on a technology review prepared for FEMP by Pacific Northwest National Laboratory (PNNL), approximately 7000 CCWs (representing a 3.2 percent market share) were purchased in the year 2000 for Federal buildings.[129] Based on research of the effectiveness of bulk government purchasing programs, DOE estimated that the market share of more-efficient CCWs in Federally owned multifamily buildings would increase at a rate of eight percent per year over a 10-year period (2012–2021) and remain at the 2021 level for the remainder of the forecast period. DOE estimated that bulk government purchases would be expected to provide 0.01 quads of national energy savings, 13 billion gallons of national water savings, and an NPV of $0.03 billion (at a seven-percent discount rate), benefits which would be much smaller than those estimated for the proposed national performance standards. Thus, DOE rejected bulk government purchases as a policy alternative to national performance standards.

DOE did not analyze the potential impacts of bulk government purchases for front-loading CCWs or conventional cooking products because a vast majority of products already meet the proposed standards. In the case of front-loading CCWs, over 88 percent of the market meets TSL 3, while in the case of conventional cooking products, over 85 percent of the gas range market already meets TSL 1. FEMP

[124] Sanchez, M. and A. Fanara, ''New Product Development: The Pipeline for Future ENERGY STAR Growth,'' *Proceedings of the 2000 ACEEE Summer Study on Energy Efficiency in Buildings* (2000) Vol 6, pp. 343–354.

[125] Nexus and RLW Analytics, *Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report, Final.* (submitted to Northeast Utilities—Connecticut Light and Power and the United Illuminating Company by Nexus Market Research, Inc. and RLW Analytics, Inc.) (2005).

[126] U.S. Department of Housing and Urban Development—Office of Policy Development and Research, *A Picture of Subsidized Households—2000* (2000). Available at: *http://www.huduser.org/picture2000/.* (Last accessed April 24, 2008.)

[127] U.S. Department of Energy—Energy Information Administration, *Residential Energy Consumption Survey: Household Energy Consumption and Expenditures 2001* (2001). Available at: *http://www.eia.doe.gov/emeu/recs/public.html.*

[128] Harris, J. and F. Johnson, ''Potential Energy, Cost, and CO_2 Savings from Energy-Efficient Government Purchase,'' *Proceedings of the ACEEE 2000 Summer Study on Energy Efficiency in Buildings* (2000) Vol 4, pp. 147–166.

[129] Pacific Northwest National Laboratory, *Assessment of High-Performance, Family-Sized Commercial Clothes Washers* (DOE/EE–0218) (2000).

procurement specifications typically promote products in the top 25 percent of the existing product offerings in terms of efficiency. Since most of the front-loading CCWs and gas ranges sold in the base case already comply with such specifications, DOE was not able to consider this program as a source of data for top-loading CCWs and conventional cooking products.

National Performance Standards (TSL 1 for conventional cooking products, TSL 3b for microwave ovens, and TSL 3 for CCWs). As indicated in the paragraphs above, none of the alternatives DOE examined would save as much energy as the proposed standards. Therefore, DOE proposes to adopt the efficiency levels listed in section V.C.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, *Proper Consideration of Small Entities in Agency Rulemaking,* 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of General Counsel's Web site: *http://www.gc.doe.gov.*

DOE reviewed today's proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. 68 FR 7990. A regulatory flexibility analysis examines the impact of the rule on small entities and considers alternative ways of reducing negative impacts. DOE identified producers of all products covered by this rulemaking which have manufacturing facilities located within the United States. DOE then looked at publicly available data and contacted manufacturers, where needed, to determine if they meet the SBA's definition of a small manufacturing facility.

For the manufacturers of products covered by this rulemaking, the SBA has set three size thresholds, which define which entities are ''small businesses'' for the purposes of the statute. Since all CCW manufacturers also produce RCWs, limits for both categories are presented in Table VI.2, along with the size limits of household cooking appliance manufacturers. DOE used the small business size standards published on March 11, 2008, as amended, by the SBA to determine whether any small entities would be required to comply with the rule. 61 FR 3286 (codified at 13 CFR part 121.) The size standards are listed by North American Industry Classification System (NAICS) code and industry description.

