DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

10 CFR Part 430

[Docket No. EE–RM–94–403]

RIN 1904–AA67

Energy Conservation Program for Consumer Products: Clothes Washer Energy Conservation Standards

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

ACTION: Notice of proposed rulemaking and public hearing.

SUMMARY: The Energy Policy and Conservation Act, as amended (hereinafter referred to as EPCA or the Act), prescribes energy conservation standards for certain major household appliances, and requires the Department of Energy (DOE, Department, or we) to administer an energy conservation program for these products. We conducted several analyses regarding the energy savings, benefits and burdens of amended energy conservation standards for clothes washers and have shared the results of these analyses with all stakeholders. Based on these analyses, several of the major stakeholders, including clothes washer manufacturers and energy efficiency advocates, submitted to the Department a joint proposal for the highest standard level which they believed to be technically feasible and economically justified. Based on our review of this proposal, we found the proposed standards technically feasible and economically justified. Therefore, today we propose to amend the energy conservation standard for clothes washers for residential applications as recommended in the joint proposal and announce a public hearing.

As part of this rulemaking in response to the joint proposal by the clothes washer manufacturers and energy efficiency advocates, we have also included revisions to the test procedure based on issues found during this rulemaking dealing with the energy test cloth, remaining moisture content (RMC), extractor testing and the correction factor. In addition, we incorporated minor editorial changes to help clarify both Appendix J and J1 of the test procedure based on the joint proposal by stakeholders. These changes have been included in their entirety in this rulemaking pertaining to the test procedure.

DATES: If you wish to submit comments on the proposed rule, they must be received on or before December 4, 2000 to Ms. Brenda Edwards-Jones at the address listed below. We request 10 copies of the written comments and, if possible, a computer disk. Oral views, data, and arguments may be presented at the public hearing. We will hold a Public Hearing on November 15, 2000, beginning at 9:00 a.m.

If you wish to speak at the hearing, requests must be received by the Department no later than 4:00 p.m., November 6, 2000. Copies of statements to be given at the public hearing must be received by the Department no later than 4:00 p.m., November 6, 2000. We will read the statements in advance of the hearing and would appreciate the oral presentations to be limited to a summary of the statement. The length of each oral presentation is limited to 5 minutes.

ADDRESSES: The hearing will be at the U.S. Department of Energy, Forrestal Building, Room 6E–069, 1000 Independence Avenue, SW., Washington, DC 20585. Written comments, oral statements, and requests to speak at the hearing are to be submitted to Ms. Brenda Edwards-Jones, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Energy Conservation Program for Consumer Products: Clothes Washers Energy Conservation Standards, Docket No. EE–RM–94–403, 1000 Independence Avenue, SW., Washington, DC 20585–0121.

Copies of the public comments received, the Technical Support Document (TSD) and the transcript of the public hearing may be read at the DOE Freedom of Information Reading Room, U.S. Department of Energy, Forrestal Building, Room 1E–190, 1000 Independence Avenue, SW., Washington, DC 20585, (202) 586–3142, between the hours of 9:00 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays. Copies of the TSD may be obtained from: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Forrestal Building, Mail Station EE–41, 1000 Independence Avenue, SW., Washington, DC 20585–0121. (202) 586–9127. Copies of the analysis can also be found on the Codes and Standards Internet site at: http://www.eren.doe.gov/buildings/codes_standards/applbrf/clwasher.html

For more information concerning public participation in this rulemaking proceeding see Section VII, ''Public Comment Procedures,'' of this Notice.

FOR FURTHER INFORMATION CONTACT: Bryan Berringer, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Forrestal Building, Mail Station EE–41, 1000 Independence Avenue, SW, Washington, DC 20585–0121, (202) 586–0371, E-mail: Bryan.Berringer@EE.DOE.GOV, or Eugene Margolis, U.S. Department of Energy, Office of General Counsel, Forrestal Building, Mail Station GC–72, 1000 Independence Avenue, SW, Washington, DC 20585, (202) 586–9526, E-mail: Eugene.Margolis@HQ.DOE.GOV.

SUPPLEMENTARY INFORMATION:

I. Summary of the Proposed Rule

The EPCA, as amended, specifies that any new or amended energy conservation standard the Department prescribes shall be designed to ''achieve the maximum improvement in energy efficiency * * * which the Secretary determines is technologically feasible and economically justified.'' Section 325(o)(2)(A), 42 U.S.C. 6295(o)(2)(A). Furthermore, the amended standard must ''result in significant conservation of energy.'' Section 325(o)(2(B)(3)(B), 42 U.S.C. 6295(o)(2)(B)(3)(B).

In accordance with the statutory criteria discussed in this notice, we are proposing to amend the clothes washer energy efficiency standards. The proposed standards are based on a Joint Stakeholders Comment recommendation submitted to the Department by clothes washer manufacturers and energy conservation advocates. (Joint Comment, No. 204). The Joint Stakeholders consist of the following: Alliance Laundry Systems LLC; Amana Appliances; Asko Incorporated; Frigidaire Home Products; General Electric Appliances (GEA), Maytag Corporation; Miele, Inc.; Fisher & Paykel Ltd; Whirlpool Corporation; Alliance to Save Energy; American Council for an Energy Efficient Economy (ACEEE); Appliance Standards Awareness Project; California Energy Commission (CEC); City of Austin, Texas; Natural Resources Defense Council (NRDC); Northwest Power Planning Council; and Pacific Gas and Electric (PG&E). The proposal as submitted in the Joint Stakeholders Comment consists of four parts as follows:

''Clothes Washer Energy Standard. The clothes washer energy standards for standard class clothes washers shall be 1.04 modified energy factor (MEF) in 1/1/2004 and 1.26 MEF in 1/1/2007. The energy test procedure will be revised to ensure that variability between test cloths will not significantly affect remaining moisture content (RMC) results. Additional clarifications will also be made to test procedure.

Energy Star Labeling Program. Energy Star levels shall be set as follows: Standard Class Clothes Washers—1.26 MEF in 2001; 1.42 MEF in 2004; Refrigerator/Freezers—10% better than the 2001 standard in 2001; change to 15% better than the 2001 in 2004.

Tax Credit for the Production of Energy Efficient Clothes Washers and Refrigerator-Freezers. The credit shall provide for two energy efficiency tiers, each with separately designated funds. There is $30 million in each designated fund per company per efficiency tier. Cap of $60 million per company for the two funds or yearly cap with carry forward. Annual total tax credit cannot exceed in any taxable year 2% of corporate gross revenues as determined by average of 3 prior years.

Standard Class Clothes Washers: Two tiers coterminous 2001–2006; $50 per unit for products manufactured with a 1.26 MEF and $100 per unit for products manufactured with a 1.42 MEF, increasing to 1.5 MEF in 2004. Includes residential-style ''coin-operated'' washers.

Refrigerators: First tier effective in 2001. $50 per unit for products manufactured 10% above 2001 minimum efficiency standard. Credit runs through 2004. Second tier also effective in 2001 and runs through 2006. It is $100 for products manufactured 15% above the 2001 minimum efficiency standard. Credits apply to automatic defrost refrigerator-freezers only, at 16.5 cubic feet internal volume and above.

Voluntary Industry Water Program. Water factor reporting shall be part of a voluntary industry sponsored program. AHAM members agree to publicly disclose through AHAM, water factors for each model that meets Energy Star/Tax Credit MEF levels, starting sometime in calendar year 2001. In calendar year 2002 and each year thereafter, industry-wide shipment weighted average water factors for units shipped in the previous year shall be reported by AHAM. Water factor calculations will use Appendix J water factor through 2003 and will use Appendix J1 thereafter. Starting in 2007, AHAM members agree to report water factor for all models. AHAM will sponsor water conference.'' (Joint Comment, No. 204).

This rulemaking only addresses the clothes washer energy standards of this agreement. The above proposed standard, based on this agreement would go into effect in stages, with the first level going into effect on January 1, 2004, and the second level going into effect on January 1, 2007. The initial standard is a 22 percent (%) reduction in energy consumption over the current standard or a MEF of 1.04, and can be attained with current vertical-axis (V-axis) clothes washer designs. The later, more stringent standard, is a 35 percent reduction in energy consumption over the current standard or a MEF of 1.26. While both vertical- and horizontal-axis (H-axis) design clothes washers are currently available in retail appliance stores at these levels, they represent less than nine percent of the washers sold per year.

The Department's analyses indicates that the proposed standards, trial standard level of a 1.04 MEF in 2004 and a 1.26 MEF in 2007 saves an estimated 5.52 quads of energy over 27 years (2004–2030), a significant amount. This amount is more than the primary energy used for heating water in all U.S. buildings (residential, commercial and industrial) in 1997 (3.82 quads). The economic impacts on consumers (*i.e.*, the average life-cycle cost (LCC) savings) are positive.

The national NPV of trial standard level of a 1.04 MEF in 2004 and a 1.26 MEF in 2007 is $15.3 billion from 2004–2030 in 1997 dollars. This is the estimated total value of future savings discounted to 1997 minus the estimated increased equipment costs also discounted to 1997. The clothes washer industry net present value (INPV) today is estimated to be $1,452 million. If we adopt trial standard level proposed, we expect manufacturers may lose between 28.6–36.0% of the INPV, which is approximately $411.0–$518.3 million. With the present value of future energy savings for the U.S. of $15.3 billion, this would exceed industry losses due to energy efficiency standards by about 30 times. Additionally, based on our interviews with the five major manufacturers, we do not expect any plant closings or loss of employment because the manufacturers stated that they would stay in business.

The proposed standard has significant environmental benefits, reducing greenhouse gas emissions and air pollution. This proposed standard level would result in cumulative greenhouse gas emission reductions of 95.1 million

metric tons (Mt) of carbon dioxide (CO_2 equivalent. Additionally, air pollution would be reduced by the elimination of 253.5 thousand metric tons of nitrous oxides (NO_X) and 28.1 thousand metric tons of sulfur dioxide (SO_2) from 2004–2030. The NO_X reduction are derived from the power sector and household emissions, whereas the SO_2 reductions are derived only from household emission.

The proposed standard also saves a significant quantity of water, which amounts to 11.59 trillion gallons through the period 2004–2030.

Therefore, DOE has determined that the benefits (energy and water savings, consumer life cycle cost savings, national net present value increase, job creation and emission reductions) to the nation outweigh the burdens (loss of manufacturer net present value and consumer life cycle cost increases for some users of clothes washers). We conclude that the proposed standard of a 1.04 MEF in 2004 and a 1.26 MEF in 2007 is economically justified. Furthermore, DOE has determined this standard level is technologically feasible. Clothes washers reaching this standard level already are commercially available in both V- and H-axis models.

II. Introduction

A. Consumer Overview

The Energy Policy and Conservation Act, as amended, specifies that the Department must consider, for amended standards, those standards that ''achieve the maximum improvement in energy efficiency which the Secretary determines is technologically feasible and economically justified'' and which will ''result in significant conservation of energy.'' Accordingly, today's proposed rule would be amending the energy conservation standard for residential clothes washers.

We are currently establishing a new energy efficiency standard for clothes washers that will amend the standard set in 1994. When today's proposed standards go into effect, they will essentially require more efficient Standard class clothes washers. The efficiency levels can be met by either top or front loading machines. The major stakeholders, including manufacturers and energy efficiency advocates, have jointly submitted a proposed clothes washer efficiency standard to the Department that they both feel is technically feasible and economically justified. The proposed standard would go into effect in two stages. The first stage would begin January 1, 2004, and require that all new residential clothes washers be 22 percent more efficient than today's baseline clothes washer. The second stage would begin January 1, 2007, and require that all new residential clothes washers be 35 percent more efficient than today's baseline clothes washer.

The Department has reviewed this proposal and its analyses, and agrees that the standard they proposed is technically feasible and economically justified. The Department therefore proposes to amend the energy conservation standard for Standard class clothes washers for residential applications as recommended in the joint stakeholders proposal and announce a public hearing.

As a result of today's proposed rule, clothes water efficiency standard will provide significant energy savings and water savings to the nation. The Department's analyses indicates that the proposed standards would save an estimated 5.52 quads of energy over 27 years (2004 to 2030). That is equivalent to saving enough electricity to light 16 million U.S. homes for 25 years, while cutting greenhouse gas emissions by an amount equal to that produced by three million cars every year. This proposed standard level would result in cumulative greenhouse gas emission reductions of 95.1 million metric tons (Mt) of carbon dioxide (CO_2) equivalent. Additionally, air pollution would be reduced by the elimination of 253.5 thousand metric tons of nitrous oxides (NO_X) and 28.1 thousand metric tons of sulfur dioxide (SO_2) from 2004 to 2030. The NO_X reductions are derived from the power sector and household emissions. The SO_2 reductions are derived only from household emissions and is a result of less home heating oil and LPG being used in oil-fired and LPG-fired water heaters for water heating.[1] DOE is seeking comment on what will be the likely impact of EPA rules, such as its proposed rule to reduce sulfur levels in highway diesel fuel, on home heating oil sulfur levels and household SO_2 emissions. In 2020, the standards will save the amount of electricity generated by 15 large, 400 megawatt, power plants.[2] The standards will save enough water to supply the needs of 6.6 million households for 25 years. The water savings will reach up to 11 trillion gallons, meaning less water needs to be pumped from America's aquifers and rivers, and less strain on many of the nation's overtaxed water and sewer systems. In total, we estimated the net present value (NPV) to the nation of this standard to be $15.3 billion from 2004 to 2030.

The proposed clothes washer energy efficiency standard will not impact clothes washer features valued by consumers. For instance, consumers will still be able to purchase either a top loading clothes washer or a front loading machine, whichever they prefer. The energy and water savings will result primarily from a variety of design changes, such as higher spin speeds, more efficient use of hot water, more sensitive clothes load technologies, more efficient motors, and the increased use of spray rinse cycles. The Department does not expect the cleaning ability or reliability of washing machines to be compromised by the design changes anticipated under the proposed clothes washer standard.

The Department expects the purchase price of the high efficiency clothes washers (*i.e.*, 35 percent efficiency increase) to be approximately $200 higher than the average price of clothes washers today. Although the purchase cost is expected to increase, the energy and water efficiency gains will result in lower washer-related energy costs and water costs, saving consumers $30 a year on their utility bills and 18 gallons of water for every load of wash. As such, the life cycle cost analysis estimates that the payback period for the high efficiency machines will be approximately 7 years. In other words, the energy and water cost savings will enable the average consumer to recoup the additional $200 he/she had to spend on the purchase of the high efficiency machine in 7 years through the energy and water cost savings. When these savings are summed over the lifetime of the high efficiency machine, consumers will save $260, on average, compared to today's baseline clothes washing machines.

B. Authority

Part B of Title III of the Energy Policy and Conservation Act, Pub. L. 94–163, as amended by the National Energy Conservation Policy Act, Pub. L. 95–619, by the National Appliance Energy Conservation Act, Pub. L. 100–12, by the National Appliance Energy Conservation Amendments of 1988, Pub. L. 100–357, and the Energy Policy Act of 1992, Pub. L. 102–486[3] (the Act

[1] The Department recognizes that the Environmental Protection Agency is considering regulations which could affect the amount of sulfur in home heating oil.

[2] DOE estimates that standards will result in 5 coal-fired and 11 gas-fired power plants avoided.

[3] Part B of Title III of the Energy Policy and Conservation Act, as amended by the National Energy Conservation Policy Act, the National Appliance Energy Conservation Act, the National Appliance Energy Conservation Amendments of 1988, and the Energy Policy Act of 1992, is referred to in this notice as the ''Act.'' Part B of Title III is codified at 42 U.S.C. 6291 *et seq.* Part B of Title III

or EPCA) created the Energy Conservation Program for Consumer Products other than Automobiles. The consumer products subject to this program (often referred to hereafter as ''covered products'') include clothes washers.

Under the Act, the program consists essentially of three parts: testing, labeling, and Federal energy conservation standards. The Department, in consultation with the National Institute of Standards and Technology, amends or establishes new test procedures for each of the covered products. Section 323. The test procedures measure the energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use. They must not be unduly burdensome to conduct. Section 323(b)(3). A test procedure is not required if DOE determines by rule that one cannot be developed. Section 323(d)(1). Test procedures appear at 10 CFR Part 430, Subpart B.

A test procedure promulgated under Section 323 of the Act must be reasonably designed to produce test results which measure energy efficiency, energy use, water use (in the case of shower heads, faucets, water closets and urinals), or estimated annual operating cost of a covered product during a representative average use cycle or period of use, and must not be unduly burdensome to conduct. EPCA, Section 323(b)(3). A test procedure is not required if DOE determines by rule that one cannot be developed. EPCA, Section 323(d)(1). One hundred and eighty days after a test procedure for a product is adopted, no manufacturer may make representations with respect to energy use, efficiency or water use of such product, or the cost of energy consumed by such product, except as reflected in tests conducted according to the DOE procedure. EPCA, Section 323(c)(2). This 180-day period may be extended for up to an additional 180 days if the Secretary determines that the requirements of Section 323(c)(2) would impose undue burden. EPCA, Section 323(c)(3).

Section 323(e) of the Act requires DOE to determine to what extent, if any, a proposed test procedure would alter the measured energy efficiency, measured energy use or measured water use of any covered product as determined under the existing test procedure. If DOE determines that an amended test procedure would alter the measured efficiency or measured use of a covered product, DOE is required to amend the applicable energy conservation standard accordingly. EPCA, Section 323(e)(2).

The Federal Trade Commission (FTC) prescribes rules governing the labeling of covered products after DOE publishes test procedures. Section 324(a). The FTC labels indicate the annual operating cost for the particular model and the range of estimated annual operating costs for other models of that product. Section 324(c)(1). Disclosure of estimated operating cost is not required if the FTC determines that such disclosure is not likely to assist consumers in making purchasing decisions, or is not economically feasible. In such a case, the FTC must require a different useful measure of energy consumption. Section 324(c). At the present time, there are Federal Trade Commission rules requiring labels for the following products: room air conditioners, furnaces, clothes washers, dishwashers, water heaters, refrigerators, refrigerator-freezers and freezers, central air conditioners and central air conditioning heat pumps, and fluorescent lamp ballasts.

The National Appliance Energy Conservation Act of 1987 amended the Act to impose prescriptive standards (design feature requirements) for clothes washers as part of the energy conservation program for consumer products. EPCA, § 325(g), 42 U.S.C. 6295(g). The design feature requirement that clothes washers shall have an unheated rinse option was effective for appliances manufactured on or after January 1, 1988. The Act required the Department to conduct a rulemaking by January 1, 1990, to determine if the above mentioned standards should be amended. The Act provided that any amendment to the standards would apply to products manufactured three years after the rulemaking. The Final Rule was issued on May 14, 1991, and is effective for products manufactured on or after May 14, 1994, (hereinafter referred to as the May 1991 Final Rule) which required top loading compact clothes washers (less than 1.6 cubic feet capacity) to have an energy factor (EF) of 0.90 cubic feet/kilowatt-hours/cycle (cu.ft/Kwh/cycle) and top loading standard clothes washers (1.6 cu. ft. or greater capacity) to have an EF of 1.18 cu. ft./Kwh/cycle). 56 FR 22279. The Act also requires the Department to conduct a subsequent rulemaking no later than five years after the date of publication of the previous final rule.

Any new or amended standard must be designed so as to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. Section 325(o)(2)(A).

Section 325(o)(2)(B)(i) provides that before DOE determines whether a standard is economically justified, it must first solicit comments on a proposed standard. After reviewing comments on the proposal, DOE must then determine that the benefits of the standard exceed its burdens, based, to the greatest extent practicable, on a weighing of the following seven factors:

(1) The economic impact of the standard on the manufacturers and on the consumers;

(2) The savings in operating costs throughout the estimated average life of the covered product in the type (or class) compared to any increase in the price, initial charges, or maintenance expenses;

(3) The total projected amount of energy, or as applicable, water, savings likely to result directly from the standard;

(4) Any lessening of the utility or the performance of the covered products likely to result from 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 standard;

(6) The need for national energy and water conservation; and

(7) Other factors the Secretary considers relevant.

In addition, Section 325(o)(2)(B)(iii), 42 U.S.C. 6295(o)(2)(b)(iii), establishes a rebuttable presumption of economic justification in instances where the Secretary determines 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 applicable test procedure. * * *'' The rebuttable presumption test is an alternative path to establishing economic justification.

Section 327 of the Act addresses the effect of Federal rules on State laws or regulations concerning testing, labeling, and standards. Generally, all such State laws or regulations are superseded by the Act unless specifically exempted in Section 327. The Department can grant a waiver of preemption in accordance with the procedures and other provisions of Section 327(d) of the Act. 42 U.S.C. 6297(d).

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of the Energy Policy and Conservation Act, as amended by the National Energy Conservation Policy Act only, is referred to in this notice as the National Energy Conservation Policy Act.

C. Background

1. Current Standards

The existing clothes washer efficiency standards have been in effect since 1994. Energy efficiency for a clothes washer is measured in terms of an energy factor (EF), which measures overall clothes washer efficiency, in terms of cubic feet per kilowatt-hour per cycle, and is determined by the DOE test procedure. 10 CFR Part 430, Subpart B, Appendix J. The current clothes washer efficiency standards are as follows:

- Top loading, compact (less than 1.6 cubic feet capacity), EF = 0.90.
- Top loading, standard (1.6 cubic feet or greater capacity), EF = 1.18.
- Top loading, semi-automatic, must have an unheated rinse option.
- Front loading, must have an unheated rinse option.
- Suds saving, must have an unheated rinse option.

2. History of Previous Rulemakings

On November 14, 1994 DOE published an Advance Notice of Proposed Rulemaking (ANOPR). 59 FR 56423. On November 19, 1998, DOE published a Supplemental ANOPR. (Hereafter referred to as the 1998 Supplemental ANOPR.) 63 FR 64344. In the 1998 Supplemental ANOPR, we provided interested persons an opportunity to comment on:

(1) The product classes that we propose to analyze;

(2) The analytical framework, models (*e.g.*, the Government Regulatory Impact Model (GRIM)), and tools (*e.g.*, a Monte Carlo sampling methodology, and life-cycle-cost (LCC) and national energy savings (NES) spreadsheets) that we plan to use in performing analyses of the impacts of standards; and

(3) The results of preliminary analyses for LCC, payback and national energy savings contained in the Preliminary Technical Support Document: Energy Efficiency Standards for Consumer Products: Clothes Washers (TSD) dated October 1998 and summarized in the 1998 Supplemental ANOPR.

3. Process Improvement

The fiscal year (FY) 1996 appropriations legislation imposed a moratorium on proposed or final rules for appliance efficiency standards for FY 1996. Public Law 104–134. During the moratorium, the Department examined the appliance standards program and how it was working. Congress advised DOE to correct the standards-setting process and to bring together stakeholders (such as manufacturers and environmentalists) for assistance. We consulted with energy efficiency groups, manufacturers, trade associations, state agencies, utilities and other interested parties to provide input to the process used to develop appliance efficiency standards. As a result, on July 15, 1996, the Department published a Final Rule: Procedures for Consideration of New or Revised Energy Conservation Standards for Consumer Products (referred to as the Process Rule) (61 FR 36974), codified at 10 CFR Part 430, Subpart C, Appendix A. DOE completed this review and decided to use the Process Rule, to the extent possible, in the development of the revised clothes washer standards.