VI.2—SBA AND NAICS CLASSIFICATION OF SMALL BUSINESSES POTENTIALLY AFFECTED BY THIS RULE

Industry description	Revenue limit	Employee limit	NAICS
Residential Laundry Equipment Manufacturing	N/A	1,000	335224
Commercial Laundry Equipment Manufacturing	N/A	500	333312
Household Cooking Appliance Manufacturing	N/A	750	335221

1. Cooking Products

The conventional cooking appliance industry is characterized by both domestic and international manufacturers. Most conventional cooking appliances are currently manufactured in the United States. Consolidation within the cooking products industry has reduced the number of parent companies that manufacture similar equipment under different affiliates and labels.

DOE conducted a market survey and created a list of every manufacturer that makes conventional cooking appliances for sale in the United States. DOE also asked stakeholders and industry representatives if they were aware of any other small manufacturers. DOE then reviewed publicly available data and contacted manufacturers, as necessary, to determine whether they meet the SBA's definition of a ''small business'' in the cooking appliance industry. Based on this analysis, DOE estimates that there are two small domestic manufacturers of conventional cooking appliances. One of these appliance manufacturers has production limited to ranges, while the other produces cooktops, ranges, hoods, wall ovens, and cooking ventilation equipment. Before issuing this notice of proposed rulemaking, DOE contacted both small businesses, and one of them agreed to be interviewed. Dun and Bradstreet reports that both companies are privately owned, have less than 300 employees, and have annual revenues of less than $60 million.[130] DOE also obtained information about small business impacts while interviewing manufacturers that exceed the small business size threshold of 750 employees in this industry.

DOE found that, as it pertains to the elimination of standing pilots, small manufacturers have the same concerns as the remaining high-volume manufacturer of gas cooking appliances with standing pilot ignition systems. DOE summarized the key issues in section IV.G.3.a of today's notice. One small business manufacturer objected to the potential elimination of standing pilot ignition systems, because 25 percent of its unit shipments feature such ignition systems. This manufacturer noted that appliances with standing pilot lights have become a niche market, with progressively fewer competitors offering these types of products. DOE found some differences in the R&D emphasis and marketing strategies between small business manufacturers and large manufacturers, as smaller businesses tend to focus on appliance sizes not offered by larger manufacturers. However, DOE believes the GRIM analysis, which models each product class separately, still represents the small businesses affected by standards. The qualitative and quantitative GRIM results are summarized in section V.B.2 of today's notice.

DOE reviewed the standard levels considered in today's notice of proposed rulemaking under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. Based on the foregoing, DOE determined that it cannot certify that these proposed energy conservation standard levels, if promulgated, would have no significant economic impact on a substantial number of small entities. DOE made this

[130] Refer to: *http://www.dnb.com/us/.*

determination because of the potential impacts that the proposed energy conservation standard levels under consideration for cooking appliances that eliminate standing pilots would have on the manufacturers, including the small businesses, which produce them. Consequently, DOE has prepared an initial regulatory flexibility analysis (IRFA) for this rulemaking. The IRFA describes potential impacts on small businesses associated with the elimination of standing pilots from conventional cooking appliance design and manufacturing.

The potential impacts on cooking appliance manufacturers are discussed in the following sections. DOE has transmitted a copy of this IRFA to the Chief Counsel for Advocacy of the Small Business Administration for review.

a. Reasons for the Proposed Rule

Title III of EPCA sets forth a variety of provisions designed to improve energy efficiency. Part A of Title III (42 U.S.C. 6291–6309) provides for the ''Energy Conservation Program for Consumer Products Other Than Automobiles.'' The program covers consumer products and certain commercial products (all of which are referred to hereafter as ''covered products''), including residential cooking products. (42 U.S.C. 6292(10)) DOE is proposing in today's notice to amend energy conservation standards for conventional cooking appliances by eliminating standing pilot ignition systems.

b. Objectives of, and Legal Basis for, the Proposed Rule

EPCA provides criteria for prescribing new or amended standards for covered products and equipment.[131] As indicated above, any new or amended standard for either of the two appliance products 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)), although EPCA precludes DOE from adopting any standard that would not result in significant conservation of energy. (42 U.S.C. 6295(o)(3)(B)) Moreover, DOE may not prescribe a standard: (1) for certain products, if no test procedure has been established for the product; or (2) if DOE determines by rule that the standard is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)) The Act (42 U.S.C. 6295(o)(2)(B)(i)) also provides that, in deciding whether a standard is economically justified, 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, weighing seven factors as described in section II.B of the preamble. EPCA directs DOE to undertake energy conversation standards rulemakings for cooking products and CCWs according to the schedules established in 42 U.S.C. 6295(h)(2) and 42 U.S.C. 6313(e)(2)(A)(i), respectively.

c. Description and Estimated Number of Small Entities Regulated

Through market research, interviews with manufacturers of all sizes, and discussions with trade groups, DOE was able to identify two small businesses that manufacture conventional cooking appliances which would be affected by today's rule.

d. Description and Estimate of Compliance Requirements

Potential impacts on all manufacturers of conventional cooking appliances vary by TSL. Margins for all businesses could be impacted negatively by the adoption of any TSL, since all manufacturers have expressed an inability to pass on cost increases to retailers and consumers. The two small domestic businesses under discussion differ from their competitors in that they are focused cooking appliance manufacturers, not diversified appliance manufacturers. Therefore, any rule affecting products manufactured by these small businesses will impact them disproportionately because of their size and their focus on cooking appliances. However, due to the low number of competitors that agreed to be interviewed, DOE was not able to characterize this industry segment with a separate cash-flow analysis due to concerns about maintaining confidentiality and uncertainty regarding the quantitative impact on revenues of a standing pilot ban.

At TSL 1 for gas ovens and gas cooktops, the elimination of standing pilot lights would eliminate one of the niches that these two small businesses serve in the cooking appliance industry. Both businesses also manufacture ovens and cooktops with electronic ignition systems, but the ignition source would no longer be a differentiator within the industry as it is today. The result would be a potential loss of market share since consumers would be able to choose from a wider variety of competitors, all of which operate at much higher production scales.

For all other TSLs concerning conventional cooking appliances (which are not being considered in today's rule), the impact on small, focused business entities would be proportionately greater than for their competitors since these businesses lack the scale to afford significant R&D expenses, capital expansion budgets, and other resources when compared to larger entities. The exact extent to which smaller entities would be affected, however, is hard to gauge since manufacturers did not respond to questions regarding all investment requirements by TSL during interviews. Notwithstanding this limitation, research associated with the LVM and other small entities in prior rulemakings suggests that many costs associated with complying with rulemakings are fixed, regardless of production volume.

Since all domestic manufacturers already manufacture all of their conventional cooking appliances with electronic ignition modules as a standard feature or as an option for consumers, the cost of converting the remaining three domestic manufacturers exclusively to electronic ignition modules would be modest. However, given their focus and scale, any conventional cooking appliance rule would affect these two domestic small businesses disproportionately compared to their larger and more diversified competitor.

e. Duplication, Overlap, and Conflict with Other Rules and Regulations

DOE is not aware of any rules or regulations that duplicate, overlap, or conflict with the rule being considered today.

f. Significant Alternatives to the Proposed Rule

In today's rule, the only TSL under consideration for conventional cooking appliances is the elimination of standing pilot ignition systems for gas ovens and gas cooktops. All manufacturers of such appliances with standing pilot systems stated during interviews that there are no known alternatives on the market today that would allow their appliances to meet safety standards (such as ANSI Z21.1), while not using a line-powered ignition system or standing pilots. While battery-powered ignition systems have found application in a few cooking products such as the outdoor gas barbeque market, none of such systems have yet to find application in or approval for indoor cooking appliances. During an MIA interview, one manufacturer

[131] The EPCA provisions discussed in the remainder of this subsection directly apply to covered products, and also apply to certain covered equipment, such as commercial clothes washers, by virtue of 42 U.S.C. 6316(a).

expressed doubt that any third-party supplier would develop such a solution, given the small, and shrinking market that standing pilot-equipped ranges represent. Another manufacturer stated, however, that while the market share of gas cooking products with standing pilot ignition systems has been declining, a substantial market is still served by such appliances. DOE research suggests that battery-powered ignition systems could be incorporated by manufacturers at a modest cost if manufacturer's market research suggested that a substantial number of consumers found such a product attribute important. DOE notes that such systems have been incorporated successfully in a range of related appliances, such as instantaneous water heaters. Further, DOE believes that there is nothing in the applicable safety standards that would prohibit such ignition systems from being implemented on gas cooking products. Therefore, DOE believes that households that use gas for cooking and are without electricity will likely have technological options that would enable them to continue to use gas cooking if standing pilot ignition systems are eliminated.