We developed an analytical framework for the clothes washer standards rulemaking for our stakeholders. The analytical framework described the different analyses (e.g., LCC, payback and manufacturing impact analyses (MIA)) to be conducted, the method for conducting them, the use of new LCC and national energy savings (NES) spreadsheets, and the relationship between the various analyses. We have conducted several meetings, workshops and discussions regarding energy efficiency standards for clothes washers. These workshops included discussions on proposed design options and a preliminary engineering analysis on November 15, 1996; development of an analytical framework for appliance standards rulemaking on July 23, 1997; and development of two new spreadsheet tools for LCC and NES on March 11, 1998. We conducted public hearings on December 15, 1998, to receive additional comments on the 1998 Supplemental ANOPR and on July 22, 1999, to discuss the process, analytical tools and uncertainties with the test procedures.

In this rulemaking we incorporated the recommendations made by the Advisory Committee on Appliance Energy Efficiency Standards on April 21, 1998. (Advisory Committee, No. 96). These recommendations relate to using the full range of consumer marginal energy prices (CMEP) in the LCC analysis (replacing the use of national average energy prices), defining a range of energy price futures for each fuel used in the economic analyses and defining a range of primary energy conversion factors and associated emission reductions, based on the generation displaced by energy efficiency standards for each rulemaking. We discuss how these recommendations have been incorporated in the discussions on methodology (Section IV). Marginal energy prices are used in the LCC, payback and NES analyses. Because the NES results are inputs to the analyses for utility, emissions and employment; these analyses are also impacted by using marginal rates.

4. Test Procedures

Federal test procedures for clothes washers were first established in 1977. Simultaneous with the rulemaking for clothes washer standards, the Department was also in the process of revising the clothes washer test procedure. The Department needed to address a number of innovative technologies for which there were no test procedures. A number of proposals were published, one on December 22, 1993, (58 FR 67710) and another on March 23, 1995. 60 FR 15330. In its comments to the March, 1995 proposed rule, AHAM requested that DOE adopt an additional new test procedure, based on current consumer habits, which would be used in considering the revision of the clothes washer energy conservation standards, and would go into effect upon issuance of standards.

On April 22, 1996, the Department issued a supplemental Notice of Proposed Rulemaking proposing such a new test procedure, Appendix J1, as well as certain additional revisions to the currently applicable test procedure in Appendix J to Subpart B of 10 CFR Part 430. 61 FR 17589. The supplemental notice was published to seek comments on whether DOE should adopt the AHAM recommended test procedure with certain changes. The Final Rule, published on August 27, 1997, adopted this recommendation. 62 FR 45484. Appendix J is the current applicable test procedure. Appendix J1 is informational and will not become mandatory until the energy conservation standards of this rule become effective. Appendix J1 includes a modified energy factor (MEF) which replaces the EF. Contrasting with the previous EF (energy factor) descriptor, the MEF descriptor incorporates clothes dryer energy by consideration of the remaining moisture content (RMC) of clothes leaving the clothes washer. Other substantive differences between the test procedures include using different water temperatures for testing and using cloth loads in J1 and not in J. The issuance of the Final Rule was a major step in accelerating the development of clothes washer standards because it provided the basis upon which the energy and water consumption, as well as the manufacturing costs would be submitted.

III. General Discussion

A. Test Procedure

As part of the July 15, 1996, Process Rule (61 FR 36974), we stated that a final modified *test procedure* would be issued prior to the notice of proposed rulemaking on standards. The process described in this rule provides for greatly enhanced opportunities for public input, improved analytical approaches, and encouragement of consensus-based standards. Section 7, *Test Procedures,* of the Process Rule provides that modifications in test procedures will be proposed before revised standards are proposed. Today's proposed revisions to the clothes washer test procedures follows the process in the Process Rule in that the Final Rule for test procedures was published on August 27, 1997, with the exception of today's proposed revisions to the test procedure language as recommended by clothes washer manufacturers and energy conservation advocates. (Joint Comment, No. 204)

During this standards rulemaking, it was discovered that the test cloth to be used for determining the RMC was giving inconsistent results. Over the approximately 20 year period that the original clothes washer and clothes dryer test procedures have been used, no variations or inconsistency of washer or dryer test results had been attributed to variations in the test cloths. A significant inconsistency in RMC test results under the new Appendix J1 procedure was noted by Alliance Laundry Systems LLC and was brought to the Department of Energy's attention in a letter dated June 7, 1999. (Alliance Laundry Systems, No. 179). In the tests referred to in this letter, which were run at Intertek Testing Services (ITS), the RMC values that were obtained in one machine with two different lots of energy test cloths differed by over 11 percentage points (67.9% versus 56.0%). When these two lots of energy test cloth were run through a second machine, a similar difference in RMC occurred.

The effect of RMC on MEF can be substantial, particularly for washers which are more efficient with respect to electrical consumption and use of hot water. The following scenario illustrates: For a high efficiency horizontal axis washer, an 18% increase in RMC (54.5%–64.5%) will result in a 13% decrease in MEF (1.52–1.33). For a lower efficiency washer, a 17% increase in RMC (57.7%–67.7%) will result in only a 6% decrease in MEF (0.82–0.77).

The Department investigated possible causes for the inconsistent test results, and results are summarized in the DOE report, ''Development of a Standardized Energy Test Cloth for Measuring Remaining Moisture Content in a Residential Clothes Washer,'' May 2000. (DOE, No. 200). As part of our investigation into the cause of these discrepancies, we found that various lots of test cloth will yield inconsistent RMC results. To understand the effects of operating variables and cloth specifications, it was necessary to conduct laboratory tests to determine RMC. To insure that test results would not be influenced or biased by any manufacturer's product (clothes washer), we used an extractor to remove moisture content. An extractor is a centrifuge—basically a rotating basket that has a controllable speed to produce a variety of centrifugal forces. The speed was varied to impose different centripetal accelerations on the test load. These accelerations are reported in terms of gravitational acceleration (g). We also soak the cloth in a tub at controlled temperature rather than use the agitated soak cycle provided by a typical washer. The RMC tests closely resembles those specified in the energy test procedure.

An extractor based test has been established to examine RMC values at different gravitational forces (g-forces). A correction factor is derived by which the deviation between a new production batch of test cloth and a standard reference test cloth is measured. This deviation is measured as the root mean square between the set of measured RMC values and the set of standard RMC values. If this absolute deviation is below 2%, then no correction factors are needed in MEF tests using that batch of cloth. If the absolute root-mean-square (RMS) difference between the cloth RMC values and standard RMC values is above 2%, then correction factors may be applied when using the cloth to test the MEF of a clothes washer.

As part of this rulemaking, we have included revisions to the test procedure based on our proposed language addressed in the May 2000 report dealing with the energy test cloth, RMC, extractor testing and the correction factor and Joint Stakeholders Comment. (Joint Comment No. 204). In addition, we incorporated AHAM's comments and Joint Stakeholders Comment requesting minor editorial changes to help clarify both Appendix J and J1. (AHAM , Nos. 197 and 199, and Joint Comment No. 204). These changes have been included in their entirety in this rulemaking pertaining to the test procedure.

B. Technological Feasibility

1. General

There are or have been clothes washers in the market at all of the efficiency levels analyzed in today's notice. Therefore, the Department believes all of the efficiency levels discussed in today's notice are technologically feasible.

2. Maximum Technologically Feasible Levels

Under the guidelines in the Process Rule, DOE will eliminate from consideration, early in the process, any design option which is not practicable to manufacture, install, or service, will eliminate product utility features or for which there are safety concerns that can not be resolved. In order to conduct the screening analysis, the Department gathers information regarding all current technology options and prototype designs. In consultation with interested parties, the Department develops a list of design options for consideration in the rulemaking. All technologically feasible design options are candidates in this initial assessment. We did not reject any design options from consideration in this rulemaking.

The Department considers design options technologically feasible if they are already in use by the respective industry or research has progressed to the development of a working prototype. The Process Rule sets forth a definition of technological feasibility as follows: ''Technologies incorporated in commercially available products or in working prototypes will be considered technologically feasible.'' 10 CFR 430, Subpart C, Appendix A(4)(a)(4)(I).

When we amend or consider new standards, we must consider those that ''shall be designed to achieve the maximum improvement in energy efficiency which the Secretary determines is technologically feasible and economically justified.'' (Section 325 (l)(2)(A)). For this clothes washer rulemaking, the Department determined that a 50% reduction in the energy use of the baseline model (corresponding to an MEF of 1.634) is the maximum technologically feasible level for the Standard class (1.6 $ft.^3$ or greater capacity). This determination was based on information relative to existing technology options and prototype designs. In consultation with interested parties, the Department developed a list of design options for consideration. All technologically feasible design options were candidates in this initial assessment. Furthermore, the clothes washer rulemaking analysis was originally performed using the design

option approach. Using this approach, information was gathered on all possible energy saving design options. The Department gathered design option information from previous clothes washer analyses, trade publications, industry research organizations, product brochures from domestic and foreign manufacturers, and appliance conferences, including the International Appliance Technical Conference (IATC). The ''Draft Report on Design Options for Clothes Washers'' and ''Draft Report on the Preliminary Engineering Analysis for Clothes Washers'' provide details on the potential technologies. (Clothes Washer Public Workshop, No. 55B and 55C).

3. Product Classes

DOE divides clothes washers into classes based on the size and features, *e.g.*, suds saving. For the existing standards, DOE defines residential clothes washers in the following classes:

- Top loading, compact (less than 1.6 cubic feet capacity);
- Top loading, standard (1.6 cubic feet or greater capacity);
- Top loading, semi-automatic;
- Front loading; and
- Suds saving.

The Department is proposing to maintain the current definitions for all these product classes. For this rulemaking, the Department is proposing to maintain the current requirements for the Semi-Automatic Top-Loading and Suds Saving classes. In the May 1991 Final Rule, these classes were not subject to minimum energy conservation standards because they represented a small portion of the market, and due to a lack of adequate information to analyze them. The standard for these classes will continue to be ''not applicable,'' except for the 1988 requirement of an unheated rinse water option.

C. Energy Savings

1. Determination of Savings

The Department forecasted energy savings through the use of a national energy savings (NES) spreadsheet, which forecasted energy savings over the period of analysis for candidate standards relative to the base case. The Department quantified the energy savings that would be attributable to a standard as the difference in energy consumption between the candidate standards case and the base case. The base case represents the forecast of energy consumption in the absence of amended mandatory efficiency standards.

The NES spreadsheet model is described in Section IV.e of this notice, *infra*, and in Chapters 9 and 10 of the TSD. The NES spreadsheet model first calculates the energy savings in site energy. The energy savings to the nation is expressed in quads, that is, quadrillions of British thermal units (Btus).

2. Significance of Savings

Under Section 325(o)(3)(B) of the Act, the Department is prohibited from adopting a standard for a product if that standard would not result in ''significant'' energy savings. While the term ''significant'' has never been defined in the Act, the U.S. Court of Appeals, in 768 F.2d 1355, 1373 (D.C. Cir. 1985), concluded that Congressional intent in using the word ''significant'' was to mean ''non-trivial.''

D. Rebuttable Presumption

The National Appliance Energy Conservation Act established new criteria for determining whether a standard level is economically justified. Section 325(o)(2)(B)(iii) states:

> ''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 * * * savings during the first year that the consumer will receive as a result of the standard, as calculated under the applicable test procedure, there shall be a rebuttable presumption that such standard level is economically justified. A determination by the Secretary that such criterion is not met shall not be taken into consideration in the Secretary's determination of whether a standard is economically justified.''

If the increase in initial price of an appliance due to a conservation standard would repay itself to the consumer in energy savings in less than three years, then we presume that such standard is economically justified.[4] This presumption of economic justification can be rebutted upon a proper showing.

E. Economic Justification

As noted earlier, Section 325(o)(2)(B)(i) of the Act provides seven factors to be evaluated in determining whether a conservation standard is economically justified.

1. Economic Impact on Manufacturers and Consumers

The July 1996 Process Improvement Rule established procedures, interpretations and policies to guide the Department in the consideration of new or revised appliance efficiency standards (Procedures for Consideration of New or Revised Energy Conservation Standards for Consumer products). 61 FR 36974 (July 15, 1996). Key objectives of the rule have direct bearing on the implementation of manufacturer impact analyses. First, the Department will utilize an annual cash flow approach in determining the quantitative impacts on manufacturers. This includes 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 comes into effect, and a long-term assessment. Impacts analyzed include industry net present value, cash flows by year, changes in revenue and income, and other measures of impact, as appropriate. Second, the Department will analyze and report the impacts on different types of manufacturers, with particular attention to impacts on small manufacturers. Third, the Department will consider the impact of standards on domestic manufacturer employment, manufacturing capacity, plant closures and loss of capital investment. Finally, the Department will take into account cumulative impacts of different DOE regulations on manufacturers.

For consumers, measures of economic impact are the changes in purchase price and annual energy expense. The purchase price and annual energy expense, i.e., life-cycle cost, of each standard level are presented in Chapter 7 of the TSD. Under Section 325 of the Act, the life-cycle cost analysis is a separate factor to be considered in determining economic justification.

2. Life-Cycle Cost (LCC)

One measure of the effect of proposed standards on consumers is the change in operating expense as compared to the change in purchase price, both resulting from standards. This is quantified by the difference in the LCC between the baseline and the more efficient technologies for the clothes washers analyzed. The LCC is the sum of the purchase price and the operating expense, including installation and maintenance expenditures, discounted over the lifetime of the appliance.

For each clothes washer, we calculated the life-cycle costs for six efficiency levels: 20, 25, 35, 40, and 50% reduction in the energy use of the baseline model. In addition, a two-step standard as proposed by the Joint Stakeholders Comment was analyzed. A distribution of discount rates averaging 6.1% was used in the calculations. The consumer is assumed to purchase a clothes washer in 2004 or 2007 (for step 2 of the Joint Stakeholders Comment).

[4] For this calculation, the Department calculated cost-of-operation based on the DOE test procedures with assumed usage shown in Chapter 7 of the TSD. Consumers that use the clothes washer less will experience a longer payback while those that use them more will have a shorter payback.

Price forecasts are taken from the 1999 *Annual Energy Outlook* of the Energy Information Administration (DOE/EIA–0383). Chapter 7 of the TSD contains the details of the life-cycle cost calculations including those considered under factor seven below, *infra*.

3. Energy Savings

While significant conservation of energy is a separate statutory requirement for imposing an energy conservation standard, the Act requires DOE, in determining the economic justification of a standard, to consider the total projected energy savings that are expected to result directly from revised standards. The Department used the NES spreadsheet results, discussed earlier, in its consideration of total projected savings. The savings are provided in Section V of today's notice.

4. Lessening of Utility or Performance of Products

This factor cannot be quantified. In establishing classes of products the Department tries to eliminate any degradation of utility or performance in the products under consideration in this rulemaking.

An issue of utility that was considered in this rule concerns the consumer utility of V-axis and H-axis machines. We conducted consumer focus groups and a conjoint analysis study to address this issue.

5. Impact of Lessening of Competition

It is important to note that this factor has two parts; on the one hand, it assumes that there could be some lessening of competition as a result of standards; and on the other hand, it directs the Attorney General to gauge the impact, if any, of that effect.

In order to assist the Attorney General in making such a determination, the Department will provide the Attorney General with copies of this notice and the Technical Support Document for review.

6. Need of the Nation To Conserve Energy

Most of the non-monetary benefits of the proposed standard are likely to be reflected in improvements to the environment, rather than in the security or reliability of the Nation's energy system. We report the environmental effects in Section V of today's notice.

7. Other Factors

This provision allows the Secretary of Energy, in determining whether a standard is economically justified, to consider any other factors that the Secretary deems to be relevant. Section 325(o)(2)(B)(i)(VI), 42 U.S.C. 6295(o)(2)(B)(i)(VI).

Under this factor, we considered the water savings from each standard level. The Department received numerous comments asking for the inclusion of a water factor standard in addition to the MEF standard. (City of Austin, No. 105 at 1; City of Bellingham, Washington, Department of Public Works, No. 106 at 1; Lower Colorado River Authority (LRCA), No. 109 at 1; Amy Vicker and Associates, Inc., No. 110 at 1; City of San Diego, No. 123 at 1; City of Santa Barbara, Public Works Department, No. 125 at 1; City of Seattle, No. 126 at 2; Santa Clara Valley Water District, No. 127 at 1; American Water Works Association, No. 149 at 1; City of Redmond, Office of the Mayor, No. 153 at 1; Massachusetts Water Resources Authority, No. 152 at 4; State of New Mexico, Office of the State Engineer, No. 158 at 1). As stated previously, the Department is considering water savings as a factor in determining the economic justification of the clothes washer standard level. However, the Department does not have the authority to prescribe a minimum water factor standard.

Another factor that the Department considered is the life-cycle cost impacts on those subgroups of consumers who, if forced by standards to purchase more efficient washers, would choose to repair their existing machines.

IV. Methodology

The methodology to be used in this rulemaking was described in the 1998 Supplemental ANOPR and accompanying TSD. In this section we will discuss comments and changes in the methodology. These changes were performed because new data was obtained or in response to comments received after publication of the 1998 Supplemental ANOPR.

In general, when information is based on periodic forecasts and surveys such as the Annual Energy Outlook (AEO) forecasts of energy prices and the Residential Energy Consumption Survey, both from the Energy Information Administration (EIA), we try to use the latest available information. The analysis in support of this proposed rule was performed using RECS93 and AEO 1999 data. Just prior to publication of this proposed rule both RECS97 and AEO2000 data became available. Although we do not expect a significant difference in results by updating to RECS97 and AEO2000, we intend to use this updated information for the final rule. We seek comment on the use of the most current RECS and AEO data.

A. Product Classes

The Supplemental ANOPR contained three proposals regarding clothes washer product classes. The first proposal suggested eliminating the Semi-Automatic Top-Loading, Front-Loading and Suds Saving classes identified in the May 1991 Final Rule. In its second proposal, the Department proposed to increase the compact class to include all clothes washers with a volume less than 2.0 cubic feet. The third proposal was to not establish separate classes for Horizontal and Vertical-axis clothes washers.

The Department received no comments on its proposal to eliminate the Semi-Automatic Top-Loading and Suds Saving classes. In the May 1991 Final Rule, these classes were not subject to minimum energy conservation standards because they represented a small portion of the market, and due to a lack of adequate information to analyze them. However, the 1988 standard requiring an unheated rise option is still applicable to these classes. Given the continued absence of information available to analyze these classes and ensure that they could meet the proposed standard levels, the Department is proposing to maintain these product classes but not to subject them to minimum energy conservation standards. However, the unheated rise water option is still applicable to these classes.

DOE received several comments regarding changing the definition of the compact clothes washers class maximum capacity, from 1.6 cubic feet to 2.0 cubic feet. Whirlpool believes that this re-definition for the compact class would better reflect the actual product offerings that exist in the marketplace which range from 1.6 to 1.96 cubic feet. (Whirlpool, No. 141 at 3). Amana Appliances is not opposed to the change. (Amana, No. 146 at 1). ACEEE and American Water Works Association (AWWA) also find this proposal acceptable. (ACEEE, No. 150 at 4 and AWWA, No. 149 at 4). Maytag is concerned that a clothes washer at 2.0 cubic feet, if not subjected to the same standard as full size washers will become a relatively larger volume seller. This would result in a reduction in the potential national energy and water savings of the standard and may place some manufacturers that have complied with more stringent standards at a competitive disadvantage. Accordingly, Maytag recommends that the Department develops safeguards as retail market share or product sales volume limits which, if exceeded, would require the product to meet the

same energy standards as full-size washers. (Maytag, No. 137 at 4–5). PG&E supported changing the ''compact'' size to 2.0 cubic feet, up from 1.6 cubic feet under the condition that the ''compact'' washers are required to at least meet the 25 percent more efficient standard level. (PG&E, No. 189 at 1).

We received several comments in support of maintaining the current limit of 1.6 cubic feet for the compact class. (Northwest Energy Efficiency Alliance, No. 131 at 3; the Northwest Power Planning Council, No. 135 at 2; Bosch, No. 142 at 1; and Miele, No. 156 at 1). GEA opposed the change in definition because it believed there is substantial room for these products to increase their efficiency. (GEA, No. 143 at 11). The Oregon Office of Energy commented that the new 2.0 cu. ft. definition puts a significantly greater number of more efficient machines in the compact class. For this reason it will insist that the Department conduct enough of an analysis on this class of products to justify raising the standard for this class. (Oregon, No. 162 at 2).

Staber Industries proposed removing tub size as a factor in determining both capacity and energy efficiency and proposed instead classifying washers by loading capacity. (Staber, Nos. 185 and 187).

The Department agrees that the increasing the compact class size to 2.0 cu. ft. will increase the number of washers in this class and possibly incorporate products currently already more efficient than compact models of 1.6 cu. ft. The Department has not been provided any information in order to conduct such an analysis. For this notice the Department is maintaining the existing 1.6 cu. ft. definition of the compact product class and given the small size of this market (less than one percent) is proposing not to change the minimum efficiency levels. However given the new test procedure (Appendix J1) and the change in descriptor it is necessary to translate the current standard of EF of 0.9 into an MEF value. Since no mathematical translation is possible, we have estimated this value using engineering calculations and assumptions which are detailed in the TSD. This value is estimated to be an MEF of 0.65.

For the Final Rule, the Department will consider changes to the definition and efficiency standards for the top loading compact class. A new definition could have different capacity requirements (such as less than 2.0 cu. ft.) and additional requirements for the maximum external dimensions (such as a width not to exceed 22.5 inches). The Department will also consider any new information on the efficiency of current models under Appendix J1. The Department seeks comment on these issues.

The Department's ANOPR proposal to eliminate the Front-Loading product class also received no negative comments. NRDC commented that the existence of a top-loading horizontal-axis washer clearly dispels the notion that the location of a washer's port of access (Top or Front) is synonymous with axis of rotation (Vertical and Horizontal). Amana notes that because of technological differences it would be more appropriate to refer to the current ''Front-Loading'' and ''Top-Loading'' product classes as Horizontal-Axis and Vertical-Axis (Amana, No. 146 at 1). Elimination of the Front-Loader class is invariably linked by many comments with the need to establish separate classes for V- and H-axis washers.

The Department received numerous comments on the proposal not to establish separate classes for V- and H-axis clothes washers. Comments supportive of the Department's proposal were received from Maytag, Whirlpool, Bosch, Staber, Miele, NRDC, the Alliance to Save Energy, ACEEE, and approximately fifteen state or city agencies and utilities. (Maytag, No. 137 at 2; Whirlpool, No. 141 at 7; Bosch , No. 142 at 1; Staber, Nos. 185 and 187; Miele, No. 156 at 1; NRDC, No. 138 at 5; the Alliance to Save Energy, No. 148 at 2; and ACEEE, No. 150 at 5).