In addition to the TSL being considered, the TSD associated with this proposed rule includes a report referred to in section VI.A in the preamble as the regulatory impact analysis (RIA) (discussed earlier in this report and in detail in chapter 17 of the TSD). For conventional cooking appliances, this report discusses the following policy alternatives: (1) No standard, (2) consumer rebates, (3) consumer tax credits, (4) manufacturer tax credits, and (5) early replacement. With the exception of consumer rebates, the energy savings of these regulatory alternatives are at least three times smaller than those expected from the standard levels under consideration. The economic impacts mirror these regulatory alternatives.

The conventional cooking appliance industry is very competitive. The two small businesses differentiate their products from most larger competitors by offering their products in non-traditional sizes and with standing pilot ignition systems. Three primary consumer groups purchasing standing pilot-equipped products were identified by manufacturers in their MIA interviews: (1) Consumers without line power near the range (or in the house); (2) consumers who prefer appliances without line power for religious reasons; and (3) consumers seeking the lowest initial appliance cost. Manufacturers could not identify the size of the respective market segments, but demographics suggest that initial price is the primary reason that consumers are opting for standing pilot-equipped ranges. Religious subgroups that eschew line power and homes without line power cannot alone explain why up to 18 percent of gas cooking appliances are bought with standing pilot ignition systems. Furthermore, all manufacturers already make gas ranges with electronic ignition, including the high-volume domestic manufacturer of conventional cooking appliances with standing pilots. Thus, the primary benefit of standing pilot ignition systems appears to be that some differentiation from most higher-volume competitors. While the actual revenue benefit is hard to quantify, one small business manufacturer stated during interviews that the company would expect to experience material economic harm if standing pilot ignition systems were eliminated.

Due to the low number of small business respondents to DOE inquiries and the uncertainty regarding the potential impact of TSL 1 on small conventional cooking appliance manufacturers, DOE was not able to conduct a separate small business impact analysis. DOE continues to seek input from businesses that would be affected by the elimination of standing pilot ignition systems and will still consider this trial level for the purpose of the NOPR.

As mentioned above, the other policy alternatives (no standard, consumer rebates, consumer tax credits, manufacturer tax credits, and early replacement) are described in section VI.A of the preamble and in the regulatory impact analysis (chapter 17 of the TSD accompanying this notice). Since the impacts of these policy alternatives are lower than the impacts described above for the proposed standard levels, DOE expects that the impacts to small manufacturers would also be less than the impacts described above for the proposed standard level. DOE requests comment on the impacts to small business manufacturers for these and any other possible alternatives to the proposed rule for these manufacturers. DOE will consider any comments received regarding impacts to small business manufacturers for all the alternatives identified (including those in the RIA,) when preparing the final rule.

2. Microwave Ovens

The microwave oven industry consists of eight manufacturers with a market share larger than two percent. Most are large, foreign companies that import microwave ovens into the United States. There are two U.S. facilities that partially assemble microwave ovens. Both of these facilities are owned by large appliance manufacturers. None of the microwave oven manufacturers falls into any small business category. Thus, DOE did not address the microwave oven industry further in the small business analysis.

3. Commercial Clothes Washers

The CCW industry consists of three principal competitors that make up almost 100 percent of the market share. Two of them are diversified appliance manufacturers, while the third is a focused laundry equipment manufacturer. Before issuing this notice of proposed rulemaking, DOE interviewed all CCW manufacturers. Since all CCW manufacturers also make RCWs, DOE also considered whether a CCW manufacturer could be considered a small business entity in that industry. None of the CCW manufacturers fall into any small business category. Thus, DOE did not address the CCW industry further in the small business analysis.

C. Review Under the Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501 *et seq.*), a person is not required to respond to a collection of information by a Federal agency, including a requirement to maintain records, unless the collection displays a valid OMB control number. (44 U.S.C. 3506(c)(1)(B)(iii)(V)) This rulemaking imposes no new information or recordkeeping requirements. Accordingly, Office of Management and Budget clearance is not required under the PRA.

D. Review Under the National Environmental Policy Act

DOE has prepared a draft environmental assessment (EA) of the impacts of the proposed rule pursuant to the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), the regulations of the Council on Environmental Quality (40 CFR parts 1500–1508), and DOE's regulations for compliance with the National Environmental Policy Act (10 CFR part 1021). This assessment includes an examination of the potential effects of emission reductions likely to result from the rule in the context of global climate change, as well as other types of environmental impacts. The draft EA has been incorporated into the TSD; the environmental impact analyses are contained primarily in Chapter 16 of that document. Before issuing a final rule for residential cooking products and CCWs, DOE will consider public

comments and, as appropriate, determine whether to issue a finding of no significant impact as part of a final EA or to prepare an environmental impact statement (EIS) for this rulemaking.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined today's proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d) and 6316(b)(2)(D)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, ''Civil Justice Reform'' (61 FR 4729 (Feb. 7, 1996)) imposes on Federal agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

DOE reviewed this regulatory action under Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) (UMRA), which requires each Federal agency to assess the effects of Federal regulatory actions on State, local and Tribal governments and the private sector. For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted for inflation), section 202 of UMRA requires an agency to publish a written statement assessing the costs, benefits, and other effects of the rule on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA (62 FR 12820) (also available at *http://www.gc.doe.gov*). Although today's proposed rule does not contain a Federal intergovernmental mandate, it may impose expenditures of $100 million or more on the private sector.

Section 202 of UMRA authorizes an agency to respond to the content requirements of UMRA in any other statement or analysis that accompanies the proposed rule. 2 U.S.C. 1532(c). The content requirements of section 202(b) of UMRA relevant to a private sector mandate substantially overlap the economic analysis requirements that apply under section 325(o) of EPCA and Executive Order 12866. The **SUPPLEMENTARY INFORMATION** section of the notice of proposed rulemaking and the ''Regulatory Impact Analysis'' section of the TSD for this proposed rule respond to those requirements.

Under section 205 of UMRA, the Department is obligated to identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a written statement under section 202 is required. DOE is required to select from those alternatives the most cost-effective and least burdensome alternative that achieves the objectives of the rule unless DOE publishes an explanation for doing otherwise or the selection of such an alternative is inconsistent with law. As required by 42 U.S.C. 6295(h) and (o), 6313(e), and 6316(a), today's proposed rule would establish energy conservation standards for residential cooking products and CCWs that are designed to achieve the maximum improvement in energy efficiency that DOE has determined to be both technologically feasible and economically justified. A full discussion of the alternatives considered by DOE is presented in the ''Regulatory Impact Analysis'' section of the TSD for today's proposed rule.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights,'' 53 FR 8859 (March 18, 1988), that this regulation would not result in any takings that would require compensation under the Fifth Amendment to the United States Constitution.

J. Review Under the Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. The OMB guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed this notice under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to the Office of Information and Regulatory Affairs (OIRA), Office of Management and Budget, a Statement of Energy Effects for any proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) Is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy, or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

Today's regulatory action would not have a significant adverse effect on the supply, distribution, or use of energy and, therefore, is not a significant energy action. Accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under the Information Quality Bulletin for Peer Review

On December 16, 2004, OMB, in consultation with the Office of Science and Technology (OSTP), issued its ''Final Information Quality Bulletin for Peer Review'' (the Bulletin), which was published in the **Federal Register** on January 14, 2005. 70 FR 2664. The Bulletin establishes that certain scientific information shall be peer reviewed by qualified specialists before it is disseminated by the Federal government, including influential scientific information related to agency regulatory actions. The purpose of the Bulletin is to enhance the quality and credibility of the Government's scientific information. Under the Bulletin, the energy conservation standards rulemakings analyses are ''influential scientific information.'' The Bulletin defines ''influential scientific information'' as ''scientific information the agency reasonably can determine will have, or does have, a clear and substantial impact on important public policies or private sector decisions.'' 70 FR 2664, 2667 (Jan. 14, 2005).

In response to OMB's Bulletin, DOE conducted formal in-progress peer reviews of the energy conservation standards development process and analyses and has prepared a Peer Review Report pertaining to the energy conservation standards rulemaking analyses. Generation of this report involved a rigorous, formal, and documented evaluation process using objective criteria and qualified and independent reviewers to make a judgment as to the technical/scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of programs and/or projects. The ''Energy Conservation Standards Rulemaking Peer Review Report'' dated February 2007 has been disseminated and is available at the following Web site: *http://www.eere.energy.gov/buildings/appliance_standards/peer_review.html.*

VII. Public Participation

A. Attendance at Public Meeting

DOE will hold a public meeting on Thursday, November 13, 2008, from 9 a.m. to 4 p.m., in Washington, DC. The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E–089, 1000 Independence Avenue, SW, Washington, DC 20585. To attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945 or *Brenda.Edwards@ee.doe.gov.* As explained in the **ADDRESSES** section, foreign nationals visiting DOE Headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE of this fact as soon as possible by contacting Ms. Brenda Edwards to initiate the necessary procedures.