GEA, Alliance Laundry and Amana opposed the Department's proposal. GEA commented that the unique characteristic and energy performance of H- and V-axis washers require two-product classes with separate minimum energy efficiency standards for each. H-axis are less convenient and potentially less reliable with different systems or features for loading clothes and adding clothes during the wash cycle, longer cycle times, smaller capacities, more expensive detergents, and availability of deep pre-soak which are important to consumers. (GEA, No. 143 at 2). Alliance Laundry commented that the V- and H-axis product classifications would ignore relevant consumer utility differences and would combine two distinct products which do not compete in the market for energy comparison purposes. (Alliance Laundry, No. 145 at 3). Amana commented that the machines differ in cost/price, utility, energy efficiency, performance, and ergonomics. The integration of these two categories into one will increase rather than decrease confusion in the marketplace with consumers. (Amana, No. 146 at 2). These concerns, DOE believes, are superceded by the Joint Comment in which the same standard was agreed to for V- and H-axis products.

The Alliance to Save Energy commented that recent technology development shows that various axis types can meet relatively stringent performance criteria. (Alliance to Save Energy, No. 148 at 2). The Department agrees with this view. Recent product introductions by Whirlpool Corporation and Fisher & Paykel of high-efficiency V-axis washers have positively demonstrated that V-axis designs are available for the same range of efficiencies as H-axis washers. Since both H-axis and V-axis washers can achieve the same range of efficiency, there is no basis for separate efficiency standards based on axis of rotation or orientation of loading. Additionally the existence of a Top Loading horizontal-axis washers dispels the notion that orientation of loading is necessarily associated with efficiency. Therefore, in today's proposal the Department is maintaining the Front Loading product class but is proposing a single efficiency standard for both the Front Loading and the Top Loading, Standard class washers.

B. Engineering Analysis

The engineering analysis develops cost-efficiency relationships to show the manufacturer costs of achieving increased efficiency. Three methodologies can be used to generate the manufacturing costs needed for the engineering analysis. These methods include: (1) The design-option approach, reporting the incremental costs of adding design options to a baseline model; (2) the efficiency-level approach, reporting relative costs of achieving energy efficiency improvements; and/or (3) the cost-assessment approach which requires a ''bottoms-up'' manufacturing cost assessment based on a detailed bill of materials.

As summarized in the Supplemental ANOPR, the engineering analysis was conducted using the efficiency-level approach. The cost-assessment approach was also used to supplement the efficiency-level approach because of the existence of a proprietary technology for which no data was available. The objective of the manufacturing cost assessment was to quantify the differential manufacturing costs of producing high efficiency clothes washers based on (1) a Whirlpool proprietary V-axis design, and (2) commercially available V- and H-axis designs.

C. Life-Cycle Cost (LCC) Analysis

The effect of standards on individual consumers includes a change in operating expense (usually decreased) and a change in purchase price (usually increased). The life-cycle cost (LCC) spread sheet is used to analyze the economic impacts of possible standards on individual consumers. This section describes modifications to the LCC spreadsheet model and revisions to data inputs as a result to new data or recommendations from comments received after the publication of the 1998 Supplemental ANOPR. 63 FR 64353 (November 19, 1998).

Table 1 summarizes the assumptions used in the LCC analysis for the 1998 Supplemental ANOPR analysis and the changes made for this proposed rule analysis than followed by a written discussion of these changes.

TABLE 1.—ASSUMPTIONS IN THE LCC ANALYSIS [1]

Parameter	Supplemental ANOPR	Proposed rule
Energy Price	average prices	marginal prices.
Variation in Household Energy Prices, Energy Use, and Water Heater Shares.	1993 RECS data	Marginal prices derived from 1993 RECS data and adjusted to 1997 prices.
Energy Price Projections	AEO 1998 reference case to the year 2020, with extrapolations to the year 2030.	AEO 1999 reference, high & low cases to the year 2020, with extrapolations to the year 2030; used FEMP methodology for extrapolations.
Water and Sewer Prices	Urban ($0.00 to $7.84 per 1000 gallons)	Urban 0–$7.97.
	Ave. price = $3.18 per 1000 gals	Rural 0–$7.97.
		Rural (no sewer) 0–$3.53.
		Individual well 2.61 kWh/1000 gals.
		Ave. price = $2.48 per 1000 gals.
Annual Real Change in Water and Sewer Cost (Water Price Projections).	0 percent	Urban = 3.01% (high 5.41%, low 0.53%).
		Rural = 3.01% (high 5.41%, low 0.53%).
		Rural with septic = 0.64% (high 2.93%, low −2.89%).
		Individual well (electricity price escalation).
Manufacturer Cost	AHAM	No change.
Manufacturer Mark-ups	Min. 1.000	Range: varies with standard level.
	Mean 1.175	Distribution: uniform.
	Max. 1.350	
	Distribution: triangular	
Retail Mark-up	1.4	No change.
Detergent Savings	not an input parameter	allowed as an input (detergent savings = zero).
Discount Rate	Distribution (0–15 percent)	No change.
Lifetime	Distribution (12–17 years)	No change.
Cycles Per Year	Distribution from RECS database (207–645)	No change.
Start Year (Effective Date of Standard)	2003	2004 (and 2007 if a second tier).

[1] All prices and costs are shown in 1997 dollars.

Energy Prices. For the Supplemental ANOPR the LCC spreadsheet model sampled the individual prices paid by households in the 1993 version of the Residential Energy Consumption Survey (RECS). These prices were updated (scaled up or down based on AEO 1998 national prices) and converted to 1997 dollars. The Advisory Committee recommended DOE use the full range of consumer marginal energy prices instead of national average energy prices. Marginal energy prices are those prices consumers pay (or save) for their last units of energy used (or saved). The Department agreed that marginal energy prices would improve the accuracy of the LCC analysis and estimated marginal rates for electricity and natural gas from the 1993 RECS database.

In accordance with the Advisory Committee's recommendation, the Department elected to substitute marginal energy prices for average prices for calculating LCC and NPV. EIA gathered monthly energy bills and energy consumption data for the RECS public use data. It did not gather information on rate schedules, fixed charges, or marginal prices. DOE estimated consumer marginal electricity and natural gas prices directly from household data in the 1993 RECS public use data survey as the change in household monthly energy bills divided by the change in monthly energy consumption for each fuel, referred to as the change in monthly bill method. This provides a precise marginal energy rate based on actual household bills.

Households for which marginal energy prices could not be calculated were eliminated, resulting in a reduction of approximately 10% of the households used from the RECS. Although electricity rates were calculated separately for four summer months (June–September) and, separately for winter (October–May) months, unlike other appliances, the usage of clothes washers for summer and winter months is on average, approximately constant.

In order to understand and characterize regional variations in pricing and distribution of fuel oil and LPG, we collected information relating to pricing and distribution of fuel oil and LPG. We learned that bills paid by residential consumers for both fuel oil and LPG are essentially volume-driven, with a single block rate. We interpreted the average prices inherent in those bills, as reported in the RECS public use data, as being equivalent to marginal prices for the purposes of the LCC price analysis. A detailed description of the methodology used to determine marginal energy rates is contained in the report entitled ''Marginal Energy Prices Final Report, July, 1999,'' which can be obtained at the website address: http://www.eren.doe.gov/buildings/codes_standards/applbrf/clwasher.html.

As an enhancement to the LCC analysis for the proposed rule, Liquid

Petroleum Gas (LPG or propane) was added as a water heater fuel type.

Variation in Household Energy Prices, Energy Use, and Water Heater Shares. In addition to determining energy prices RECS data is used to determine the market share, *i.e.,* percentage of water heaters and dryers, that are electric, gas, liquefied petroleum gas (LPG) or oil. The current analysis was based on Residential Energy Consumption Survey 1993 (RECS93) and Annual Energy Outlook 1999 (AEO99). Although demographic information, price and equipment types change from survey to survey, we do not expect that the differences are significant enough to change the outcome of this rulemaking.

Energy Price Projections. For the proposed rule, the Annual Energy Outlook 1999 (AEO99) forecasts replaced AEO98 energy price forecasts for electricity, gas and oil. Given the uncertainty of projections of future energy prices, DOE used scenario analysis to examine the robustness of proposed energy efficiency standards under different energy price conditions. The LCC calculations use these scenarios. Each scenario provides a self-consistent projection, integrating energy supply and demand. The scenarios differ from each other in the energy prices that result. The Advisory Committee suggested the use of three scenarios. While many scenarios can be envisioned, specification of three scenarios should be sufficient to bound the range of energy prices.

The AEO 1999 reference case provides a well-defined middle scenario. DOE also used AEO fuel price forecasts under assumptions of high and low economic growth. The future trend in energy prices assumed in each of the three scenarios is clearly labeled and accessible in the LCC spreadsheet. The Gas Research Institute (GRI) reference case fuel price forecast is another choice available in the LCC spreadsheet. Stakeholders can easily substitute alternative assumptions in the LCC spreadsheet to examine additional scenarios as needed.

Another modification for the proposed rule analysis concerns the extrapolation method used to project the AEO energy prices from 2020 to 2030. (The AEO contains energy prices projections to the year 2020.) For the ANOPR the price of electricity was extrapolated based on the trend of the last five years of the scenario used. For gas and oil, prices values were kept constant from the year at which the extrapolation was necessary.

For the proposed rule we are now using the approach EIA uses to forecast fuel prices for the Federal Energy Management Program (FEMP). This was done to be consistent with the rest of the energy forecasting also done by EIA.

Water and Sewer Prices. For the Supplemental ANOPR the main source of data on water and sewer prices was from a 1994 survey of water prices in major metropolitan areas by Ernst & Young. The Ernst and Young data was adjusted for service population, base utility charges and average household use by Al Dietemann of Seattle Water.

The Department received several comments on this issue. Denver Water suggested replacing the 1994 Rates Study done by Ernst and Young and using the 1998 Raftelis Study. (Denver Water, No. 107 at 20). The American Water Works Association (AWWA) commented that an average water price of $3.18 per thousand gallons as used was too high. (AWWA, No. 108 at 64360). Energy Market and Policy Analysis, Inc. observed that the data was limited to certain metropolitan areas and probably would overstate water and sewer costs in non-metropolitan areas. Therefore, use of the data would probably overstate potential water and sewer cost savings that might be achieved by using a washer that uses less water. (Energy Market and Policy Analysis, Inc., No. 144 at 8).

In response to comments received and for the proposed rule analysis, 1998 prices and projected escalation rates were added for rural water and wastewater to the previous estimates for urban customers. The revised analysis, based on the 1998 Raftelis Study, divided water use into categories of urban, rural with water and wastewater utilities, rural with water utility service and septic tank, and individual well with septic tank. The range of prices used for each category is: for urban areas 0–$7.97, rural areas 0–$7.97, rural areas (no sewer) 0–$3.53, individual well 2.61 kWh/1000 gals. The resulting average price is $2.48 per 1,000 gallons.

Water Price Projections. As of the time of publication of the Supplemental ANOPR, the Department had found no national level water price forecasts and thus the Supplemental ANOPR assumed that future water prices would remain constant. In the Supplemental ANOPR the Department agreed that future water prices should not be assumed to be constant and described an approach to establish marginal water prices and escalation rates. See Chapter 7 of the TSD for details on how these marginal water prices and escalation rates where determined.

At a workshop held on December 15, 1998, DOE detailed its proposal for water prices and escalation rates. Support for this proposal was given by ACEEE, the Oregon Office of Energy, NRDC, the Northwest Energy Efficiency Alliance, PG&E, and the City of Seattle, Seattle Public Utilities. (ACEEE, No. 150 at 1; Oregon Office of Energy, No. 162 at 7; NRDC, No. 138 at 14; Northwest Energy Efficiency Alliance, No. 131 at 2; PG&E, No. 130 at 2; and the City of Seattle, Seattle Public Utilities, No. 126 at 2). In contrast, the Edison Electric Institute (EEI) commented that the escalation rate of 3.1% real will probably overstate the change in water and wastewater prices. (EEI, No. 122 at 6).

For the proposed rule, escalation rates were specified for urban and rural water and wastewater customers. The average escalation rates used are: for urban areas, 3.01% (high 5.41%, low 0.53%), rural areas, 3.01% (high 5.41%, low 0.53%), rural areas with septic 0.64% (high 2.93%, low −2.89%). Finally for areas with individual wells, the electricity price escalation rates were used.

Manufacturing Cost. The cost data used was provided by manufacturers. It was then compiled and reported to the Department by AHAM as a range of costs at each efficiency level. NRDC observed that the Department's engineering analysis weights incremental costs submitted by AHAM manufacturers by their 1997 market shares. In its opinion the real impact on consumers will be weighted not by 1997 market shares but by the market shares following the introduction of the standards. The argument is based not on a lack of credibility of the AHAM data but on the assumption that the market share of the very expensive machines will go down. As a consequence, NRDC believes the Department should weight the outlier points at the high cost end of the cost distribution curve minimally, if at all, in doing its analysis. (NRDC, No. 138 at 6 and 14).

The Department agrees that a wide variation in costs exists in the AHAM data. This variation in incremental costs are driven in part by the variability in cost structures of the various manufacturers (production volume, current technology) and in part by the variability in designs. Additionally, given the lack of experience manufacturing some of these technologies, uncertainty contributes to the range in costs. The Department believes the mean values of the distribution are the most appropriate for consideration in the LCC analysis and will weight analysis results for values surrounding the mean more heavily. However it will continue to incorporate the full range of costs as it represents a probability-weighted distribution of

costs based on the full spectrum of possible costs.

Manufacturer Mark-ups. In the Preliminary TSD for the ANOPR, the Department used a manufacturer mark-up over the full production costs with a maximum value of 1.35, which maintains industry (manufacturer) cost structure, and a minimum value of 1.00, which represents a pass-through of full production costs. This was modeled as a triangular distribution with a minimum value of 1.00, a most likely value of 1.175, and a maximum value of 1.35. For the proposed rule, a uniform distribution was used. The range of the mark-up is dependent on the standard level and obtained from the GRIM model.

Alliance Laundry believes that the low end of 1.00 for the manufacturing mark-up should not be used at all. It commented that history suggests manufacturing mark-up is within the 1.27 to 1.35 range. (Alliance Laundry, No. 164 at 10). The Oregon Office of Energy commented that manufacturer mark-ups are not static over time. Nor are they typically the same for products at the lower end of the product line as they are for the upper end. It further recommended that DOE find a way to model a variable mark-up pattern for each manufacturer—a pattern that is appropriate for each and responsive to market conditions as they evolve. (Oregon Office of Energy, No. 162 at 8). As suggested, the Department worked with each manufacturer to forecast its future mark-ups at the various standards levels factoring anticipated market dynamics. These market dynamics include: the technology status of existing product offerings as it relates to the cost-efficiency relationship; the status of manufacturing technology, including an assessment of conversion and restructuring costs; likely product offerings at each efficiency level (*e.g.,* V-axis, H-axis), consumer demand for product features and its implications for trade-offs between manufacturing cost and consumer utility; patent restrictions on design options; brand equity; availability of technical and financial resources; manufacturing versus sourcing strategies; and company cost structure and ability to pass on fixed (and sometimes even variable) costs. Individual mark-up forecasts were aggregated to characterize the industry and the resulting range of mark-ups was used in both the industry GRIM and LCC analysis.

Retail Mark-up. In the Preliminary TSD for the ANOPR, the Department used a fixed retail mark-up of 1.40, and a fixed mark-up of 1.052 to cover the sales tax. There was no change made for the proposed rule. ACEEE commented that the retail mark-up of 40% is too high. It proposed that the Department use an average retail mark-up based on the last five years of available data. (ACEEE, No. 150 at 4). In response to this comment, the Department did examine more recent data from the same data sources originally used (Dealerscope Merchandising's Annual Statistics Surveys, Bureau of Census—Current Industrial Report (CIR), Bureau of Labor Statistics—Consumer Expenditure Survey (CES), INTELECT—Elrick & Lavidge Computerized Audit Program (ELCAP) price database, AHAM Fact Book) and found no significant cause to alter its earlier estimate.

Detergent Savings. In the Supplemental ANOPR we did not include any possible detergent savings into the LCC analysis. The Northwest Power Planning Council, Oregon Office of Energy, ACEEE, Northwest Energy Efficiency Alliance, and PG&E commented that the Department should consider detergent cost savings as a benefit of H-axis clothes washers. (Northwest Power Planning Council, No. 135 at 1; Oregon Office of Energy, No. 162 at 6; ACEEE, No. 150 at 4; Northwest Energy Efficiency Alliance, No. 131 at 2&3; and PG&E, No. 189 at 2). These comments did not have specific recommendations as to appropriate values to use for detergent cost savings in the LCC.

Alliance Laundry System LLC commented that detergent cost savings associated with horizontal axis machines are unlikely. In fact, detergent costs may even be higher due to the fact that higher priced specially formulated detergent may have to be used for optimal cleaning performance. (Alliance Laundry, No. 145 at 11). Maytag believes that the detergent and dosage recommended by the detergent manufacturer will produce the best washing performance and that detergent use will not be a significant factor in consumer operating cost savings. (Maytag, No. 137 at 7).

The Department believes there is no conclusive evidence that detergent costs will change due to new standards. We believe results of the Bern Study (Bern Clothes Washer Study Final Report; ORNL/M–6382; prepared by Oak Ridge National Laboratory for the U.S. DOE, dated March 1998) do not show any significant difference in cost savings related to detergent use. Patterns of detergent use will change as detergent specially formulated for H-axis machines become more available. In addition, comments by major detergent manufacturers state that savings based on less detergent use will not occur (Procter & Gamble, No. 9 at 1) and using a lessor amount of detergent produced inferior cleaning performance (Lever Brothers, No. 51 at 2). In consideration of the previous evidence detergent savings were not included in the analysis. However, the LCC spread sheet does include the capability to input detergent costs, at the users' option.

Cycles per year. The EEI commented that the number of washer cycles appeared to be on the high side, especially for one and two person households. (EEI, No. 122 at 3). The Department used the most current information available to estimate the cycles per year. The Department adjusted the number of cycles per year based on the number of occupants for each RECS household. The cycles per week are based on a Procter and Gamble survey and adjusted using the RECS data, so the overall average cycles per year agree with the test procedure assumption of an overall average of 392 cycles per year.

Discount Rate. The LCC spreadsheet uses a distribution for discount rates ranging from 0 to 15%. These represent the variability in financing methods consumers use in purchasing appliances. The average discount rate from this distribution is 6.1% real.

Four comments suggested that the discount rate used in the consumer analysis was likely too high. Comments stated that DOE should take into account such factors as: declining bank card rates, the substantial fraction of card users who pay off monthly credit card balances, the substantial number of buyers who use lower-cost credit such as home equity credit lines, and bank card default rates. Future interest rates on credit cards are not expected to rise, so future inflation will yield lower real interest rates. (Alliance to Save Energy, No. 148 at 3; ACEEE, No. 150 at 4; Oregon Office of Energy, No. 162 at 7; and NRDC, No. 138 at 6). Three comments suggested that the discount rate may be too low. (Energy Market and Policy Analysis, Inc., No. 144 at 8; Consumer Alert, No. 155 at 4; and EEI, No. 122 at 6). Opportunity costs are higher and EIA uses higher rates for forecasting residential purchase decisions. DOE policy is to base discount rates on average financing costs (or opportunity cost of reduced savings).

In the Process Rule, DOE committed to using real (adjusted for federal taxes) discount rates for residential consumers by considering a range of three different real discount rates: credit card financing rate, a rate based on consumers having substantial savings, and a mid-range

rate. The mid-range discount rate will represent DOE's approximation of the average financing cost (or opportunity cost of reduced savings) experienced by typical consumers.

Based on the guidelines from the Process Rule, we derived a distribution of discount rates to reflect the variability in financing methods consumers can use in purchasing clothes washers. The real interest rate associated with financing an appliance purchase is a good indicator of the additional costs incurred by consumers who pay a higher first cost, but enjoy future savings, although it is not the only indicator of such costs. While the method used to derive this distribution relies on a number of uncertain assumptions regarding the financing methods used by consumers, DOE believes the resulting distribution of discount rates encompasses the full range of discount rates that are appropriate to consider in evaluating the impacts of standards on consumers (*i.e.,* values represented by the mid-range financing cost, consumers with no savings, and consumers with substantial savings), as well as all the discount rates that fall between the high and low extreme values.

DOE assumes the method of purchase used by consumers is indicative of the source of the funds and the type of financing used, although DOE is not aware of detailed research into this relationship. Whirlpool Corporation indicated that approximately 40% of white goods are purchased in cash, 35% with credit cards, and 25% with retailer loans. (1994 Eight Product Notice of Proposed Rulemaking, 59 FR 10464, March 4, 1994.) Whirlpool also indicated that 25% of appliance purchases are for new homes. However, we know consumers purchase 20% of clothes washers with new homes, *i.e.,* in mortgages, and 80% as replacements for existing clothes washers in separate retail purchases. Consumers pay for retail purchases by cash, credit cards, or loans. In order to derive a full distribution of discount rates, DOE estimated a range of interest rates, based on historical data and judgments of future trends, for different types of consumer savings or financing.

For new housing, the estimated nominal mortgage rate ranges from 5–8%, the derived after-tax rate is based on a tax of 28%, and a 2% inflation rate is subtracted from the total. The result is a range of real mortgage rates from 1.60%–3.76%. Example: 5%*(100%–28%)–2%=1.6%.

For cash, the minimum interest rate is 0%. This rate applies to consumers making cash purchases without withdrawing from savings accounts or interest bearing checking accounts. For the maximum rate, the opportunity cost is the interest that could have been earned in a savings account or mutual fund. Historic savings rate ranged from 4.5–5.5% from 1970–1986 (real rates of −8.27 to +3.58%). We believe the current maximum is the opportunity cost represented by the interest earned in a typical mutual fund (assumed to be 6% real). DOE selected a real rate of 3% as the mean.

DOE assumed the interest rates for retail loans and credit cards have the same range. The minimum credit card rate is 6% real. Introductory rates on some credit cards today are 5.9% nominal, but after the introductory period (often six months), the rate can increase sharply. Maximum rates are more than 20% nominal. However, if the consumer pays with a credit card and the balance is paid in less than the life of the clothes washer, then the effective interest rate is lower than the nominal credit card rate. The current assumption is a range of 6–15% real.

Combining the assumed shares of each financing method, the above real interest rates result in a weighted-average (mean) value of 6% and a distribution that varies from 0–15%. Sensitivity studies show that while the LCC results are sensitive to the value chosen for the mean discount rate, the LCC results are not sensitive to the distribution of discount rates.

DOE believes the methods described above are valid for establishing a distribution of discount rates relevant to most purchasers of the products covered by this rulemaking. However, the Department acknowledges that different assumptions could be made about likely interest, inflation and marginal tax rates, or about consumer financing methods, and that different approaches to identifying consumer discount rates might also be valid. For example, it is possible to base consumer discount rates on the average real rates of return on consumer investment or other measures of the opportunity costs incurred by consumers who purchase the covered products. DOE does not believe, however, such alternative assumptions or alternative approaches would significantly alter the range of discount rates used by the Department or the conclusions drawn from the LCC analyses conducted using these discount rates.

The Department is seeking any information that would support significant alterations in the range or distribution of the discount rates derived from its analysis. Alternatively, DOE is soliciting comment on the possible use of a standardized distribution of discount rates ranging from approximately 4–12%, with a mean of 6%. The use of such a standardized distribution would explicitly recognize the many uncertainties associated with DOE's current analysis and, based on sensitivity analyses already performed by DOE, such a standardized distribution would not significantly alter the conclusions of DOE's life cycle cost analyses.

Lifetime. The ANOPR analysis assumes that the period of time a clothes washer will provide service ranges from 12 to 16 years with an average of 14.2 years. One comment asked the Department to explain the assumptions used to determine the lifetime of a clothes washer. Since few consumers who purchase a clothes washer own it for the full lifetime of the appliance, using this value in the LCC may overstate the benefits to the original purchaser. (Energy Market and Policy Analysis, Inc., No. 119 at 4). For the national energy savings, calculating the benefits requires consideration of the full lifetime of the product. In response, DOE believes that the requirements of the statute are to analyze the savings in operating costs throughout the estimated average life of the covered product even if there is more than one owner during this lifetime for the LCC analysis.

Start Year. This is the year the new standard is expected to become effective. The Joint Stakeholder Comment proposes a two-step standard in which the first standard level is effective in 2004 and the second high standard level becomes effective in 2007. (Joint Comment No. 204).

Maintenance and Repair Costs. The ANOPR analysis assumed no change in maintenance and repair costs as a result of new clothes washer standards. The Department received a comment expressing the need to account for maintenance, repair and warranty costs in the LCC analysis. (Energy Market and Policy Analysis, Inc., No. 119 at 3). Staber Industries also requested that the Department consider maintenance in the LCC analysis since H-axis have no transmissions and it is more reliable than V-axis. (Staber, Nos. 185 and 187). In response, the Department's analysis does not consider changes in the maintenance and repair cost as we do not have any data to indicate the costs to be different for more efficient products for the proposed rule.

Request for Comment. DOE requests comments on the LCC analysis, particularly the range of values used as input to the analysis. For example,

RECS does not measure usage so we used the Proctor & Gamble survey data for national average usage values and then adjusted those values based on RECS-reported household size. DOE would like comment both on the Proctor & Gamble and RECS data as well as the method DOE used to develop the range of usage.

D. Payback Period Analysis

The payback period measures the amount of time needed to recover the additional consumer investment in increased efficiency through lower operating costs. The payback period is the ratio of the increase in purchase price to the decrease in annual operating expenditures from replacing the baseline clothes washer with a more efficient washer. We express payback periods in years.

Rebuttable Payback. In accordance with EPCA, DOE calculated payback based on the values specified by the DOE test procedure, Appendix J1. This includes the Appendix J1 test procedure assumption of an electric water heater and an electric dryer. Today's amendments to Appendix J1 have no effect on these results. This payback, however, does take into account that a distribution of clothes washer efficiencies exists in the current and future stock. This distribution is approximated by assuming that the efficiency of the stock of washers is a combination of baseline and H-axis efficiency washers. Table 2 shows the changes in assumptions since the ANOPR for the base case.

TABLE 2.—CHANGES IN REBUTTABLE PAYBACK ASSUMPTIONS

Parameter	Supplemental ANOPR	Proposed rule
H-axis sales	3.0% in 1998	6.25% in 1998.
Escalation of H-axis sales	0.5% annual (linear)	0.5% of sales not already H-axis.

Changes in assumptions outlined in Table 1 that also apply to rebuttable payback include:

- Water price;
- Energy price;
- Energy and water price escalation only to the year 2004; and
- Manufacturer mark-up (average of range is used).

Basecase Assumptions. The Department received comments on the assumptions made concerning the existing saturation of higher efficiency washers and their expected increase in sales over time. We received comments stating that we had either overestimated or underestimated the penetration of H-axis washers, and we either overestimated or underestimated the future escalation of H-axis sales. EEI, Whirlpool, NRDC, City of Seattle, Seattle Public Utilities, Alliance Laundry System, Northwest Power Planning Council, ACEEE, and Amana believes that the projections for sale of high efficiency units is too low. (EEI, No. 122 at 3; Whirlpool, No. 141 at 12; NRDC, No. 138 at 8; City of Seattle, Seattle Public Utilities, No. 126 at 2; Alliance Laundry, No. 145 at 20; Northwest Power Planning Council, No. 135 at 1; ACEEE, No. 150 at 7; and Amana, No. 146 at 2). Northwest Energy Efficiency Alliance, Oregon Office of Energy and the Alliance to Save Energy believe DOE overestimated sales in the absence of standards because many incentive programs are ending. (Northwest Energy Efficiency Alliance, No. 131 at 4; Oregon Office of Energy, No. 162 at 2; and Alliance to Save Energy, No.148 at 3–4).

Based on additional updated data, we revised the estimated H-axis sales in 1998 from 3.0% to 6.25%. Previously the annual escalation rate of H-axis washer sales market were assumed to capture an additional 0.5% per year of all clothes washer sales but now the annual sales of H-axis clothes washers is determined by an amount equal to 0.5% of the previous year's V-axis sales. Additional sensitivity analyses were performed at escalation rates of 0.25% and 0.75% with minimal effect on rebuttable payback (less than half a year payback difference from the reference case). Base case assumptions are addressed in greater detail in the National Impact Analysis, *infra.*

E. National Impact Analyses

The national energy savings is determined in two steps using the integrated NES/Shipments spreadsheet model. First the shipments are determined before and after a new standard; and then the shipments are used to calculate energy savings and national economic benefits (net present value of the higher standards). Chapters 9 and 10 of the TSD contains a detail explanation of the NES/Shipments spreadsheet model.

The basic outputs from the National Impact Analysis are shipments forecasts, energy and water consumption, and the Net Present Value (NPV) for baseline and standards scenarios. The shipments forecasts are an input into the National Energy Savings model as well as an input for the Manufacturing Impact Analysis. The cumulative savings for energy and water are determined for the nation to the year 2030. Finally, the net present values (NPVs) are determined for each standard level based average data for the nation. See results in Section V of this notice.

1. National Energy Savings (NES) Spreadsheet Model

Historical Background. The development of the NES and shipments model consisted of three phases: (1) Supplemental ANOPR and preliminary TSD analysis, (2) analysis presented at the July 1999 Workshop, and (3) proposed rule and TSD analysis.

At the time of the supplemental ANOPR the shipment model was a work in progress. We asked for comment on a general accounting methodology that included price, operating cost and income elasticities. Since the shipments model was not fully developed at the time of the supplemental ANOPR, a placeholder set of shipments were used as input to the NES spreadsheet in order to produce a preliminary analysis on the national impacts.

At the July 1999 Workshop, we presented a fully developed shipment model that included a decision tree. The decision tree allows the consumer to choose between not buying a washer, buying a new washer, repairing a washer or buying a used washer. It also allows consumers to decide to replace a washer before it was necessary (see TSD Chapter 9 for details). This model also incorporated results from the consumer conjoint analysis along with fitting parameters to historical data.

After presenting this shipment model at the July 1999 Workshop, we received comments regarding specific parameters of the model, sources of data used in the model and whether or not the results forecasted seemed reasonable. We received comments agreeing that the general approach of the Shipment and NES models were appropriate, however, comments included suggestions to modify parts of the models. (Oregon Office of Energy, No. 162 at 8 and

ACEEE, No.188 at 3). Details of the Shipment and NES models are discussed in the sections on elasticity below. After the Workshop we carefully looked at the comments and began to make improvements to the model. These improvements included refinements that were not necessarily suggested by stakeholders but were based on using more data and detail. In addition, suggestions contributed by a renowned economist were carefully considered. (Assessment of DOE Shipments Model for Forecasting the Impacts of Clothes Washer Standards, Kenneth Train, Comment No. 194 at 13). After all of the revisions, the shipment model forecasted had significantly different results. The two changes made that had the greatest effect on results were using a longer historical time period to fit forecasting equations to and accounting for new appliance sales due to all changes in residence, not just purchases of new housing.

The following section describes the modifications to the NES and Shipment spreadsheets as recommended in comments received after the publication of the 1998 Supplemental ANOPR. 63 FR 64347, 64359 (November 19, 1998).

The modifications to the NES Model follows the three phase development from the Supplemental ANOPR analysis to the July 1999 Workshop analysis to the proposed rulemaking analysis. The changes to the Shipment Model as incorporated into the NES are summarized in Table 3. Discussions of these changes and of comments received which prompted these changes are also discussed after the table.

TABLE 3.—MODIFICATIONS TO THE NES MODEL, INCLUDING SHIPMENTS MODEL

Parameter	Supplemental ANOPR	July 1999 workshop	Proposed rule
Shipment Model	accounting model recommended—fixed shipment values were used as a placeholder.	accounting with decision tree	accounting with decision tree.
Shipment Elasticities	price operating cost income *(These were used in analysis prior to the Supplemental ANOPR.)*.	price operating savings top/front access feature	price. operating savings. top/front access feature. price/income. income. interest rate elasticities.
Source of Elasticities	In previous analyses the three input variables below were used. *Price Elasticity (PE)*—from Oak Ridge equation. *Operating Cost (OC) elasticity*—derived from implicit discount rate. *Income Elasticity*—from Oak Ridge model. *(For the ANOPR, a shipment analysis had not been performed yet and shipments were kept constant as a placeholder pending future analysis.)*.	*Operating savings*—derived from the WashWise Intercept Survey. *Features elasticity*—based on conjoint analysis. *Price elasticity*—with other parameters set, determined by calibrating to 1981–1996 historical data.	*Operating savings*—derived from the WashWise Intercept Survey. *Features elasticity*—based on conjoint analysis. *Price elasticity*—with other parameters set, determined by calibrating to 1970–1996 historical data.
Market Segments	new housing starts existing homes (replacement washers).	New housing starts early replacement market regular replacement market extra repair market homes without a clothes washer	New housing completions & moves. early replacement market. regular replacement market. extra repair market. homes without a clothes washer.
Houses that Drop Out of Washer Market.	not applicable	energy accounted for—assumes laundry done at Laundromat or elsewhere.	energy accounted for—assumes laundry done at Laundromat or elsewhere.
Cost of Repairs and Used Washers.	None	The model factored in the price of a new washer into the Replace or buy Used versus buy new decision without subtracting the cost of repairing or buying a used washer.	Allows input on the cost of repairs and used washers relative to buying a new washer. Changed the net washer price in the Used vs. New decision model and the Replace decision model. The net washer price is the price of a new washer minus the price of either the used washer or the repair, where the used washer and the repair are assumed to scale with new washer price.
Residence-Change-Induced Purchase.	None, however in prior analysis new housing starts were accounted for and this approach was recommended in the Supplemental ANOPR TSD.	Assumes New Housing Market is determined by net housing increase. Ignores AHAM data on the number of washers purchased due to a change of residence.	A small market of purchases induced by changes of residence is included. Assumed that new sales from changes in residence are correlated with new housing completions. The volume of sales induced by change of residence is calibrated with AHAM NFO data on washers purchased due to a move.
Implied Discount Rate Used in Historical Fit.	None—consumer discount rate had not been established at this point.	75%—from WashWise intercept survey.	75%—from WashWise intercept survey.

TABLE 3.—MODIFICATIONS TO THE NES MODEL, INCLUDING SHIPMENTS MODEL—Continued

Parameter	Supplemental ANOPR	July 1999 workshop	Proposed rule
Historical Fit	None	Historical fit made to 1981 to 1996 period.	Model projected back to 1951. Fit made to 1970 to 1996 data.
Operating Cost Scaling	None	Assumed operating cost scaled with electricity price changes.	Disaggregates operating cost and estimates operating cost back to 1951 using Electricity, Gas, Water, Oil, and LPG price indices.
Stock Accounting	Uses historical sales and saturation data as input to clothes washers household stock accounting due to lack of model estimates prior to 1980.	Uses historical sales and saturation data as input to clothes washers household stock accounting due to lack of model estimates prior to 1980.	Model is more independent of historical data inputs. It uses model estimates of annual sales as the input into stock accounting after 1951.
Housing Start Data	Recommended using AEO 1996 Housing Starts Projection.	Uses AEO 1996 Housing Starts Projection.	Uses AEO 1999 projections adjusted to reflect housing completions.
Initial Stock Assumption	Pre-1957 clothes washer stock initialized as zero.	Pre-1957 clothes washer stock initialized as zero.	1951 automatic washer stock initialized at 1.63 million (1950 sales) for one-year age washers decreasing linearly to 1.03 million at 13-year vintage and zero thereafter.
Operation Cost Comparison	None—no shipments model yet For NES incremental cost from the baseline washer.	Measured operating cost savings relative to the real operating cost in 1997 of a 1997 base case machine (MEF=0.817).	Measures savings in current year relative to a baseline machine (MEF=0.817) with current fuel costs.
Fuel Site-to-Source Conversion.	constant value	conversion varies yearly and is generated by EIA's NEMS–BRS [1] program.	conversion varies yearly and is generated by EIA's NEMS–BRS [1] program.
Fuel Prices	average from RECS 93	average of marginal prices determined from RECS93.	average of marginal prices determined from RECS93.
Escalation of Fuel Prices	AEO98	AEO98	AEO99.
Fuel Price Extrapolation from 2020 to 2030.	LBNL method	method used by EIA, consistent with new LCC methodology.	method used by EIA, consistent with new LCC methodology.
Water Heater Fuels	electricity, gas, oil	electricity, gas, oil	added LPG.
Water & Wastewater Prices	urban rates: $3.18 per 1000 gallons	average rates: $2.66 per 1000 gallons in 1998.	updated average for urban & rural: avg.=$2.48 per 1000 gals. (1998) (see LCC).
Water & Wastewater Price Escalation.	0%	2.96% an average from LCC—a weighting of 3.01% and 0.64% (see LCC).	2.96% an average from LCC—a weighting of 3.01% and 0.64% (see LCC).
Base Case: H-axis Escalation Rates.	0.5%	0.5%	0.5%.
Base Case: H-axis Sales	3% in 1998	6.25% in 1998	6.25% in 1998.
Discount Rate	7%	7%	7%.
Manufacturer Mark-ups	Min. 1.000 Mean 1.175 Max. 1.350 Distribution: triangular	Min. 1.000 Mean 1.175 Max. 1.350 Distribution: triangular	Range: varies with standard level. Distribution: uniform.
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[1] EIA approves use of the names NEMS (National Energy Modeling System) only to describe an AEO version of the model with out any modification to code or data. Since, in this work, there will be some minor code modifications, DOE proposes use of the name NEMS–BRS for the model as used here.

Shipments Model. In the Supplemental ANOPR, we examined several different approaches to forecasting washer sales. The investigated models included an Auto-Regressive Moving Average Model (ARIMA), a Multi-Variate Time Series Fit, a Saturation/Lifetime Model, and an Accounting Model with elasticity. Of the different approaches, we selected the Accounting Model because it was the most full-featured model which included price and operating cost elasticities. At the July 1999 Workshop we described the revised accounting model for projecting annual clothes washer shipments. After stakeholder comment the Shipment model was further revised and integrated into a single spreadsheet called the NES/Shipment spreadsheet. It includes the following features:

- Combined effects of price, operating cost, and features on annual U.S. shipments
- Market segments (e.g., new housing, replacement decisions, non-owner adding a washer)
- Decisions to repair rather than replace
- Purchases of used washers
- Age categories of clothes washers

The NES/Shipment spreadsheet now incorporates information from the DOE Consumer Analysis. Since the Supplemental ANOPR, DOE has gathered additional information about features of clothes washers that influence consumers' purchase decisions, and analyzed consumer's stated preferences. This new information also has been calibrated with updated information about historical purchases. Details of the consumer analysis and shipment

spreadsheet are explained in Chapters 8 (Consumer Analysis) and 9 (Shipments) of the TSD.

Shipment Elasticities. The Department received many comments concerning which elasticities need to be considered in the shipments model. Whirlpool notes that combining the impacts of the purchase behavior of discretionary buyers with the postponement and repair decisions or ''forced purchase'' consumers, and assuming energy reduction regulation of 35% (a $250 retail price increase), it is reasonable to expect shipment decreases in excess of 10%. (Whirlpool, No. 141 at 10). Amana states that the elasticity of price and sales needs to be considered. (Amana, No. 146 at 3). Both ACEEE and the Alliance to Save Energy stated that the only market for which there is likely to be an elasticity of demand is the early replacement market, since homeowners expect to have access to a clothes washer and will continue to purchase them even if the cost is higher. (ACEEE, No. 150 at 6 and Alliance to Save Energy, No. 148 at 3). The Oregon Office of Energy and ACEEE recommended reconstructing the shipments model without a price-based elasticity variable but including variables for disposable income, credit availability, usable washer capacity, and average washer cleaning ability (Oregon Office of Energy, No. 190 at 11 and ACEEE, No. 188 at 5).

In consideration of the comments received, the Department elected to use elasticity values for the following factors: clothes washer price, operating savings, top/front access feature, clothes washer price/income. In addition, income elasticities, and interest rate elasticities were added as input options to the spreadsheet. Details of how elasticities were derived are explained in Chapter 9 (Shipments) of the TSD.

Source of Elasticities. After we presented the shipments model at the July 1999 Workshop, we received several comments relating to how the value of elasticities are determined. The Oregon Office of Energy took issue with the methodologies used to derive price elasticities, especially the use of the consumer conjoint analysis. (Oregon Office of Energy, Nos.162 at 8 and No. 190 at 4–9). Several comments also question whether price elasticities derived from past declining prices would apply in a future market of increased prices due to a standard. (ACEEE, No.188 at 3; Oregon Office of Energy, No.190 at 8; and PG&E, No. 189 at 2–3). PG&E also questions the use of the consumer research survey to calibrate elasticity variables. It states that instead of asking questions about a 10-year-old washer, the questions should have been posed for a series of washer ages. It also believes that the likely repair cost of a washer is likely to exceed the $150 value used in the questionnaire. (PG&E, No. 189 at 2).

Many enhancements were made to the shipment model to address the stakeholder comments listed above. The purpose of these model enhancements is to provide the best possible estimates of the impacts of standards, consistent with the recent history of washer shipments, clothes washer market structure and consumer preferences. These enhancements are: (1) Calibration of the model over a longer historical period. (2) more detailed and accurate calculation of operating costs and savings (3) inclusion of additional user specified explanatory macroeconomic variables (4) inclusion of consumer responsiveness to price and operating costs as calibrated to historical clothes washer shipments. (5) calibration of the relative size of the features response, and estimation of the rate at which clothes washer owners might drop out of the market using the results from the Clothes Washer Consumer Analysis. (6) use of NFO Research Incorporated data from a 1996 survey (prepared for AHAM) to estimate the proportion of early (discretionary) replacements, and the proportion of new versus used purchases. (7) consideration of AHAM historical shipments and statistics on the recent (post 1994 standard) changes in mean clothes washer efficiency. (8) inclusion of *Consumer Reports* data on repair rates during the first five years of the clothes washer lifetime. These enhancements are described in more detail below.

Market Segments. Shipment models used prior to the supplemental ANOPR accounted for the new clothes washer and the replacement markets which assumed that a washer was replaced by a new machine when it broke down. The new shipment model presented at the July 1999 Workshop provides a more detailed accounting of different market segments, washer ownership categories and accounts for a variety of other market dynamics including new versus used shipments, changes in repair behavior and life extension of machines through extra repairs.

Houses That Drop Out of Washer Market. Houses that drop out of the washer market are where the laundry is done at Laundromats or elsewhere and were not accounted for in analyses presented prior to the July 1999 Workshop. One stakeholder commented that the analysis will be incomplete and not useful without an assessment of the used appliance market, and participation in that market on the part of low income consumers. (Oregon Office of Energy, No. 162 at 11). Another comment emphasized that low income consumers will find it increasingly difficult to purchase clothes washers at more stringent standard levels, and may simply not be able to buy a new machine. Thus DOE should expect an increase in used/repaired clothes washer sales and a relative decrease in shipments of new high efficiency models. (Whirlpool, No. 141 at 15). In response to the previous comments, the revised shipments model takes in account the households that drop out of the washer market, and assumes that they wash their clothes at a Laundromat or elsewhere.

Cost of Repair and Used Washers. The shipment model presented at the July 1999 Workshop incorporated changes in the prices of new washers, but not changes in the prices of used washers or the price of repairing an existing washer. The Department received a comment which asked that the model incorporate the higher price of used washers and repair services resulting from increased demand as consumers delay the purchase of new washers in response to higher prices. (Assessment of DOE Shipments Model for Forecasting the Impacts of Clothes Washer Standards, Kenneth Train, Comment No. 194 at 13). The proposed rule Shipment/NES model now gives an input option for the cost ratios of repairing a washer and of buying a used washer instead of buying a new washer. This option is now an input in terms of the ratio between these options and buying a new washer. See TSD Chapter 9 on Shipments.

Residence-Change-Induced Purchase. The versions of the Shipment model presented at the July 22 Workshop only considered residence changes for those purchasing new housing. The model now includes purchases of washers for change of residences for new and existing housing. This improvement to the model has a significant effect on forecasted shipments.

Implied Discount Rate Used in Historical Fit. The implied discount rate is a value that describes how important energy cost savings are to consumers relative to increases in price. This is different from the 7% discount rate used in the analysis that describes the time value of money in order to convert dollar costs and savings (first price and operating savings) to the same year in order to determine the LCC. Ken Train commented that both a 20% implied discount rate which was derived from the conjoint analysis and a 75% implied discount rate which was derived from

the WashWise survey are consistent with historical shipments data. (Ken Train, Comment No. 194 at 4 and 13). A lower implied discount rate would place greater value on future operating cost savings and result in a lower drop in shipments as compared to the higher implied discount rate. We agree that several values for the implied discount rate can be used to fit a curve to historical data. We derived an implied discount rate by two methods: (1) The relationship of price and efficiency for current models (based on the engineering analysis) is consistent with an implied discount rate of 50–100%; (2) while stated preference surveys are often unreliable indicators of revealed preferences, we analyzed. We believe the WashWise intercept survey results are a more accurate measurement of the implied discount rate because its sole intent was specific to recent washer purchases, designed to measure price savings and interviewed consumers at the point of purchase. In contrast, the conjoint analysis provided a limited set of choices for implied discount rate and was conducted in a setting removed from purchase decision. See TSD Chapter 9. Both derivations (engineering analysis and WashWise) are consistent with an implied discount rate of 75%. This value is higher than found from studies of other appliances, perhaps in part because consumers are unaware of how much water costs contribute to operating expense. The Department is interested in comments.

Historical Fit; Operating Cost Scaling; Stock Accounting; Housing Start Data; Initial Stock Assumption; and Operation Cost Comparison. These parameters were refined, after the July 1999 Workshop, to reflect updated data or longer historical time periods. These changes were not prompted by any specific stakeholder comments.

Fuel Site-to-Source Conversion. The Appliance Energy Efficiency Standards Advisory Committee recommended (letter dated April 21, 1998) that we define a range of energy conversion factors and associated emission reductions based on generation displaced by standards. In the supplemental ANOPR, a constant conversion factor was used. EEI commented that the value shown for electric conversion (heat rates) on the NES spreadsheet is overstated by at least 11% because AEO 98 (authored by EIA) assigns the same factor for fossil fuel power plant heat rates to hydro-electric and other renewable forms of electric generation. This results in overstating primary energy savings from reductions in electricity usage. (EEI, No.122 at 7). We have addressed this issue by using a year-by-year conversion rate that is calculated based on displaced generation using NES.