B. Procedure for Submitting Requests to Speak

Any person who has an interest in this notice, or who is a representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation. Such persons may hand-deliver requests to speak, along with a compact disc (CD) in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format to the address shown in the **ADDRESSES** section at the beginning of this notice of proposed rulemaking between the hours of 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Requests may also be sent by mail or e-mail to: *Brenda.Edwards@ee.doe.gov.*

Persons requesting to speak should briefly describe the nature of their interest in this rulemaking and provide a telephone number for contact. DOE requests persons scheduled to be heard to submit an advance copy of their statements at least two weeks before the public meeting. At its discretion, DOE may permit any person who cannot supply an advance copy of their statement to participate, if that person has made advance alternative arrangements with the Building Technologies Program. The request to give an oral presentation should ask for such alternative arrangements.

C. Conduct of Public Meeting

DOE will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with 5 U.S.C. 553 and section 336 of EPCA, 42 U.S.C. 6306. A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. After the public meeting, interested parties may submit further comments on the proceedings as well as on any aspect of the rulemaking until the end of the comment period.

The public meeting will be conducted in an informal, conference style. DOE will present summaries of comments received before the public meeting, allow time for presentations by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a prepared general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will

permit other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the public meeting.

DOE will make the entire record of this proposed rulemaking, including the transcript from the public meeting, available for inspection at the U.S. Department of Energy, Resource Room of the Building Technologies Program, 950 L'Enfant Plaza, SW, Suite 600, Washington, DC, 20024, (202) 586–2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays. Any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data, and information regarding the proposed rule before or after the public meeting, but no later than the date provided at the beginning of this notice of proposed rulemaking. Information submitted should be identified by docket number EE–2006–STD–0127 and/or RIN 1904–AB49. Comments, data, and information submitted to DOE's e-mail address for this rulemaking should be provided in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format. Stakeholders should avoid the use of special characters or any form of encryption and, wherever possible, comments should carry the electronic signature of the author. Comments, data, and information submitted to DOE via mail or hand delivery/courier should include one signed original paper copy. No telefacsimiles (faxes) will be accepted.

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit two copies: One copy of the document including all the information believed to be confidential, and one copy of the document with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

E. Issues on Which DOE Seeks Comment

DOE is particularly interested in receiving comments and views of interested parties concerning:

(1) The proposed standards for residential gas kitchen ranges and ovens, microwave ovens, and CCWs, as well as the proposed ''no-standard'' standard for residential electric kitchen ranges and ovens other than microwave ovens;

(2) Whether battery-powered spark ignition modules are a viable alternative to standing pilots for manufacturers of gas ranges, ovens, and cooktops;

(3) The preliminary determination of the technical infeasibility of incorporating microwave oven cooking efficiency with standby mode and off mode power into a single metric for the purpose of developing energy conservation standards;

(4) Input and data regarding off mode power for microwave ovens;

(5) Input and data on the utility provided by specific features that contribute to microwave oven standby power. In particular, DOE seeks information on the utility of display technologies, as well as on cooking sensors that do not require standby power;

(6) Input and data on control strategies available to allow manufacturers to make design tradeoffs between incorporating standby-power-consuming features such as displays or cooking sensors and including a function to turn power off to these components during standby mode. DOE also seeks comment on the viability and cost of microwave oven control board circuitry that could accommodate transistors to switch off cooking sensors and displays;

(7) Whether switching or similar modern power supplies can operate successfully inside a microwave oven and the associated efficiency impacts on standby power;

(8) The selection of microwave oven standby standard levels for the engineering analysis;

(9) Input and data on the estimated incremental manufacturing costs, as well as the assumed approaches to achieve each standby level for microwave ovens. DOE also seeks comment on whether any intellectual property or patent infringement issues are associated with the design options presented in the TSD to achieve each standby level;

(10) Input and data on the estimated market share of microwave ovens at different standby power consumption levels;

(11) The appropriateness of using other discount rates in addition to seven percent and three percent real to discount future emissions reductions; and

(12) The determination of the anticipated environmental impacts of the proposed rule, particularly with respect to the methods for valuing the expected CO_2 and NO_X emissions savings due to the proposed standards.

VIII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this proposed rule.

List of Subjects

10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Intergovernmental relations, Small businesses.

10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation, Reporting and recordkeeping requirements.