Fuel Prices. As discussed in the LCC methodology section, after the supplemental ANOPR, marginal gas and electric prices were used, whereas previously average prices were used. The marginal price is the price paid for the last increment of fuel used. Refer to Section C. *Life-Cycle Cost (LCC) Analysis* for a description of these changes.

Escalation of Fuel Prices. The Alliance to Save Energy, ACEEE and the Oregon Office of Energy believe that assumptions of residential price declines are overstated. (Alliance to Save Energy, No. 148 at 1–2; ACEEE, No. 150 at 4; and Oregon Office of Energy, No. 162 at 6). The Alliance to Save Energy recommends that DOE analyze at least one case with flat residential energy prices. (Alliance to Save Energy, No. 148 at 1–2). ACEEE believes EIA estimates of residential energy price declines remain too high. It cites its April 1998 comments in which it referred to a survey by the Association of Energy Service Professionals of its members projected on average that residential bills will increase 4.9% with restructuring while commercial and industrial bills will decrease an average of 5.8 to 8.6%. Based on this information, ACEEE believes EIA's projections of future residential electricity prices are higher in the 1999 Annual Energy Outlook than in the 1998. ACEEE recommends that DOE conduct a sensitivity analysis with smaller price declines, such as the EIA high use forecast. (ACEEE, No. 150 at 4). Similarly, the Oregon Office of Energy believes residential rates will remain flat or rise somewhat. (Oregon Office of Energy, No.162 at 6).

While we generally agree that future energy prices are uncertain, we are relying on the EIA and its forecasts for the analysis. To account for the uncertainty, we have included the high and low fuel and electricity forecasts, i.e., AEO low & high economic growth scenarios in the analysis.

Fuel Price Extrapolation from 2020 to 2030. Refer to Section C. *Life-Cycle Cost (LCC) Analysis*for a description of this change.

Water Heater Fuels. LPG was added as a fuel type.

Water and Wastewater Prices; and Water and Wastewater Price Escalation. Refer to Section C. Life-Cycle Cost (LCC) Analysis for a description of these changes.

Base Case H-axis Escalation Rates; and Base Case H-axis Sales. These issues concern the estimated initial percentage of sales that are H-axis and the estimated escalation of H-axis sales. EEI, Whirlpool, NRDC, City of Seattle, Seattle Public Utilities, Alliance Laundry System LLC, Northwest Power Planning Council, ACEEE, and Amana believe that the projections for sale of high efficient units is too low. (EEI, No. 122 at 3; Whirlpool, No. 141 at 12; NRDC, No. 138 at 8; City of Seattle, Seattle Public Utilities, No. 126 at 2; Alliance Laundry, No. 145 at 20; Northwest Power Planning Council, No. 135 at 1; ACEEE, No. 150 at 7; and Amana, No. 146 at 2). Northwest Energy Efficiency Alliance, Oregon Office of Energy and the Alliance to Save Energy believe DOE overestimated sale in the absence of standards because many incentive programs are ending. (Northwest Energy Efficiency Alliance, No. 131 at 4; Oregon Office of Energy, No. 162 at 2; and Alliance to Save Energy, No. 148 at 3–4).

NRDC commented that the Supplemental ANOPR proposal to use a single basecase forecast with a known gradually increasing penetration of high efficiency clothes washers is incorrect. (NRDC, No. 138 at 8). Whirlpool, Amana, and Alliance Laundry System LLC provide estimates of the growth of H-axis clothes washers. Whirlpool commented that the forecasts presented in the TSD of 0.5% per year growth in market penetration is significantly low based on actual trends. (Whirlpool, No. 141 at 12). Amana commented that the assumption of 1.5% H-axis washers in 1995 with a 0.5% yearly increase has proved to be a conservative assumption and that its competitive information indicates a 6% market share of H-axis machines is a more appropriate number to use at this time. (Amana, No. 146 at 2). Alliance Laundry System LLC commented that it does not believe that front load washing penetration will actually shrink 20% in the next 24 months, as the DOE spreadsheet analysis presumes. (See TSD at page 8–16, Table 8.3). It believes that a more realistic projection would show front load washing machines gaining in acceptance for those consumers who choose energy and water savings over other features such as ergonomics or far lower purchase price. (Alliance Laundry, No. 145 at 20). With regard to the assumptions concerning sales in absence of standards, ACEEE believes the DOE forecast seems conservative in early years. Saturation are currently running higher than DOE's forecast. But, without a standard, we'd expect a leveling off at around 15% saturation (based on levels achieved in the North-

West, even with heavy promotion). (ACEEE, No. 150 at 7).

The Northwest Energy Efficiency Alliance believes that the baseline forecast of resource-efficient clothes washers (RECWs) should begin with a current (1998) market penetration rate of 5–6%. It should then assume an annual increase of .75% every year until 2030 (i.e., 28% market share by 2030). This forecast would place the market share of RECWs at approximately 10% in 2030. This value represents the conservative end of the range of estimates provided by manufacturers participating in the Northwest Energy Efficiency Alliance's interviews, (Market Progress Evaluation Report: WashWise No. 2, publication No. E98–012.). (Northwest Energy Efficiency Alliance, No. 131 at 4.) Oregon Office of Energy believes DOE has potentially overestimated the base case share of high efficiency clothes washers defined by DOE, based on AHAM data, to be 35% more efficient than the minimum efficiency required of today's machines in future shipments. There is not a lot of expectation that this share will grow significantly, now or in the near term, as organized efficiency programs are seriously on the wane. (Oregon Office of Energy, No. 162, at 2).

DOE agrees the market share of the more efficient clothes washers is greater than estimated. Based on the comments, DOE has updated the estimate of the H-axis sales to assume in 1998 that 6.25% of clothes washers are H-axis, escalating at 0.5% a year.

Discount Rate. The NES analysis assumes a fixed discount rate of 7%. This is used in determining the savings and costs due to a new standard and for calculating the NPV. This is unchanged from the ANOPR.

Manufacturer Mark-ups. For the Supplemental ANOPR the shipment weighted average was used for the manufacturing mark-up. One value was used for all standard levels. For the proposed rule, a range of manufacturer mark-ups were calculated for each standard level. The average of the range was used.

2. Net National Employment

The Process Rule includes national employment impacts among the factors DOE considers in selecting a proposed standard. The Department estimates the impacts of standards on employment for appliance manufacturers, relevant service industries, energy suppliers, and the economy in general. We estimate two employment impacts: total and direct impacts. Total impacts—or net national employment impacts—are impacts on the national economy, including the manufacturing sector being regulated. Direct employment impacts would result if standards led to a change in the number of employees at manufacturing plants and related supply and service firms. The MIA only discusses the direct employment impacts.

Net national employment impacts from clothes washer standards are defined as net jobs created or eliminated in the general economy as a consequence of: (1) reduced spending by end users on energy (electricity, gas including LPG, and oil) and water; (2) reduced spending on new energy supply by the utility industry; (3) increased spending on the purchase price of new clothes washers; and (4) the associated indirect effects of those three factors throughout the national economy. The resulting net savings are expected to be redirected to other forms of economic activity. We expect these shifts in spending and economic activity to affect the demand for labor, but there is no generally accepted method for estimating these effects.

One method to assess the possible effects on the demand for labor of such shifts in economic activity is to compare sectoral employment statistics developed by the Labor Department's Bureau of Labor Statistics (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. BLS data indicates that expenditures in the electric 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 the capital-intensity of the utility sector and wage differences. Based on the BLS data alone, we believe net national employment will increase due to shifts in economic activity resulting from the clothes washer standards.

In developing this proposed rule, the Department attempted a more precise analysis of national employment impacts using an input/output model of the U.S. economy. The model, ImBuild, was developed by the Office of Building Technology, State and Community Programs, DOE. ImBuild is a PC-based economic analysis model that characterizes the interconnections among 35 sectors as national input/output structural matrices. It can be applied to future time periods. ImBuild calculates the total effect on employment, including job creation or deletion in the manufacturing sector. Inputs to the ImBuild model are outputs of the NES/Shipment spreadsheet. Since the electric 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), a shift in spending away from energy bills into other sectors would be expected to increase overall employment. For more details on the net national employment analysis, please see Chapter 13 in the TSD.

Because this is a new analysis for an energy conservation standard rulemaking, we are requesting public comments on the validity of the analytical methods used and the appropriate interpretation and use of the results of this analysis.

F. Consumer Analysis

In determining whether a standard is economically justified, we consider any other factors that the Secretary deems to be relevant. Under this factor, the Department is considering the life-cycle cost impacts on those subgroups of consumers who, if forced by standards to purchase H-axis machines, would choose to repair their existing machines.

Consumer Sub-Groups

The consumer analysis evaluates impacts to any identifiable groups, such as consumers of different income levels, who may be disproportionately affected by any national energy efficiency standard level. The impact on consumer sub-groups is determined using the LCC spreadsheet model for low income households and for household where the head of the household was a senior.

G. Manufacturer Impact Analysis

The manufacturer analysis estimates the financial impact of standards on manufacturers and calculates impacts on employment and manufacturing capacity.

Prior to initiating the detailed MIA for the clothes washer rulemaking, the Department prepared a document titled ''Clothes Washer Manufacturer Impact Analysis'' which outlines procedural steps and identifies issues for consideration in the MIA. This document was presented at a public workshop held on December 14–15, 1998. It was based on the general framework for the MIA presented by the Department at a workshop in March 1997 and was modified for its application to the clothes washer rule.

As proposed in the approach document, the MIA was conducted in three phases. Phase 1, ''Industry Profile,'' consisted of the preparation of

an industry characterization. Phase 2, ''Preliminary Industry Cash Flow,'' had as its focus the larger industry. In this phase, the Government Regulatory Impact Model (GRIM) was used to prepare a preliminary industry cash flow analysis. Here, the Department used publicly available information developed in Phase 1 to adapt the GRIM structure to facilitate the analysis of new clothes washer standards. In Phase 3, ''Sub-Group Impact Analysis,'' the Department discussed fully the results of the Preliminary Industry Cash Flow analysis with each manufacturer and identified manufacturer-specific variances.

Phase 3 also entailed documenting additional impacts on employment and manufacturing capacity through a structured interview process.

Phase 1, Industry Profile. Phase 1 of the MIA consisted of preparing an Industry Profile. Prior to initiating the detailed impact studies, DOE received input on the present and past structure and market characteristics of the clothes washer industry. This activity involved both quantitative and qualitative efforts to assess the industry and products to be analyzed. Issues addressed included manufacturer market shares and characteristics, trends in the number of firms, the financial situation of manufacturers, and trends in clothes washer characteristics and markets.

The industry profile included a top-down cost analysis of the appliance industry that was used to estimate the disaggregated costs of a baseline clothes washer. The cost structure was used to derive cost and financial inputs for the GRIM—e.g., material, labor, overhead, depreciation, Sales General & Administration (SG&A), and Research & Development (R&D). The profile was also instrumental in estimating the manufacturer and retail mark-ups that were used in the Life-Cycle Cost Analysis.

Publicly-available quantitative data published by the U.S. Bureau of Census with regards to the clothes washer industry was included in Chapter 3 of the preliminary Technical Support Document (TSD) dated October 1998 accompanying the clothes washer Supplemental ANOPR dated November 19, 1998. These reports include such statistics as the number of companies, manufacturing establishments, employment, payroll, value added, cost of materials consumed, capital expenditures, product shipments, and concentration ratios.

The Department also utilized additional sources of information to further characterize the clothes washer industry. These included company Securities and Exchange Commission (SEC) 10K and annual reports, Moody's company data reports, Standard & Poor's (S&P) stock reports, value line industry composites, and Dow Jones Financial Services.

Phase 2, Preliminary Industry Cash Flow. Phase 2 of the MIA had as its focus the ''larger'' industry. The analytical tool used for calculating the financial impacts of standards on manufacturers is the GRIM. In Phase 2, the GRIM was used to perform a preliminary industry cash flow analysis.

For the Preliminary Industry Cash Flow Analysis, DOE prepared a list of financial values to be used in the GRIM industry analysis. These were calculated by studying publicly-available financial statements of clothes washer manufacturers. A detailed definition of financial inputs and their values for a ''prototypical'' clothes washer manufacturer was presented in Chapter 9 of the preliminary TSD. Values for currently sold ''Base Case'' prices were derived from the Bureau of Census's Current Industrial Reports (CIRs). The dollar value of clothes washer shipments from factories is divided by the quantity of clothes washers shipped to arrive at the per-unit manufacturer price. In order to estimate manufacturing costs—labor, materials, depreciation/tooling, etc.—from the average manufacturer prices obtained from the CIRs, a typical clothes washer industry cost structure was developed using publicly-available information from the Census of Manufacturers (CMs) and from industry statistics obtained from the SEC–10K reports. Finally, in preparing the Preliminary Industry Cash Flow Analysis, DOE used the same clothes washer shipment scenarios developed for the National Energy Savings (NES) spreadsheet.

The Department received a comment accurately signaling an error in the Preliminary Industry Cash Flow Analysis calculation of the cost of capital. (NRDC, No. 138, at 12–13). The suggested change was made and its impact is the reduction of the discount factor from 7.25% to 6.65%. Another comment received concerned DOE's assumption of a 10.5% working capital requirement. Given ValueLine's estimate of just under 7%, a more detailed explanation for the Department's assumption was requested. (Oregon Office of Energy, No. 162 at 8). The Department recognizes that there exists considerable variability in the working capital requirements of various firms based on information obtained from SEC 10–K reports. Discussions with appliance industry analysts indicated that working capital requirements are in the 7–14%, thus the ANOPR input assumption. This assumption was subsequently verified through interviews with six clothes washer manufacturers and found to be accurate.

Phase 3, Sub-Group Impact Analysis. DOE conducted detailed interviews with clothes washer manufacturers representing over 99% of domestic clothes washer sales to gain insight into the potential impacts of standards. During these interviews, the Department solicited the information necessary to validate industry cash flows and to assess employment and capacity impacts.

The interview process played a key role in the MIA, since it allowed manufacturers to privately express their views on important issues and provide confidential information needed to assess financial, employment, and other business impacts. To verify the assumptions used to derive the Preliminary Industry Cash Flow, an interview guide solicited information on the possible impacts of new standards on manufacturing costs, product prices, and sales.

Each manufacturer was provided a version of the GRIM that included discrete manufacturer costs for all percentiles reported by the AHAM. In preparation for the interview, each manufacturer could, if desired, input its own data and assumptions to develop its own expected cash flow. Alternatively, manufacturers could select the percentile values that best represented their costs at different efficiency levels.

The evaluation of the possible impacts on direct employment and manufacturing assets also drew heavily on the information gathered during the interviews. The interview guide solicited both qualitative and quantitative information. Supporting documentation was requested whenever applicable. Interview participants were asked to identify all confidential information provided in writing or orally as such. Approximately two weeks following the interview, an interview summary was provided to give manufacturers the opportunity to confirm the accuracy and protect the confidentiality of all collected information.

Small Manufacturer Sub-Group. We received a comment following the publication of the preliminary TSD indicating that smaller manufacturers of clothes washers could be negatively affected more than other manufacturers by any proposed standard. (Amana, No. 146 at 3). To assess the potential impacts of possible washer standards on

smaller manufacturers, Arthur D. Little (ADL) conducted preliminary interviews with the three smallest clothes washer manufacturers (by market share) and held discussions on possible approaches to performing the MIA for smaller manufacturers. ADL and the manufacturers discussed how a small-manufacturer GRIM could be constructed and contrasted with the industry cash flow analysis. Foremost in the discussions were issues surrounding data collection and aggregation and the ensuing confidentiality concerns given the small group of manufacturers and their unbalanced size.

All of the smaller manufacturers worked with ADL to develop a company-specific GRIM analysis for their firms. Even within the small manufacturer sub-group, ADL found significant differences in financial structure for the firms depending on their business models (*e.g.,* original equipment manufacturer (OEM) vs. retail emphasis, product market niche). ADL found that from a financial standpoint the common characteristic of this group, in contrast with the overall industry, was its need to spread fixed costs over smaller production volumes. During the interviews, small manufacturers demonstrated that several of the key costs necessary to meet any new regulation are largely independent of the product volume produced. The most apparent are the costs necessary to design a new product meeting the proposed energy standards. Other costs, such as plant engineering, some tooling, and other capital costs, have significant portions that are independent of final production volumes.

To assess the ''differential'' potential impacts of possible washer standards on smaller manufacturers without revealing individual manufacturers' proprietary information, ADL prepared a cash flow analysis of the potential effects on a ''prototypical'' smaller manufacturer. The basic approach to analyzing the economic effects on a smaller manufacturer involved determining the smaller company's fixed cost structure relative to the industry average and the likely ability of the smaller company to recover its full costs and investments after implementation of a new standard.

Dryer Analysis: An important consideration regarding new efficiency standards that came to light during the course of the manufacturer interviews, was the pull-through effect of clothes washers on the clothes dryer market. The majority of manufacturers indicated that stringent standards on clothes washers would have an effect on dryers since dryer sales are highly correlated to washer sales as people frequently buy these appliances as a set. A separate GRIM (referred to as the Dryer GRIM) was prepared in an effort to model the financial impact of these considerations on the dryer business.

Impact on Clothes Washer Repair Industry: Should an increase in energy efficiency standards result in higher prices for new clothes washers, consumers may be influenced to repair old units rather than purchase new ones at the higher price. The Oregon Office of Energy strongly believes the parts side of the manufacturers' businesses should be included in the manufacturer impact analysis and urges the Department to gather the data necessary. (Oregon Office of Energy, No. 190, at 10). The Department agrees that the repair business should be considered. Based on the forecast of clothes washer repairs in the LBNL shipments model, the Department estimated the impact of a change in clothes washer repair revenues on the NPV of the clothes washer manufacturers' repair parts business.

H. Utility Analysis

The utility analysis estimates the effects of the reduced energy consumption due to improved appliance efficiency on the utility industry. Because electric utility restructuring is well underway, it is no longer valid to assume a cost recovery mechanism under public utility regulation, which was the basis of previous utility impact analyses. Therefore, this utility analysis consists of a comparison between forecast results for a case comparable to the AEO99 Reference Case and forecasts for policy cases incorporating each of the clothes washer trial standard levels.

Table 4 lists the major assumptions DOE used in the clothes washer utility analysis. We discuss each of these assumptions briefly in this section. For more details on the utility analysis, see Chapter 12 in the TSD.

TABLE 4.—ASSUMPTIONS USED IN THE UTILITY IMPACT ANALYSIS

Description	Assumption
Energy Prices	AEO99.
Energy Savings	From the NES spreadsheet as site energy savings.
Interpolation of Scaling Factors.	Linear.

The Department uses a variant of EIA's widely recognized National Energy Modeling System (NEMS) called the National Energy Modeling System-Building Research and Standards (NEMS–BRS) for the utility analysis, together with some scaling and interpolation calculations.[5] EIA uses NEMS primarily for the purpose of preparing the Annual Energy Outlook. Using NEMS, EIA produces a baseline forecast for the U.S. energy economy through 2020. The NEMS–BRS model used for this analysis is based on the AEO99 version of NEMS with minor modifications.

NEMS–BRS has several advantages that have led to its adoption as the source for basic forecasting in the appliance energy efficiency analyses. NEMS–BRS relies on the AEO99 assumptions, which are well-known and accepted due to the exposure and scrutiny each AEO receives. In addition, the comprehensiveness of NEMS–BRS permits the modeling of interactions among the various energy supply and demand sectors and the economy as a whole, so it produces a sophisticated picture of the effects of appliance standards. Perhaps most importantly, because it explicitly simulates the impact on the industry, NEMS–BRS provides an accurate estimate of marginal effects, which yield better indicators of actual effects than estimates based on industry-wide average values. Marginal rates show only the effects of standards. Average rates show the effects of standards as well as what is happening in the market.

To analyze the effects of standards, we evaluate the trial standard levels by entering the changes in electricity, gas, LPG, and oil consumption values into the NEMS–BRS Residential Demand Module. We took the energy savings input from the NES spreadsheet, applied it to the clothes washer, water heater, and clothes dryer end uses, and allocated it appropriately among census divisions. In the TSD, we report results for several key industry parameters, notably residential energy sales, generation, and installed capacity, including the fuel mix that is used for generation. See Chapter 12 of the TSD for more details.

I. Environmental Analysis

The Department determines the environmental impacts of each standard level as required in Section

[5] For more information on NEMS, please refer to the National Energy Modeling System: An Overview 1998. DOE/EIA–0581 (98), February, 1998. DOE/EIA approves use of the name NEMS to describe only an official version of the model without any modification to code or data. Because our analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on DOE/EIA assumptions, the name NEMS–BRS refers to the model as used here. BRS is DOE's Building Research and Standards office.

325(o)(2)(B)(i)(VI), 42 U.S.C. 6295(o)(2)(B)(i)(VI). Specifically, DOE calculates the reduction in carbon from carbon dioxide (CO_2) and nitrogen oxides (NO_X) emissions with the NEMS–BRS computer model, together with external calculations. DOE also calculated the reduction in sulfur dioxide (SO_2) household emissions which are not covered by NEMS–BRS.

Table 5 lists the major assumptions DOE used in the clothes washer environmental analysis. We discuss each of these assumptions briefly in this section. For more details on the environmental analysis, please see the Environmental Assessment which is published with the TSD.

TABLE 5.—ASSUMPTIONS USED IN THE ENVIRONMENTAL ANALYSIS

Description	Assumption
Energy Prices	AEO99.
Energy Savings	From the NES spreadsheet as site energy savings.
Interpolation of Scaling Factors.	Linear.
Household Emissions	C, NO_X & SO_2 estimated from general factors.

We analyze the environmental effects of proposed clothes washer energy-efficiency standards using NEMS–BRS plus some scaling and interpolation calculations. Inputs to NEMS–BRS are similar to those used for the AEO99 reference case, except residential energy usage for clothes washer, water heaters, and clothes dryers is reduced by the amount of energy (gas, oil, LPG, and electricity) saved due to the clothes washer trial standard levels.

The environmental analysis considers two pollutants, SO_2 and NO_X, and one emission, carbon. NEMS–BRS has an algorithm for estimating NO_X emissions from power generation. Since we use the AEO99 version of NES, the May 25, 1999, EPA rule (64 FR 28249) on trading of NO_X is fully incorporated in our analysis. However, NEMS–BRS estimates of NO_X emissions are incomplete because NEMS–BRS does not estimate household emissions. Household emissions result from the combustion of fossil fuels, primarily natural gas, within individual homes. Because households that use natural gas, fuel oil, or LPG contribute to NO_X emissions, DOE's analysis includes a separate household NO_X emissions estimation, based on simple emissions factors derived from the general literature. NEMS–BRS tracks carbon emissions based on the total of fuels consumed. NEMS–BRS also produces comprehensive estimates of the benefits of the trial standard levels, so no additional analysis is necessary. Because SO_2 emissions from power plants are capped by clean air legislation, physical emissions of this pollutant from electricity generation will be only minimally affected by possible clothes washer standards. Therefore, we do not consider power plant SO_2 emissions here, although we report household emissions savings using a method similar to that described for NO_X. See Appendix EA–1 in the TSD for a description of the methodology used to derive emission factors for residential combustion.

The NES spreadsheet provides the input of energy savings for NEMS–BRS, which then produces the emissions forecast. We calculate the net benefits of the standard as the difference between emissions estimated by the reference case version of NEMS–BRS and the emissions estimated with the trial clothes washer standard in place. See the Environmental Assessment (EA) which is published with the TSD for details.

V. Analytical Results

A. Trial Standard Levels

In selecting trial standard levels, we followed the guidance set forth in the Process Rule. We identified and selected candidate standard levels at the lowest LCC (Trial Standard Levels 4 and 5), a three year or less payback period (Trial Standard Levels 1 and 2), and the most energy efficient achievable design (Trial Standard Level 6). Additionally, we selected as a trial standard level the efficiency levels proposed in the joint recommendation submitted to the Department by clothes washer manufacturers and energy conservation advocates (Trial Standard Level 3). The Joint Stakeholders Comment levels would go into effect in stages, with the first level going into effect on January 1, 2004, and the second level going into effect on January 1, 2007. The initial standard will achieve a modified energy factor (MEF) of 1.04 (approximately a 22 percent reduction in energy consumption over the current standard). The later standard will achieve a MEF of 1.26 (approximately 35 percent reduction in energy consumption over the current standard).

We have examined six trial standard levels. Table 6 presents the baseline and trial standard levels, the associated MEF values and the percentage reduction in energy use, from the baseline, achieved at the trial standard level. Trial Standard Level 3 is the combination of standards proposed in the Joint Stakeholders Comment. (Joint Comment No. 204). In addition, Table 6 presents the retail price and incremental price from the baseline. For the clothes washer rulemaking the method we used to generate the manufacturing costs needed for the engineering analysis was the efficiency level approach, reporting relative costs of achieving energy efficiency improvements (represented here as the percentage reduction in energy use).

TABLE 6.— TRIAL STANDARD LEVELS FOR CLOTHES WASHERS

Trial standard level	MEF	Percent reduction in energy use	Retail price	Incremental price from baseline
Baseline	0.817	0	$421	
1	1.021	20	450	$29
2	1.089	25	534	113
3	1.04 in 2004	22 in 2004	474	53
	1.26 in 2007	35 in 2007	661	240
4	1.257	35%	661	240
5	1.362	40%	664	243
6	1.634	50%	775	354

1. Economic Impact on Consumers

a. *Life-Cycle-Cost.* To evaluate the economic impact on consumers, we conducted a LCC analysis for each of the trial standard levels as well as the proposed standards. LCC results are presented as differences in the LCC relative to the baseline clothes washer design. Life-cycle cost was determined for three scenarios: low, reference and high growth. The reference growth scenario assumes the average fuel price forecast found in the Energy Information Administration's (EIA) Annual Energy Outlook 1999 (AEO99) and expected water price escalations based on earlier DOE analysis, which can be found in Section 7.2 of the TSD. The high growth scenario assumes high economic growth will increase the demand for fuel, and therefore increase the price of fuel. The high growth scenario also assumes a high water price and wastewater escalation rate. The reference case is assumed by AEO the most likely case and is bounded by the high and low growth scenarios. In Table 7 we present results for the reference case. Results for the high and low growth scenarios can be found in Section 7.2.3 of the TSD.

Table 7 shows the average LCC savings and the percentage of households benefitting for each of the trial standard levels. The average LCC savings for each of the trial standards and the joint comment proposed standards are positive. The convention is used whereby all values in parentheses are negative. A negative change in LCC means that the LCC after standards is lower than without standards, and implies positive LCC savings. Note that washers purchased under stage 1 and stage 2 of joint comment proposal have different LCC savings. The LCC analysis indicates that 89% of households purchasing a clothes washer at the 1.04 MEF level would benefit, in comparison to the LCC of a baseline clothes washer. Starting in 2007, the LCC analysis indicates that 80% of households will benefit from the joint comments standard level, in comparison to the LCC of a baseline clothes washer.

TABLE 7.—SUMMARY OF LCC RESULTS FOR THE REFERENCE CASE

Trial standard level	MEF	Mean change in LCC from baseline [1]	Percent with LCC less than baseline [2]
1	1.021	(61)	84
2	1.089	(211)	87
3	1.04 in 2004	(103)	89
	1.26 in 2007	(260)	80
4	1.257	(242)	79
5	1.362	(243)	80
6	1.634	(176)	69

[1] The baseline LCC, based on the shipment weighted average of the most likely costs, is $1633.
[2] For a sample of 10,000 households.

b. *Payback Period.* As part of the LCC analysis is the payback analysis. We report the median payback for the reference case from the distribution of paybacks for each trial standard level in Table 8. The median payback is the median number of years required to recover, in energy savings, the increased costs of the efficiency improvements. The mean or average payback period is also reported. Results for the high and low growth scenarios can be found in Section 7.2.3 of the TSD.

TABLE 8.—SUMMARY OF PAYBACK PERIOD RESULTS—AEO REFERENCE

Trial standard level	MEF	Median [1] payback	Mean [1] payback
1	1.021	0.6	4.4
2	1.089	4.0	5.0
3	1.04 in 2004	3.5	4.6
	1.26 in 2007	5.0	6.8
4	1.257	5.1	7.0
5	1.362	5.1	7.0
6	1.634	7.0	8.7

[1] For a sample of 10,000 households.

c. *Rebuttable Presumption Payback.* The Act states that if the Department determines that the payback period of a standard is less than three years as calculated under the test procedure, there shall be a rebuttable presumption that such trial standard level is economically justified. The Act further states that if this three year payback is not met, this determination shall not be taken into consideration in deciding whether a standard is economically justified. Section 325(o)(2)(B)(iii), 42 U.S.C. 6295(o)(2)(B)(iii). Rebuttable Presumption Paybacks (PBPs) are presented in order to provide the established rebuttable presumption that a energy efficiency standard is economically justified if the additional product costs attributed to the standard are less than three times the value of the first year energy cost savings. Rather than using distributions for input values, the Rebuttable PBP is based on discrete values and is based on the DOE clothes washer test procedure assumptions. These values (including cycles per year, electric fuel source, etc.) correspond to those outlined in the DOE test procedure, found in 10 CFR 10, Volume 3, Part 430, Subpart B, Appendix J1. The result is a single payback value and not a distribution of PBPs.

Payback periods are calculated at the new standard level for all efficiency levels of product sold in the basecase. For this analysis the Department has assumed two efficiency levels in the

basecase: baseline units (MEF=.817) and units at a 35% reduction in the energy use of the baseline model (MEF=1.26) to represent the H-axis market segment. With the presently available data, the baseline efficiency level is weighted with a market share of 91% and the horizontal axis market share is weighted at 9%.

The payback periods are calculated for the expected effective year of the standard (2004 or 2007) and are presented in Table 9.

TABLE 9.—REBUTTABLE PRESUMPTION PAYBACK IN YEARS

Trial standard level	MEF	Payback for baseline to standard level	Payback for 35% efficiency level to standard level	Market share weighted payback period
		Market share = 91%	Market share = 9%	
1	1.021	2.1	NA	2.1
2	1.089	2.9	NA	2.9
3	1.04 in 2004	2.5	NA	2.5.
	1.26 in 2007	4.1	19.8	5.5
4	1.257	4.2	NA	4.2
5	1.362	4.3	19.6	5.7
6	1.634	5.7	23.2	7.3

Note: NA = not applicable.

The results in Table 9 are based on an increase of H-axis sales per year of 0.5%. Previously the annual escalation rate of H-axis washer sales market were assumed to capture an additional 0.5% per year of all clothes washer sales but now the annual sales of H-axis clothes washers is determined by an amount equal to 0.5% of the previous year's V-axis sales. The negotiated scenario of a two-tier standard with MEF levels of 1.04 becoming effective in the year 2004 and a MEF level of 1.26 becoming effective in the year 2007 is also represented. The values shown for the second tier were calculated for the year 2007. All other calculations are based on the year 2004. The effective year does not have a great impact on the payback period because only the fuel and water price are different for different years.

As can be seen from Table 9, Trial Standard Levels 1, 2 and the first level of 3 satisfy the rebuttable presumption test.

d. Consumer Sub-Group Analysis. As part of the consumer analysis we evaluated the impact to any identifiable groups or consumers, such as households of different income levels, who may be disproportionately affected by any national energy efficiency standard level. This analysis examines the economic impacts on different groups of consumers by estimating the average change in LCC and by calculating the fraction of households that would benefit. We analyzed the potential effect of standards for households with low income levels and senior households, two consumer subgroups of interest identified by DOE and supported by stakeholders. Seniors is defined as having a head of household over 65. Low income is defined as at 100% of poverty level. (Inputs to the spreadsheet used in determining life-cycle-cost and payback periods are explained in detail in Chapter 7 of the TSD). We present the results of the analysis in Table 10.

TABLE 10.—CONSUMER SUBGROUP LCC SAVINGS AND PERCENT OF HOUSEHOLDS BENEFITTING

Trial std levels	MEF	Sample households benefitting (%)			Average LCC savings ($)		
		Total	Senior	Low income	Total	Senior	Low income
1	1.021	84	79	85	61	41	69
2	1.089	87	80	88	211	137	243
3	1.04 in 2004	90	84	90	103	68	118
	1.26 in 2007	81	72	81	260	147	310
4	1.257	79	71	81	242	132	289
5	1.362	80	70	80	243	130	287
6	1.634	69	55	71	176	61	227

The two consumer subgroups show the same trend in average LCC savings and percent of sample households benefitting as the total sample of households.

For the low-income subgroup the percentage of households benefitting from standards is either the same or greater than for the general population. This can be explained by looking at the cycles per year (i.e., washer loads) used in determining the LCC. This number is estimated from the number of occupants in a household. Our RECS sample of low income households showed a greater number of people per household and we calculated 410 cycles per year, greater than the 392 used for the general population.

The senior household subgroup had less people per household, and therefore had less wash loads per year (on average 299 wash loads per year or 24% less wash loads). Therefore, seniors benefitted from standards somewhat less.

Other differences that could explain changes in LCC and the percentage in a subgroup benefitting from standards are other factors that determine the amount spent on fuel. Fuel costs are higher if electric water heaters and dryers are used instead of gas. The geographic location of these populations and the price they pay for fuel also affect the number of households in a subgroup

benefitting. These differences were small when compared to the differences in LCC due to the cycles per year between the subgroups and the total sample population.

An analysis on the effects on payback period by subgroup are shown in Table 11. In agreement with the LCC results, the payback periods for the low income subgroup were somewhat shorter than that for the overall population, while the payback periods were somewhat longer for the senior subgroup. The primary reason for the differences in payback period is the same as for the LCC analysis; the differences in wash loads per year.

TABLE 11.—CONSUMER SUBGROUP PAYBACK PERIOD COMPARISONS

Trial Std levels	MEF	Average payback period in years		
		Total RECS sample	Senior	Low income
1	1.021	4.4	5.4	4.4
2	1.089	5.0	6.4	4.9
3	1.04 in 2004	4.6	5.7	4.5.
	1.26 in 2007	6.8	8.4	6.5
4	1.257	7.0	8.7	6.8
5	1.362	7.0	8.8	6.9
6	1.634	8.7	10.9	8.4

2. Economic Impact on Manufacturers

We performed a Manufacturer Impact Analysis (MIA) to determine the impact of standards on manufacturers. The complete analysis is Chapter 11 of the TSD. In conducting the analysis, we conducted detailed interviews with six clothes washer manufacturers that together supply more than 99% of the domestic clothes washer market. The interviews provided valuable information used to evaluate the impacts of a new standard on manufacturers' cash flows, manufacturing capacities and employment levels.

Definition of Shipments Scenarios. The Manufacturer Impact Analysis was conducted using three shipment scenarios: High Price Elasticity Scenario, Medium Price Elasticity Scenario, and Medium Price/Income Elasticity Scenario. The High Price Elasticity scenario most closely resembles the original shipments forecast which was presented at the July 1999 workshop and used during the interviews. The results presented in this notice are for the Medium Price Elasticity Scenario—the reference case—which forecasts a reduction in clothes washer shipments approximately half way between the other two scenarios. Additional parameters used in forecasting shipments are summarized in Table 17. Results for the High Price Elasticity and Medium Price/Income Elasticity Scenarios are shown in Chapter 11 of the TSD.

Definition of Business Scenarios. During the interviews, several manufacturers stated that they would possibly exit the clothes washer manufacturing business if the standard exceeded certain improvement levels. To capture this uncertainty in future industry dynamics, ADL evaluated the industry financial impacts using two different business scenarios. In the first scenario, the ''no consolidation scenario,'' it is assumed that all current manufacturers continue to manufacture clothes washers and maintain their market share, even if they believe they will be unable to recuperate their incremental costs. This could result in a negative Standard Case industry net present value (INPV) for some manufacturers. In the second scenario, the ''industry consolidation scenario,'' it is assumed that some manufacturers would exit the industry or lose significant market share. In this scenario, their volumes are redistributed among the remaining and more profitable players in the industry.

Industry Cash Flow Results. The Department used the interviews to understand each manufacturer's incremental costs and its ability to pass through these costs at the various standard levels. Some manufacturers provided their cash flow analysis using the GRIM spreadsheet while others provided information on mark-ups, cost pass-through assumptions, prices, and expected shipments which were used by DOE to develop individual company cashflows. Individual company cashflow results were aggregated to calculate standard induced changes in Industry NPV (INPV) at each of the potential standard levels.

The aggregated industry Standard Case INPV for the ''No Consolidation'' scenario and the Medium Price Elasticity Shipment Scenario is presented in Table 12. Results for both business scenarios and the three shipment scenarios are presented in Chapter 11 of the TSD. Not all manufacturers provided information at the 50% level (MEF=1.634) and hence the cash flows at this level were extrapolated from the available information. Similarly, the Department extrapolated data submitted at the 20% and 25% efficiency levels to estimate the impacts of a two step standard with a reduction in the energy use of the baseline model of approximately 22% (MEF=1.04) in 2004 followed by a second step at 35% in 2007.

TABLE 12.—INDUSTRY CASH FLOW RESULTS FOR THE ''NO CONSOLIDATION'' SCENARIO—MEDIUM PRICE ELASTICITY

Trial standard level	MEF	Base case INPV (million)	Standard case INPV ($million)	Change in INPV ($million)	% Change in INPV	Standard deviation % NPV
1	1.021	1,439.1	1,420.4–1,349.5	(18.7)–(89.6)	(1.3)–(6.2)	11.5
2	1.089	1,439.1	1,033.8–877.2	(405.2)–(561.9)	(28.2)–(39.0)	11.4
3	1.04 in 2004, 1.26 in 2007	1,439.1	1,028.0–920.8	(411.0)–(518.3)	(28.6)–(36.0)	15.8
4	1.257	1,439.1	944.7–842.3	(494.4)–(596.8)	(34.4)–(41.5)	17.7
5	1.362	1,439.1	1,002.1–929.9	(437.0)–(509.2)	(30.4)–(35.4)	27.7

TABLE 12.—INDUSTRY CASH FLOW RESULTS FOR THE ''NO CONSOLIDATION'' SCENARIO—MEDIUM PRICE ELASTICITY—Continued

Trial standard level	MEF	Base case INPV (million)	Standard case INPV ($million)	Change in INPV ($million)	% Change in INPV	Standard deviation % NPV
6	1.634	1,439.1	989.7–815.2	(449.4)–(623.8)	(31.2)–(43.3)	27.7

From Table 12, we note that energy efficiency standards could result in losses of INPV between $411.0 and $518.3 million (28.6–36%) for the consensus proposal (Trial Standard Level 3). Although the impacts of the consensus proposal approach those of Trial Standard Levels 5 and 6, the Department found the impacts of Trial Standard Levels 5 and 6 to be much more unevenly distributed between firms. This large variability of impacts is attributed to the presence of existing product at these levels (H-axis designs) for some firms which may gain a competitive advantage over firms that do not have product.

The standard deviation (SD)[6] values reported in Table 12 provide a measure of how widely individual companies' percentage NPV changes are dispersed from the industry percentage change in value (% change in INPV). Calculating the SD of individual company % value change at each efficiency level from the industry INPV % change yields the following results: at Trial Standard Level 1 the SD is 11.5%; at Trial Standard Level 2 the SD is 11.4%; at Trial Standard Level 3 the SD is 15.8%, at Trial Standard Level 4 the SD is 17.7%; and at Trial Standard Levels 5 and 6 the SD leaps to 27.7%. This is significant because the greater the difference in impacts between manufactures, the greater the risk of industry consolidation. Several manufacturers believe that setting the standard at Trial Standard Level 5 or more would result in industry consolidation and the exit of two or three firms.

Compared with Trial Standard Level 4 (MEF=1.26 in 2004), the industry impacts of the consensus proposal (Trial Standard Level 3) are lower and more evenly distributed among the manufacturers. A potential factor lessening the impact of the consensus proposal from the impacts shown is the possible effect of technological innovation. Delaying the standard implementation date to 2007 for the more stringent level (MEF=1.26) gives manufacturers more time to research and develop lower-cost solutions to achieving higher standards.

Impact on Clothes Dryer Business. The majority of manufacturers indicated that stringent standards on clothes washers would have a corresponding effect on clothes dryers. Dryer sales are highly correlated to washer sales as people frequently buy these appliances as a set. From the manufacturers' data, it is estimated that approximately 45% to 55% of washers are sold in pairs with dryers. Therefore, any change in washer volumes will impact a significant portion of the dryer business. A separate GRIM was run in an effort to model the financial impact of these considerations on the dryer business. Table 13 presents the Base and Standard Case INPV for the Medium Price Elasticity Shipment Scenario. The loss of value is significant for standard levels 2 and greater.

TABLE 13.—STANDARD CASE NPV FOR DRYER BUSINESS—MEDIUM PRICE ELASTICITY SCENARIO

Trial standard level	MEF	Base case INPV ($million)	Standard case INPV ($million)	Change in INPV ($million)	% Change in INPV
1	1.021	665.1	664.5	(0.6)	(0.1)
2	1.089	665.1	660.6	(4.48)	(0.7)
3	1.04 in 2004, 1.26 in 2007	665.1	654.1	(11.0)	(1.7)
4	1.257	665.1	648.3	(16.84)	(2.5)
5	1.362	665.1	647.9	(17.2)	(3.9)
6	1.634	665.1	638.3	(26.8)	(4.0)

At the more stringent standard levels, manufacturers expect that they will redesign and retool their clothes washer platforms and these changes will dictate a change to the dryer platform as well. Manufacturers estimate that, at the more stringent standard levels of 25% and above, total industry conversion costs for dryers could be in the range of $25 million to $75 million. The Dryer GRIM does not consider any conversion costs (capital and design) that might be required to upgrade the dryer platforms at the more stringent standard levels. Any such investments will increase the negative impact on the INPV of the dryer industry over and above those presented in Table 13.

In addition, based on data gained from manufacturers, a decline in washer-related dryer sales will result in a decline in employment related to dryer production. The greatest impact is at and above a 35 percent reduction in the energy use of the baseline model, when shipments are expected to decline substantially, resulting in a similar impact on related employment levels. Table 14 summarizes the potential impact of new clothes washer standards on dryer industry employment. As shown Trial Standard Level 3 and above will result in a loss of more than 200 jobs in the dryer industry.

[6] Refer to Chapter 11 of the TSD for details of how the standard deviation was calculated.

TABLE 14.—IMPACT OF STANDARDS ON DRYER SHIPMENTS ON DRYER INDUSTRY EMPLOYMENT—MEDIUM PRICE ELASTICITY SCENARIO

Trial standard level	MEF	1999 dryer employment	Forecast 2004 dryer employment	Impact relative to 2004 base case
Basecase	Base Case	2,544	2,594	.....
1	1.021	2,544	2,578	(16)
2	1.089	2,544	2,520	(74)
3	1.04 in 2004 1.26 in 2007	2,544	2,506/2,488	[1](88)/(147)
4	1.257	2,544	2,352	(241)
5	1.362	2,544	2,348	(245)
6	1.634	2,544	2,226	(368)

[1] Reduction on top of first standard reduction, not cumulative.

Impact on Clothes Washer Repair Industry. Should an increase in energy efficiency standards result in higher prices for new clothes washers, consumers may be influenced to repair old units rather than purchase new ones at the higher price. Based on the forecast of clothes washer repairs in the shipments model, we estimated the impact of a change in clothes washer repair revenues on the INPV of the clothes washer manufacturers' repair parts business. The INPV of the estimated additional profit stream is presented in Table 15. As may be observed the increase in NPV for the repair industry is one order of magnitude lower than the loss of value of the dryer industry. For instance for Trial Standard Level 3 the net present value of increases in OEM revenue is .9 million compared to a loss of 11 million for the dryer business.

TABLE 15.—NET PRESENT VALUE OF OEM REPAIR REVENUES

[$ millions]

Trial standard level	MEF	Medium price elasticity
1	1.021	0.1
2	1.089	0.2
3	1.04 in 2004 1.26 in 2007	0.9
4	1.257	1.1
5	1.362	1.1
6	1.634	1.7

Impacts on Small Manufacturers. Converting from a company's current basic product line involves creating a new design, testing it and moving it into production with associated capital investments. Small manufacturers of clothes washers, because of their need to spread fixed costs over smaller production volumes, could be affected more negatively than large manufacturers by a proposed standard. The Department conducted a separate GRIM analysis for small manufacturers which are presented in Table 16. The changes in value due to a standard for a small company compared to a large company illustrates the effects of capital and engineering costs that are fixed with respect to production volume.

As shown in Table 16, a small manufacturer (4.2% market share) producing 331,000 clothes washers absent standards in 2004 sees its value reduced by 78.9–89.9% for Trial Standard Level 2. A small manufacturer (2.1% market share) producing 165,000 clothes washers in 2004 will lose all of its value (143.1–153.9%) since it is above 100% for Trial Standard Level 2. This compares to the loss of 28.2–39.0% for a large manufacturer (20% market share) producing 1,578,000 clothes washers in 2004 for Trial Standard Level 2.

At the time of the manufacturer interviews, the U.S. washer industry had one manufacturer of washers with a production volume of approximately 300,000 units (Alliance Laundry Systems, LLC), most of whose production was supplied to another relatively small appliance company (Amana Appliances) under the terms of a private label supply agreement entered into when the two companies were sold by Raytheon. This agreement ended in September 1999, and Amana announced that it would produce its own vertical-axis washers instead of sourcing them from Alliance. Amana and Alliance both report that any standard that requires a 25 percent or higher improvement (for Trial Standard Level 2 and above) in energy efficiency would certainly require major investments and the development of a horizontal-axis machine. At this time, neither Amana nor Alliance believes they have a functioning horizontal-axis washer capable of cost-competitively participating in the mass consumer marketplace.

The decision by either of the smaller producers, or any other washer manufacturer, to exit washer production would require an assessment of the linkages with their dryer business and with other appliances. Manufacturers and their retail partners generally perceive some value in being a full-line producer and greater value in producing both washers and dryers. If a manufacturer perceived significant value in its dryer businesses and if the total product line generated acceptable rates of return, it might continue to produce washers, even in the face of declining company values due to investment in new washer technology. Based on the major loss in company value associated with meeting a more stringent standard above Trial Standard Level 2 as seen in Table 16, it is likely that one or both of the two smaller companies would cease to produce washers covered by the standard and might also cease to market them.