Issued in Washington, DC, on September 29, 2008.

John F. Mizroch,

Acting Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons stated in the preamble, chapter II, subchapter D, of Title 10 of the Code of Federal Regulations, Parts 430 and 431 are proposed to be amended to read as set forth below:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

1. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

2. Section 430.23 of subpart B is amended by revising paragraph (i)(3) to read as follows:

§ 430.23 Test procedures for the measurement of energy and water consumption.

* * * * *

(i) * * *

(3) The standby power for microwave ovens shall be determined according to 3.2.4 of appendix I to this subpart. The standby power shall be rounded off to the nearest 0.1 watt.

* * * * *

3. Section 430.32 of subpart C is amended by revising paragraph (j) to read as follows:

§ 430.32 Energy and water conservation standards and effective dates.

* * * * *

(j) *Cooking Products.* (1) Gas cooking products with an electrical supply cord shall not be equipped with a constant burning pilot light. This standard is effective on January 1, 1990.

(2) Gas cooking products without an electrical supply cord shall not be equipped with a constant burning pilot light. This standard is effective on [DATE 3 YEARS AFTER FINAL RULE **Federal Register** PUBLICATION].

(3) Microwave ovens shall have an average standby power not more than 1.0 watt. This standard is effective on [DATE 3 YEARS AFTER FINAL RULE **Federal Register** PUBLICATION].

* * * * *

4. Section 430.62(a)(4) of subpart F is amended by redesignating paragraphs (a)(4)(xi) through (xvii) as (a)(4)(xii) through (xviii) respectively, and by adding new paragraph (a)(4)(xi) to read as follows:

§ 430.62 Submission of data.

(a) * * *

(4) * * *

(xi) Microwave ovens, the average standby power in watts.

* * * * *

PART 431—ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

5. The authority citation for part 431 continues to read as follows:

Authority: 42 U.S.C. 6291–6317.

6. Section 431.156 of subpart I is revised to read as follows:

§ 431.156 Energy and water conservation standards and effective dates.

Each commercial clothes washer manufactured on or after [DATE 3 YEARS AFTER FINAL RULE **Federal Register** PUBLICATION], shall have a modified energy factor no less than and a water factor no greater than:

Product class	Modified energy factor (cu. ft./kWh/cycle)	Water factor (gal./cu. ft./cycle)
i. Top-Loading	1.76	8.3
ii. Front-Loading	2.00	5.5

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DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE–2008–BT–TP–0011]

RIN: 1904—AB78

Energy Conservation Program for Consumer Products: Test Procedure for Microwave Ovens

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

ACTION: Notice of proposed rulemaking and public meeting.

SUMMARY: The U.S. Department of Energy (DOE) proposes to amend its test procedures for microwave ovens under the Energy Policy and Conservation Act to provide for the measurement of standby mode and off mode power use by microwave ovens. The proposed amendments would incorporate into the DOE test procedure provisions from the International Electrotechnical Commission's Standard 62301, *Household electrical appliances—Measurement of standby power*, First Edition 2005–06, as well as language to clarify application of these provisions for measuring standby mode and off mode power in microwave ovens. The proposed amendments would also correct a technical error in the calculation of microwave test cooking energy output. DOE will hold a public meeting to discuss and receive comments on the issues presented in this notice.

DATES: DOE will accept comments, data, and information regarding the notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than December 31, 2008. For details, see section V, ''Public Participation'', of this NOPR.

DOE will hold a public meeting on Friday, November 14, 2008, from 9 a.m. to 4 p.m., in Washington, DC. DOE must receive requests to speak at the public meeting before 4 p.m., Friday, October 31, 2008. DOE must receive a signed original and an electronic copy of statements to be given at the public meeting before 4 p.m., Friday, November 7, 2008.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E–089, 1000 Independence Avenue, SW., Washington, DC 20585–0121. To attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945. Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE as soon as possible by contacting Ms. Edwards to initiate the necessary procedures.

Any comments submitted must identify the NOPR on Test Procedures for Microwave Ovens, and provide the docket number EERE–2008–BT–TP–0011 and/or regulatory information number (RIN) 1904–AB78. Comments may be submitted using any of the following methods:

1. *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.

2. *E-mail: MicroOven–2008–TP–0011@ee.doe.gov.* Include docket number EERE–2008–BT–TP–0011 and/or RIN 1904–AB78 in the subject line of the message.

3. *Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, 1000 Independence Avenue, SW.,