TABLE 16.—CHANGE IN VALUE OF SMALL MANUFACTURERS, RESULTS FOR THE ''NO CONSOLIDATION'' SCENARIO—MEDIUM PRICE ELASTICITY SCENARIO (%)

Trial standard level	MEF	Large manufacturer (20% market share)	Small manufacturer (4.2% market share)	Small manufacturer (2.1% market share)
1	1.021	(1.3)–(6.2)	(17.4)–(22.4)	(37.9)–(42.8).
2	1.089	(28.2)–(39.0)	(78.9)–(89.8)	(143.1)–(153.9).
3	1.04 in 2004 1.26 in 2007	(28.6)–(36.0)	(83.1)–(90.6)	(152.2)–(159.6).
4	1.257	(34.4)–(41.5)	(91.8)–(98.9)	(164.4)–(171.6).
5	1.362	(30.4)–(35.4)	(87.7)–(92.7)	(160.3)–(165.3).
6	1.634	(31.2)–(43.3)	(90.7)–(102.8)	(166.0)–(178.1).

Impacts on Employment. The weight of available evidence does not support a conclusive assessment of the impact that new energy efficiency standards would have on employment levels in the clothes washer industry. The data that is available is extremely variable and the true extent of the impact will be largely dependent on whether manufacturers choose to exit the industry or move to non-domestic production facilities.

Manufacturers stated that any decrease in shipments will have a similar effect on employment, as employment levels tend to track production levels. However, while reductions in shipments may lead to reductions in employment at various manufacturers due to plant closures, this could be matched by increased employment in United States plants at those firms picking up the additional market share and corresponding volumes. In addition, the manufacturers' data supplied to the AHAM indicates that incremental labor-related costs are expected to increase at the higher efficiency levels (by up to 50 percent at the 40 percent reduction in the energy use of the baseline model level), due to the increased complexity of production and assembly of more efficient machines. Tracking employment levels by shipments using this data actually indicates total industry employment could increase as the change in labor expense for higher efficiency machines is greater than the change in labor resulting from the decline in shipments.

B. Significance of Energy Savings

The Act requires a standard to result in ''significant'' energy savings. Section 325(o)(3)(B), 42 U.S.C. 6295(o)(3)(B). While the term ''significant'' is not defined in the Act, the U.S. Court of Appeals, in *Natural Resources Defense Council* v. *Herrington,* 768 F.2d 1355, 1373 (D.C. Cir. 1985), stated that Congress intended ''significant'' energy savings to be savings that were not ''genuinely trivial.'' The energy savings for all of the trial standard levels considered in this rulemaking are non-trivial and therefore we consider them ''significant'' within the meaning of Section 325 of the Act.

All efficiency levels for which we have engineering data were analyzed. Each efficiency level was analyzed for three scenarios. Some of the parameters that were varied are inputs to the shipment-model and some are inputs to the NES spreadsheet model. Since shipments have an effect on the national energy savings, changes to the shipment inputs have a direct effect on the national energy savings. Changes in the input parameter affect the base case results as well as the standards case results. Table 17 outlines the input parameters used to generate the high and low bound sensitivities. Three scenarios are run: (1) reference case, (2) lower bound and (3) upper bound. The lower bound is defined as having medium price/income elasticity. The upper bound is defined as the price elasticity being high. All other parameters are unchanged from the reference case.

TABLE 17.—NES SPREADSHEET MODEL SHIPMENTS SENSITIVITIES

Parameter	Reference case	Lower bound (least drop in shipments after standard)	Upper bound (greatest drop in shipments after standards)
AEO growth	AEO99 reference	AEO99 reference	AEO99 reference.
Water Escalation Rate	medium	medium	medium.
H-axis base case escalation	0.5%	0.5%	0.5%.
Price Elasticity	medium	none	high.
Price/Income Elasticity	none	medium	none.
Top-loading Elasticity	medium	medium	medium.
Manufacturer incremental price mark-up	medium	medium	medium.
Year of standard	2004	2004	2004.

The Lower Bound Scenario results in the greatest energy savings. This scenario used price/income data to fit an equation to historical data. This resulted in a greater number of shipments and greater savings in energy than the reference case forecasted. The Upper Bound Scenario resulted in the least energy savings. This scenario assumed a high price elasticity. This resulted in lower shipments and energy savings. The Reference Case Scenario used medium or average values as parameter inputs and is bounded on both sides by the other scenarios described above. This is considered the most likely scenario.

The national energy savings and net present value results from the NES spreadsheet for the reference case are shown in Tables 18 and 19, respectively. More detailed results are also available in Appendix N of the TSD. Results are cumulative to 2030 and are shown as absolute energy and water savings and as the discounted value of

these savings in dollar terms. Table 20 shows the water savings for different standard levels. It can be seen that while the two-tier standard is a combination or hybrid of Trial Standard Levels 1 and 4, it is estimated to attain nearly the same energy, water, and national cost savings as a pure Trial Standard Level 4.

All of the trial standard levels considered in this rulemaking have significant energy savings, ranging from 2.12 quads to 7.53 quads, depending on the trial standard level.

TABLE 18.—REFERENCE CASE—ALL PARAMETERS SET TO MEDIUM OR AVERAGE

Trial standard level	MEF	Energy savings quads
1	1.021	2.12
2	1.089	4.04
3	1.04 in 2004 .. 1.26 in 2007 ..	5.52
4	1.257	5.99
5	1.362	6.03
6	1.634	7.53

C. Lessening of Utility or Performance of Products

This section summarizes the results of the department's consumer utility analysis. Preferences of low-income and elder populations are also addressed.

The focus group and conjoint results indicate that price is the most important attribute when consumers are purchasing a new clothes washer, although in each case another attribute is virtually tied with price in terms of importance. In the focus groups, 83% of the respondents included price in their top ten list of important clothes washer attributes, while 81% included wash tub capacity in that same list. In the conjoint analysis, price had the highest relative importance score (26%), followed closely by the availability of a wash load size option on the control panel (25%). Of the six attributes included in the conjoint analysis survey, door placement was the fifth most important attribute with a relative importance score of 11% (for further information, see Chapter 8 and Appendix J of the TSD).

In the likelihood of purchase scenarios, the purchase probabilities were more sensitive to price than any of the other washer attributes.[7] While the shift from a standard to a high efficiency machine resulted in a drop in the estimated purchase probability, this was due to the change in price rather than to changes in the other attributes. When price was held constant at the standard efficiency level and the other attributes were allowed to change to reflect a high efficiency machine, the likelihood of purchase increased. This is due to the fact that consumers value energy savings more than top load door placement.

The purchase probability findings indicate that low-income consumers and elderly consumers were slightly more likely to purchase a high efficiency, front-load washing machine than the total group of consumers. When the analysis focused exclusively on the impacts of clothes washer prices increasing, the data indicated that a smaller percentage of low-income consumers would be willing or able to purchase machines in the $650 price level, when compared to the total group of consumers. There was no statistical difference between elderly consumers and the full sample at the $650 level. While the data from the price impact questions indicate that low-income consumers are more adversely affected by higher clothes washer prices than the sample as a whole, the Department is unable to determine the magnitude of the impact on future clothes washer purchases using the survey data. For instance, the consumer analysis survey found that approximately half of the low-income respondents currently do not own a clothes washer, while more than three-quarters of the respondents making more than $25,000 annually own a washing machine. The Department is unable to determine if this ratio would change with a price increase due to the proposed standards. The fact that the survey found low-income consumers are more likely to use store financing plans, such as no interest for one year, to purchase a clothes washing machine than the sample as a whole further clouds the magnitude of the new standards' impact on low-income consumers because store financing encourages consumers to purchase high price products by allowing payments to be paid over a number of months.

The Department concludes that none of the trial standard levels reduces the performance of clothes washers. The Department conducted extensive consumer research to understand the product features that consumers value in clothes washers. Generally the trial standard levels increase clothes washer price and reduce operating cost but do not affect other product offerings. A significant issue raised during the rulemaking concerns the relative consumer utility of V-axis and H-axis washers. Some stakeholders believed that higher standard levels would require H-axis designs and this would result in eliminating the top loading V-axis machines thereby reducing utility for some consumers who prefer that option. Recent product offerings of high efficiency V-axis washers show that the axis-efficiency relationship is untenable.

D. Impact of Lessening of Competition

The Act directs the Department to consider any lessening of competition that is likely to result from standards. It further directs the Attorney General to determine the impact, if any, of competition likely to result from such standard and transmit such determination, not later than 60 days after the publication of a proposed rule to the Secretary, together with an analysis of the nature and extent of such impact. Section 325(o)(2)(B)(i)(V), 42 U.S.C. 6295(o)(2)(B)(i)(V).

In order to assist the Attorney General in making such a determination, the Department has provided the Department of Justice (DOJ) with copies of this notice and the TSD for review. At DOE's request, the DOJ reviewed the manufacturer impact analysis interview questionnaire to ensure that it would provide insight concerning any lessening of competition due to any proposed trial standard levels.

E. Need of the Nation To Save Energy and Net National Employment

1. National Net Present Value

Table 19 lists the National NPV for the trial standard levels. The NPV considers the combined discounted energy savings less the increased consumer costs of a particular trial standard level. We base this calculation on all expenses and savings occurring between 2004 and 2030.

The national NPV is positive for all the trial standard levels. In this analysis, a positive NPV means that the estimated energy savings are greater than the increased costs due to standards. It can be observed that the National NPV of Trial Standard Levels 2 through 5 are in the range of 14 to 17 billion dollars. Trial Standard Level 6 however has a lower NPV of 10 Billion due to the higher first cost of a clothes washer at this efficiency level.

[7] Purchase probabilities indicate the likelihood a consumer will purchase a particular clothes washer, assuming (s)he has made the decision to buy a new clothes washer.

TABLE 19.—REFERENCE CASE—ALL PARAMETERS SET TO MEDIUM OR AVERAGE

Trial standard level	MEF	Net present value (NPV) (billion 1997$) (discounted to 1999)
1	1.021	3.66
2	1.089	14.29
3	1.04 in 2004 1.26 in 2007	15.30
4	1.257	16.88
5	1.362	16.73
6	1.634	10.79

2. National Water Savings

Table 20 presents the estimated energy water savings. The savings is positive for all of the trial standard levels.

TABLE 20.—REFERENCE CASE—ALL PARAMETERS SET TO MEDIUM OR AVERAGE

Trial standard level	MEF	Water savings trillion gallons
1	1.021	0.53
2	1.089	9.09
3	1.04 in 2004 1.26 in 2007	11.59
4	1.257	12.94
5	1.362	12.94
6	1.634	10.85

3. Environmental Impacts

Enhanced energy efficiency improves the Nation's energy security, strengthens the economy and reduces the environmental impacts of energy production. The energy savings from clothes washer standards result in reduced emissions of CO_2, SO_2 and NO_X and aid in addressing global climate change and reducing air pollution. Depending on the standard level chosen, the cumulative emission reductions to 2030 range from 38–135 Mt for carbon equivalent, 115–364 thousand metric tons (kt) for NO_X, and 28–31 kt for SO_2. Cumulative emissions savings for the power and households sectors through the year 2030 are presented in Table 21.

TABLE 21.—CUMULATIVE EMISSIONS REDUCTIONS THROUGH 2030: HOUSEHOLD AND POWER SECTORS

Emission	Trial standard level emission reductions and MEF					
	1 0.817	2 1.089	3 1.04 in 2004, 1.26 in 2007	4 1.257	5 1.362	6 1.634
Carbon(Mt)	38.1	70.9	95.1	106.2	107.3	135
NO_X (kt)	115.6	193.6	253.5	280.6	283.1	364
SO_2 (kt)	[1] 31.4	[1] 30.3	[1] 28.1	[1] 30.3	[1] 30.3	[1] 31.4

[1] Results include only household emissions reductions because the power sector emissions cap implies that savings from electricity generation will be negligible.

4. Net National Employment

Net national employment impacts from clothes washer standards are defined as net jobs created or eliminated in the general economy as a consequence of: (1) Reduced spending by end users on energy (electricity, gas including LPG, and oil) and water; (2) reduced spending on new energy supply by the utility industry; (3) increased spending on the purchase price of new clothes washers; and (4) the associated indirect effects of those three factors throughout the national economy. Jobs are created when a clothes washer standard results in operating cost savings that more than offset the greater capital required to buy a more efficient clothes washer. More information on how these impacts are estimated is presented in the Net National Employment in Chapter 13 of the TSD.

The model used to estimate net national employment impacts suggests that the greatest number of jobs would be created by the standard level calling for a 35% reduction in clothes washer energy use. For this standard level, the model estimates that there would be 142,800 more jobs in 2030 than if there were no new efficiency standard implemented. However, it is unlikely that net employment would increase to this extent if the economy was continuing to perform at levels comparable those experienced during 2000. Taking into consideration these legitimate concerns regarding the interpretation and use of the employment impacts analysis, the Department concludes only that the proposed clothes washer standards are likely to produce employment benefits that are sufficient to offset fully any

adverse impacts on employment in the clothes washer or energy industries.

F. Conclusion

The Act specifies 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 which the Secretary determines is technologically feasible and economically justified. Section 325(o)(2)(A), 42 U.S.C. 6295(o)(2)(A). In determining whether a standard is economically justified, the Secretary must determine whether the benefits of the standard exceed its burdens. Section 325(o)(2)(B)(i), 42 U.S.C. 6295(o)(2)(B)(i). The amended standard must ''result in significant conservation of energy.'' Section 325(o)(2)(B)(3)(B), 42 U.S.C. 6295(o)(B)(3)(B).

We consider the impacts of standards at each of six trial standard levels, beginning with the most efficient level. We have included a summary of the analysis results in Table 22 to aid the reader in the discussion of the benefits and burdens for the different trial standard levels.

TABLE 22.—SUMMARY ANALYSIS RESULTS

Trial standard level	1	2	3	4	5	6
MEF	1.02	1.09	1.04 in 2004, 1.26 in 2007	1.26	1.36	1.63
Total Energy Saved (Quads)	2.12	4.04	5.52	5.99	6.03	7.53
Water Savings (trillion gallons)	0.53	9.09	11.59	12.94	12.94	10.85
NPV (Billion $)	3.66	14.29	15.3	16.88	16.73	10.79
Emissions						
Carbon Equivalent (Mt)	38.1	70.9	95.1	106.2	107.3	134.6
NO_X (kt)	115.6	193.6	253.5	280.6	283.1	364
SO_2 (kt) [1]	131.41	30.31	28.11	30.31	30.31	31.41
Manufacturer Impacts						
Cumulative Loss in Industry NPV ($ Million) [2]	19.2–90.1	409.9–566.2	421.1–528.4	510.1–612.5	453.1–524.9	474.5–648.9
% Change in INPV	(1.3)–(6.3)	(28.5)–(39.3)	(29.2)–(36.7)	(35.4)–(42.5)	(31.7–36.5)	(33.0)–(45.2)
Standard Deviation % NPV	11.5	11.4	15.8	17.7	27.7	27.7
Life Cycle Cost ($)						
Mean Savings ($)	61	211	103/260	242	243	176
Percent Households LCC Less than Baseline	84	87	89/80	79	80	69.
Payback (years)	4.4	5	4.6/6.8	7	7	8.7

[1] Results only include household SO_2 emissions reductions because SO_2 emissions from power plants are capped by clean air legislation. Thus, SO_2 emissions will only be negligibly affected by possible water heater standards.
[2] Includes impacts on dryer and repair business.

Trial Standard Level 6—MEF 1.63

First, we considered the most efficient level (max tech), MEF 1.63, which saves a total of 7.53 quads of energy through 2030. This is a significant amount of energy. The cumulative water savings through 2030 would be 10.85 trillion gallons. The emissions reductions through 2030 would total 134.6 Mt of carbon equivalent, 364 kt of NO_X, and 31.41 kt of SO_2, which are significant. At this level, consumers experience a considerable savings in life cycle cost of $176, with a payback of 8.7 years.

At Trial Standard Level 6, the clothes washer industry would experience a cumulative INPV loss of between $474.5–648.9 million which represents between 33.0 and 45.2% of the clothes washer industry value absent standards ($1,439.1 million—basecase). This impact is not evenly distributed among the six major manufactures.[8] This large variability of impacts is attributed to the presence of existing product for some manufacturers at this efficiency level which means that some firms may gain a competitive advantage. This variability is measured by the standard deviation of individual companies' changes in NPV.[9] At this level the standard deviation in individual companies' percentage change in NPV is 27.7%. Given the high industry impacts and the uneven burden on individual firms, there exists a significant risk of industry consolidation.

Based on the major loss in company value associated with meeting this trial standard level (90.7 to 102.8% assuming a 2.1% market share and 166 to 178.1% assuming a 4.2% market share) as shown in Table 16, it is likely that one or both of the two smaller manufacturers [10] would cease to produce clothes washers covered by the standard and might also cease to market commercial clothes washers.

The Department concludes that the burdens of Trial Standard Level 6 outweigh the benefits. Consequently, the Department concludes Trial Standard Level 6 is not economically justified.

Trial Standard Level 5—MEF 1.36

Next, we considered a 1.36 MEF, which saves a total of 6.03 quads of energy through 2030, also a significant amount. The cumulative water savings through 2030 for this trial standard level would be 12.94 trillion gallons. The emissions reductions through 2030 would total 107.3 Mt of carbon equivalent, 283.1 kt of NO_X, and 30.31 kt of SO_2, which are significant. At this level, consumer experience a

[8] Alliance Laundry Systems LLC, Amana Appliances, Frigidaire Home Products, General Electric Appliances (GEA), Maytag Corporation, and Whirlpool Corporation.

[9] The standard deviation is a measure of how widely individual companies' percentage NPV changes are dispersed from the industry percentage change in value. Refer to Chapter 11 of the TSD for a description of the calculation method.

[10] Alliance Laundry Systems LLC and Amana Appliances.

considerable savings in life cycle cost of $243, with a 7 year payback.

The clothes washer industry would experience a cumulative INPV loss of between $453.1–524.9 million. This represents between 31.7 and 36.5% of industry value absent standards ($1,439.1 million—basecase). For the same reason in Trial Standard Level 6, this impact is not evenly distributed among the six major manufactures. At this level the standard deviation in individual companies' percentage change in NPV is 27.7%. Refer to Chapter 11 of the TSD for a description of the calculation method for standard deviation. Given the high industry impacts and the uneven burden on individual firms, there exists a significant risk of industry consolidation.

Once again based on the major loss in company value associated with meeting this standard level (87.7 to 92.7% assuming a 2.1% market share and 160.3 to 165.3% assuming a 4.2% market share), as shown in Table 16, it is likely that one or both of the two smaller manufacturers would cease to produce washers covered by the standard and might also cease to market commercial clothes washers.

The Department concludes that the burdens of Trial Standard Level 5 outweigh the benefits. Consequently, the Department concludes Trial Standard Level 5 is not economically justified.

Trial Standard Level 4—MEF 1.26

Next, we considered a 1.26 MEF, which saves a total of 5.99 quads of energy through 2030, a significant amount. Just as in the case of the 1.36 MEF, the cumulative water savings through 2030 would equal 12.94 trillion gallons. The cumulative emissions reductions through 2030, however, are slightly lower for the 1.26 MEF because the cumulative energy savings is lower for this standard level than the 1.36 MEF. The 1.26 MEF level would save 106.2 Mt of carbon equivalent, 280.6 kt of NO_X, and 30.31 kt of SO_2, which are significant. At this level, consumers experience a considerable savings in life cycle cost of $242 with a payback of 7 years.

Under a 1.26 MEF standard, the clothes washer industry would experience a cumulative INPV loss of between $510.1–612.5 million. This represents between 35.4 and 42.5% of industry value absent standards ($1,439.1 million—basecase). Compared to Trial Standard Levels 5 and 6, this impact is more evenly distributed amongst the six major manufactures as represented by a standard deviation in individual companies' NPV of 17.7%, and thus there exists less risk of industry consolidation. Refer to Chapter 11 of the TSD for a description of the calculation method for standard deviation. This lower standard deviation reflects the greater diversity of designs, approaches and engineering flexibility to meet this efficiency level compared to Trial Standard Levels 5 and 6. However, given the high level of investment required to meet this efficiency level and an inability to spread fixed costs over large volumes, small manufacturers are particularly vulnerable. Based on the major loss in company value associated with meeting this standard level (91.8 to 98.9% assuming a 2.1% market share and 164.4 to 171.6% assuming a 4.2% market share), as shown in Table 16, it is likely that one or both of the two smaller manufacturers would cease to produce washers covered by the standard and might also cease to market commercial clothes washers.

The Department concludes that the burdens of Trial Standard Level 4 outweigh the benefits. Consequently, the Department concludes Trial Standard Level 4 is not economically justified.

Trial Standard Level 3—MEF 1.04/1.26

Next, we considered the two step 1.04/1.26 MEF efficiency level, which had been proposed in the Joint Stakeholders Comment. (Joint Comment, No. 204). This trial standard level, Trial Standard Level 3, had energy savings of 5.52 quads through 2030, a significant amount. The cumulative water savings through 2030 would equal 11.59 trillion gallons. The emissions reductions through 2030 would total 95.1 Mt of carbon equivalent, 253.5 kt of NO_X, and 28.11 kt of SO_2, which are significant. At the 1.04 MEF level, consumers would experience a savings in life cycle cost of $103, while they would experience a LCC savings of $260 at the 1.26 MEF level that would go into effect in 2007. The payback for the 1.04 MEF level is 4.6 years, and 6.8 years for the 1.26 MEF. The clothes washer industry would experience a cumulative NPV loss of between $421.1–528.4 million representing between 29.2 and 36.7% of basecase industry value.

Compared to a single step standard level of a 1.26 MEF implemented in 2004, the Joint Stakeholders Comment proposal reduces the impacts of the standards on manufacturers by delaying the effective date three years for the 1.26 MEF level. This allows clothes washer manufacturers more time to depreciate their current assets and plan a more orderly transition of their production facilities. Delaying the standard implementation date for the higher efficiency level gives manufacturers more time to research and develop lower-cost solutions to achieve higher standards.

Since the MIA shows that small manufacturers suffer the greatest impact, the Department takes into consideration that the consensus proposal was developed in consultation with, and supported by small manufacturers.

Furthermore, we consider that the Joint Stakeholders Comment specifically states that the proposal is not expected to eliminate any competitors. (Joint Comment No. 204).

Based on the manufacturers' statement in the Joint Stakeholders Comment, we believe that these impacts from the proposal are mitigated and is sufficient to conclude that, given the benefits, the standards submitted in the Joint Stakeholders Comment are economically justified. (Joint Comment No. 204).

After carefully considering the analysis and comments, the Department proposes to amend the energy conservation standards for clothes washers as proposed by the Joint Stakeholders Comment. (Joint Comment No. 204). The Department concludes this standard saves a significant amount of energy and is technologically feasible and economically justified. In determining economic justification, the Department finds that the benefits of energy and water savings, consumer life cycle cost savings, national net present value increase, job creation and emission reductions resulting from the standard outweigh the burdens of the loss of manufacturer net present value, and consumer life cycle cost increases for some users of clothes washers covered by today's notice. Therefore, the Department today proposes to adopt the energy conservation standards for clothes washers at Trial Standard Level 3.

VI. Procedural Issues and Regulatory Review

A. Review Under the National Environmental Policy Act of 1969

The Department is preparing an Environmental Assessment of the impacts of the proposed rule and DOE anticipates completing a Finding of No Significant Impact (FONSI) before publishing the final rule on Energy Conservation Standards for Clothes Washers, pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), the regulations of the Council on

Environmental Quality (40 CFR parts 1500–1508), and the Department's regulations for compliance with NEPA (10 CFR part 1021).

B. Review Under Executive Order 12866, ''Regulatory Planning and Review''

Today's regulatory action has been determined to be an ''economically significant regulatory action'' under Executive Order 12866, ''Regulatory Planning and Review.'' (58 FR 51735, October 4, 1993). Accordingly, today's 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 (OMB).

The draft rule submitted to OIRA and other documents submitted to OIRA for review have been made a part of the rulemaking record and are available for public review in the Department's Freedom of Information Reading Room (1E–190), 1000 Independence Avenue, SW, Washington, DC 20585, between the hours of 9:00 a.m. and 4:00 p.m., Monday through Friday, telephone (202) 586–3142.

The following summary of the Regulatory Impact Analysis (RIA) focuses on the major alternatives considered in arriving at the proposed approach to improving the energy efficiency of consumer products. The reader is referred to the complete draft ''Regulatory Impact Analysis,'' which is contained in the TSD, available as indicated at the beginning of this proposed rule. It 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.

Each alternative has been evaluated in terms of its ability to achieve significant energy savings at reasonable costs, and has been compared to the effectiveness of the proposed rule. These alternatives were analyzed with the NES/Shipments model modified to allow inputs for voluntary measures, as explained in the RIA attached to the TSD.

The RIA calculates the effects of feasible policy alternatives to clothes washer energy efficiency standards, and provides a quantitative comparison of the impacts of the alternatives. We evaluate each alternative in terms of its ability to achieve significant energy savings at reasonable costs, and we compare it to the effectiveness of the proposed rule.

We created the RIA using a series of alternative scenarios (with various assumptions), which we used as input to the NES/Shipments model for clothes washers.

We identified the following seven major policy alternatives for achieving consumer product energy efficiency. These alternatives include:

- No New Regulatory Action
- Enhanced Public Education & Information
- Financial Incentives

—Tax credits

—Rebates

—Low income and seniors subsidy

- Voluntary Energy Efficiency Targets (5 Years, 10 Years)
- Mass Government Purchases
- Early Replacement Program to existing standard levels
- Early Replacement Program to high-efficiency clothes washers (defined as having an MEF of 1.257, a 35% energy reduction level)
- The Proposed Approach (Performance Standards)

We have evaluated each alternative in terms of its ability to achieve significant energy savings at reasonable costs (See Table 23), and have compared it to the effectiveness of the proposed rule.

TABLE 23.—ALTERNATIVES CONSIDERED

Policy alternatives	Energy savings quads	Water savings trillion gallons	NPV $ in billions
Enhanced Public Education & Information	0.026	0.054	0.074
Consumer Tax Credits	0.410	0.085	0.117
Consumer Rebates High Efficiency	0.072	0.150	0.205
Low Income and Seniors Subsidy	0.031	0.065	0.089
Manufacturer Tax Credits	0.153–0.330	0.299–0.666	0.203–0.707
Voluntary Efficiency Target (5 year delay)	4.550	9.970	11.570
Voluntary Efficiency Target (10 year delay)	3.090	6.810	7.980
Mass Government Purchases	.....	0.013	.....
Early Replacement Program (w/Current Eff.)	0.004	0.006	0.024
Early Replacement Program (w/H-axis)	0.078	0.161	0.223
Proposed Negotiated Performance Standard	5.520	11.590	14.330

NPV=Net Present Value (2004–2030, in billion 1997 $).
Savings=Energy Savings (Source Quads).

The Net Present Value amounts shown in Table 23 refer to the NPV for consumers. Rebates or tax credits are not included as an expense since on average consumers are both paying for and receiving benefits of the payments.

The case in which no regulatory action is taken with regard to clothes washer efficiency constitutes the ''base case'' (or ''No Action'') scenario. In this case, between the years 2004 and 2030, clothes washers are expected to use 21.76 Quads (22.94 Exajoules (EJ)) of primary energy. Since this is the base case, energy savings and NPV are zero by definition.

A short description of each alternative is provided below:

Enhanced Public Education and Information. This would make the public more aware of energy savings available for more efficient clothes washers (examples would be Energy Star labeling, web sites with efficiency information and advertising). To model this possibility, we assumed that the effective market discount rates change from 75% to 47% for purchasers of clothes washers. This would have the same effect as a $39 discount on high efficiency washer prices. This program is assumed to continue through 2030.

Consumer Tax Credits. We assume tax credits equal to 15% of the cost of high-efficiency models (MEF of 1.257) and that 60% of consumers buying a clothes washer would take advantage of the tax credit. We assume this program is in place for six years.

Manufacturer Tax Credits. We assume that a manufacturer tax credit of $50 or $100 per machine with a cap on the number of washers per manufacturer (based on the proposed tax credit). The

tax credits are capped at $30 million per manufacturer per Tier, or $60 million per manufacturer. This program is assumed to be in place in six years between 2004 to 2010.

Consumer Rebates. We assume a rebate of 15% of the retail price of high-efficiency models for a period of 6 years. This is modeled by reducing the price of a washer with a MEF of 1.257 (a 35% reduction in energy use from the baseline model) by 15%.

Low Income and Seniors Subsidy. Based on the RECS survey for households owning a clothes washer and dryer, 28% of households qualify as low-income or senior households. We assumed a subsidy program would provide an amount equivalent to 25% of the price of a high efficiency clothes washer. This program was assumed to be in effect for 6 years.

Voluntary efficiency target (5 & 10 year delays). Assume a 1.26 MEF washer efficiency level but taking place 5 and 10 years after 2007.

Mass Government Purchases. This alternative assumes a Government agency such as the U.S. Department of Housing and Urban Development (HUD) purchases high efficiency washers for low income housing. We assume a program in which 25% of the 1.3 million households in public housing would participate in the program. We also assume that only washers reaching the end of their lifetime of 14 years would be replaced. Over a 6 year program period, this would result in a replacement of 138,000 clothes washers.

Early Replacement Programs. The purpose of this program would be to remove older, presumably less efficient models from the clothes washer stock with either existing base case efficiency washers or with high efficiency (MEF of 1.257, 35% energy reduction) washers. We model this by assuming a 15% increase in the size of the early replacement market segment. This program like the others is assumed to have a duration of 6 years.

Performance Standards. The proposed standard (proposed standard level 3).

Lastly, all of these alternatives must be gauged against the performance standards we are proposing in this proposed rule. Such performance standards would result in energy savings of 5.52 Quads (5.82 EJ), and the NPV would be an expected $14.33 billion.

As indicated in the paragraphs above, none of the alternatives we examined would save as much energy as the proposed rule. Also, several of the alternative would require new enabling legislation, since authority to carry out those alternatives does not presently exist.

C. Review Under the Regulatory Flexibility Act of 1980

The Regulatory Flexibility Act of 1980, 5 U.S.C. 601–612, requires an assessment of the impact of regulations on small businesses. Small businesses are defined as those firms within an industry that are privately owned and less dominant in the market.

To be categorized as a ''small'' clothes washer manufacturer, a firm must employ no more than 1,000 employees. The clothes washer industry is characterized by six firms accounting for nearly 99% of sales. By this definition none of the six major U.S. manufacturers of clothes washers are considered ''small.'' The Department is aware of one small domestic manufacturer of clothes washer, Staber Industries, that produces a top loading horizontal-axis clothes washer. The energy efficiency of this product already exceeds the proposed standard level.

The Department prepared a manufacturing impact analysis which was made public and available to all the clothes washer manufacturers. This analysis considered the effects on small manufacturers with a minimum annual production of 165,000 units (representing a 2.1% market share). The Department did not receive any information or comments indicating that even smaller manufacturers of clothes washers would be impacted differentially from those included in the small manufacturer analysis performed.

In view of the foregoing, the Department has determined and hereby certifies pursuant to Section 605(b) of the Regulatory Flexibility Act that, for this particular industry, the proposed standard levels in today's proposed rule will not ''have a significant economic impact on a substantial number of small entities,'' and it is not necessary to prepare a regulatory flexibility analysis.

D. Review Under the Paperwork Reduction Act

No new information or record keeping requirements are imposed by this rulemaking. Accordingly, no Office of Management and Budget clearance is required under the Paperwork Reduction Act. 44 U.S.C. 3501 *et seq.*

E. Review Under Executive Order 12988, ''Civil Justice Reform''

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 (February 7, 1996), imposes on Executive 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.

With regard to the review required by Section 3(a), 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 reviewed today's proposed rule under the standards of Section 3 of the Executive Order and determined that, to the extent permitted by law, the proposed regulations meet the relevant standards.

F. ''Takings'' Assessment Review

It has been determined pursuant to Executive Order 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights,'' 52 FR 8859 (March 18, 1988), that this regulation would not result in any takings that might require compensation under the Fifth Amendment to the United States Constitution.

G. Review Under Executive Order 13132, ''Federalism''

Executive Order 13132 (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. Agencies are required to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and carefully assess the necessity for such actions. Agencies also must provide State and local officials an opportunity for meaningful and timely input in the development of regulatory proposals that have federalism implications. DOE published a notice of

its intergovernmental consultation policy on March 14, 2000. (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. State regulations that may have existed on the products that are the subject of today's proposed rule were preempted by the Federal standards established in the National Appliance Energy Conservation Amendments of 1988. States can petition the Department for exemption from such preemption based on criteria set forth in EPCA.

H. Review Under the Unfunded Mandates Reform Act of 1995

With respect to a proposed regulatory action that may result in the expenditure by the private sector of $100 million or more (adjusted annually for inflation), Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires a Federal agency to publish estimates of the resulting costs, benefits and other effects on the national economy. 2 U.S.C. 1532(a), (b). 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 ''Regulatory Impact Analysis'' section of the TSD for this proposed rule responds to those requirements.

Under Section 205 of UMRA, we are 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. We are 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 Section 325(o) of the Energy Policy and Conservation Act (42 U.S.C. 6295(o)), this proposed rule would establish energy conservation standards for clothes washers that are designed to achieve the maximum improvement in energy efficiency that DOE has determined to be both technologically feasible and economically justified. DOE may not adopt an alternative that does not meet EPCA's substantive standard. A full discussion of the alternatives considered by DOE is presented in the ''Regulatory Impact Analysis'' section of the TSD for this proposed rule.

I. Review Under the Treasury and General Government Appropriations Act of 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. No. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any proposed rule or policy that may affect family well-being. Today's proposal 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.

J. Review Under the Plain Language Directives

Section 1(b)(12) of Executive Order 12866 requires that each agency draft its regulations to be simple and easy to understand, with the goal of minimizing the potential for uncertainty and litigation arising from such uncertainty. Similarly, the Presidential memorandum of June 1, 1998 (63 FR 31883) directs the heads of executive departments and agencies to use plain language in all proposed and final rulemaking documents published in the **Federal Register**.

Today's proposed rule uses the following general techniques to abide by Section 1(b)(12) of Executive Order 12866 and the Presidential memorandum of June 1, 1998 (63 FR 31883):

- Organization of the material to serve the needs of the readers (stakeholders).
- Use of common, everyday words in short sentences.
- Shorter sentences and sections.

We invite your comments on how to make this proposed rule easier to understand.

VII. Public Comment Procedures

A. Written Comment Procedures

The Department invites interested persons to participate in the rulemaking by submitting data, comments, or information with respect to the proposed issues set forth in today's proposed rule to Ms. Brenda Edwards-Jones, at the address indicated at the beginning of this notice. We will consider all submittals received by the date specified at the beginning of this notice in developing the final rule.

According 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 one complete copy of the document and ten (10) copies, if possible, from which the information believed to be confidential has been deleted. The Department of Energy will make its own determination with regard to the confidential status of the information and treat it according to its determination.

Factors of interest to the Department when evaluating requests to treat as confidential information that has been submitted include: (1) A description of the items; (2) an indication as to 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) an indication as to 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.

B. Public Workshop (Hearing)

1. Procedures for Submitting Requests To Speak

You will find the time and place of the public workshop (hearing) listed at the beginning of this notice of proposed rulemaking. The Department invites any person who has an interest in today's notice of proposed rulemaking, or who is a representative of a group or class of persons that has an interest in these proposed issues, to make a request for an opportunity to make an oral presentation. If you would like to attend the public workshop, please notify Ms. Brenda Edwards-Jones at (202) 586–2945. You may hand deliver requests to speak to the address indicated at the beginning of this notice between the hours of 8:00 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays, or send them by mail.

The person making the request should state why he or she, either individually or as a representative of a group or class of persons, is an appropriate spokesperson, briefly describe the nature of the interest in the rulemaking, and provide a telephone number for contact.

The Department requests each person wishing to speak to submit an advance copy of his or her statement at least ten days prior to the date of this workshop as indicated at the beginning of this notice. The Department, at its discretion, may permit any person wishing to speak who cannot meet this requirement to participate if that person has made alternative arrangements with the Office of Building Research and Standards in advance. The letter making a request to give an oral presentation must ask for such alternative arrangements.

2. Conduct of Workshop (Hearing)

The workshop (hearing) will be conducted in an informal, conference style. The Department may use a professional facilitator to facilitate discussion, and a court reporter will be present to record the transcript of the meeting. We will present summaries of major topics contained in the comments received before the workshop, allow time for presentations by workshop participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Following the workshop, there is provided an additional comment period, during which time interested parties will have an opportunity to comment on the proceedings at the workshop, as well as on any aspect of the rulemaking proceeding.

The Department reserves the right to select the persons to be heard at the hearing, to schedule the respective presentations, and to establish the procedures governing the conduct of the hearing. The length of each presentation is limited to 5 minutes.

A DOE official will be designated to preside at the hearing. The hearing will not be a judicial or an evidentiary-type hearing, but will be conducted in accordance with 5 U.S.C. 533 and Section 336 of the Act. At the conclusion of all initial oral statements at each day of the hearing, each person who has made an oral statement will be given the opportunity to make a rebuttal statement, subject to time limitations. The rebuttal statement will be given in the order in which the initial statements were made. The official conducting the hearing will accept additional comments or questions from those attending, as time permits. Any interested person may submit, to the presiding official, written questions to be asked of any person making a statement at the hearing. The presiding official will determine whether the question is relevant, and whether time limitations permit it to be presented for answer.

Further questioning of speakers will be permitted by DOE. The presiding official will afford any interested person an opportunity to question other interested persons who made oral presentations, and employees of the United States who have made written or oral presentations with respect to disputed issues of material fact relating to the proposed rule. This opportunity will be afforded after any rebuttal statements, to the extent that the presiding official determines that such questioning is likely to result in a more timely and effective resolution of such issues. If the time provided is insufficient, DOE will consider affording an additional opportunity for questioning at a mutually convenient time. Persons interested in making use of this opportunity must submit their request to the presiding official no later than shortly after the completion of any rebuttal statements and be prepared to state specific justification, including why the issue is one of disputed fact and how the proposed questions would expedite their resolution.

Any further procedural rules regarding proper conduct of the hearing will be announced by the presiding official.

The Department will arrange for a transcript of the workshop and will make the entire record of this rulemaking, including the transcript, available for inspection in the Department's Freedom of Information Reading Room as provided at the beginning of this notice. Any person may purchase a copy of the transcript from the transcribing reporter. You can also download the TSD and other analyses from the Internet at: http://www.eren.doe.gov/buildings/codes_standards/applbrf/clwasher.html

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Energy conservation, Household appliances.

Issued in Washington, DC., September 26, 2000.

Dan W. Reicher,

Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble Part 430 of Chapter II of Title 10, Code of Federal Regulations, is proposed to be amended 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. Appendix J to subpart B of part 430 is amended by adding, in section 2, paragraphs 2.3.1, 2.3.2, and by revising paragraphs 2.10, 2.11 and 2.11.1 to read as follows:

Appendix J to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Automatic and Semi-Automatic Clothes Washers

* * * * *

2. TESTING CONDITIONS

* * * * *

2.3 *Supply water.* * * *

2.3.1 *Supply water requirements for water and energy consumption testing.* For nonwater-heating clothes washers not equipped with thermostatically controlled water valves, the temperature of the hot and cold water supply shall be maintained at 100° ±10°F (37.8°C ±5.5°C). For nonwater-heating clothes washers equipped with thermostatically controlled water valves, the temperature of the hot water supply shall be maintained at 140°F ±5°F (60.0°C ±2.8°C) and the cold water supply shall be maintained at 60°F ±5F° (15.6°C ±2.8°C). For water-heating clothes washers, the temperature of the hot water supply shall be maintained at 140°F ±5°F (60.0°C ±2.8°C) and the cold water supply shall not exceed 60°F (15.6°C). Water meters shall be installed in both the hot and cold water lines to measure water consumption.

2.3.2 *Supply water requirements for remaining moisture content testing.* For nonwater-heating clothes washers not equipped with thermostatically controlled water valves, the temperature of the hot water supply shall be maintained at 140°F ±5°F and the cold water supply shall be maintained at 60°F ±5°F. All other clothes washers shall be connected to water supply temperatures as stated in section 2.3.1.

* * * * *

2.10 *Wash time (period of agitation or tumble) setting.* If the maximum available wash time in the normal cycle is greater than 9.75 minutes, the wash time shall be not less than 9.75 minutes. If the maximum available wash time in the normal cycle is less than 9.75 minutes, the wash time shall be the maximum available wash time.

* * * * *

2.11 *Agitation speed and spin speed settings.* Where controls are provided for agitation speed and spin speed selections, set them as follows:

2.11.1 *For energy and water consumption tests, set at the normal cycle settings.* If settings at the normal cycle are not offered, set the control settings to the maximum speed permitted on the clothes washer.

3. Appendix J to subpart B of part 430 is amended, in section 3, by revising paragraph 3.3.1 to read as follows:

3. TEST MEASUREMENTS

* * * * *

3.3.1 The wash temperature shall be the same as the rinse temperature for all testing. Cold rinse is the coldest rinse temperature

available on the machine. Warm rinse is the hottest rinse temperature available on the machine.

* * * * *

4. Appendix J1 to Subpart B of part 430 is amended, in section 1, by adding paragraphs 1.22 and 1.23 to read as follows:

Appendix J1 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Automatic and Semi-Automatic Clothes Washers

* * * * *

1. DEFINITIONS AND SYMBOLS

1.22 *Cold rinse* means the coldest rinse temperature available on the machine (and should be the same rinse temperature selection tested in section 3.7).

1.23 *Warm rinse* means the hottest rinse temperature available on the machine (and should be the same rinse temperature selection

5. Appendix J1 to subpart B of part 430 is amended in section 2 by revising paragraphs 2.6.1, 2.6.2, and adding paragraphs 2.6.3 through 2.6.7.2, to read as follows:

2. TESTING CONDITIONS

* * * * *

2.6.1 *Energy Test Cloth.* The energy test cloth shall be made from energy test cloth material, as specified in 2.6.4, that is 24 inches by 36 inches (61.0 cm by 91.4 cm) and has been hemmed to 22 inches by 34 inches (55.9 cm by 86.4 cm) before washing. The energy test cloth shall be clean and shall not be used for more than 60 test runs (after preconditioning as specified in section 2.6.3). Mixed lots of material shall not be used for testing the clothes washers.

* * * * *

2.6.2 *Energy Stuffer Cloth.* The energy stuffer cloth shall be made from energy test cloth material, as specified in 2.6.4, and shall consist of pieces of material that are 12 inches by 12 inches (30.5 cm by 30.5 cm) and have been hemmed to 10 inches by 10 inches (25.4 cm by 25.4 cm) before washing. The energy stuffer cloth shall be clean and shall not be used for more than 60 test runs (after preconditioning as specified in section 2.6.3). Mixed lots of material shall not be used for testing the clothes washers.

2.6.3 *Preconditioning of Test Cloths.* The new test cloths, including energy test cloths and energy stuffer cloths, shall be pre-conditioned in a clothes washer in the following manner:

2.6.3.1 Perform 5 complete normal wash-rinse-spin cycles, the first two with AHAM Standard detergent 2A and the last three without detergent. Place the test cloth in a clothes washer set at the maximum water level. Wash the load for ten minutes in soft water (17 ppm hardness or less) using 6.0 grams per gallon of water of AHAM Standard detergent 2A. The wash temperature is to be controlled to 135°F ±5°F (57.2°C ±2.8C) and the rinse temperature is to be controlled to 60°F ±5°F (15.6°C ±2.8°C). Repeat the cycle with detergent and then repeat the cycle three additional times without detergent, bone drying the load between cycles (total of five wash and rinse cycles).

2.6.4 *Energy test cloth material.* The energy test cloths and energy stuffer cloths shall be made from fabric meeting the following specifications. The material should come from a roll of material with a width of approximately 63 inches and approximately 500 yards per roll, however, other sizes maybe used if they fall within the specifications.

2.6.4.1 *Nominal fabric type.* Pure finished bleached cloth, made with a momie or granite weave, which is nominally 50 percent cotton and 50 percent polyester.

2.6.4.2 The fabric weight shall be 5.60 ounces per square yard (190.0 g/m ^{2}), ±5 percent.

2.6.4.3 The thread count shall be 61 x 54 per inch (warp x fill), ±2 percent.

2.6.4.4 The warp yarn and filling yarn shall each have fiber content of 50 percent ±4 percent cotton, with the balance being polyester, and be open end spun, 15/1 ±5 percent cotton count blended yarn.

2.6.4.5 Water repellent finishes, such as fluoropolymer stain resistant finishes shall not be applied to the test cloth. The absence of such finishes shall be verified by:

2.6.4.5.1 AATCC–118 Oil Repellency Test (DuPont or 3M version) of each new lot of test cloth (when purchased from the mill) to confirm the absence of Scotchguard or other water repellent finish (required scores of ''D'' across the board).

2.6.4.5.2 AATCC–79 Drop Absorbency Test of each new lot of test cloth (when purchased from the mill) to confirm the absence of Scotchguard © or other water repellent finish (time to absorb one drop should be on the order of 1 second).

2.6.4.6 The moisture absorption and retention shall be evaluated for each new lot of test cloth by the Standard Extractor Remaining Moisture Content (RMC) Test specified in section 2.6.5.

2.6.4.6.1 Repeat the Standard Extractor RMC Test in section 2.6.5 three times.

2.6.4.6.2 An RMC correction curve shall be calculated as specified in section 2.6.6.

2.6.5 *Standard Extractor RMC Test Procedure.* The following procedure is used to evaluate the moisture absorption and retention characteristics of a lot of test cloth by measuring the RMC in a standard extractor at a specified set of conditions. Table 2.6.5 is the matrix of test conditions. The 500g requirement will only be used if a clothes washer design can achieve spin speeds in the 500g range. When this matrix is repeated 3 times, a total of 48 extractor RMC test runs are required. For the purpose of the extractor RMC test, the test cloths may be used for up to 60 test runs (after preconditioning as specified in section 2.6.3).

TABLE 2.6.5.—MATRIX OF EXTRACTOR RMC TEST CONDITIONS

''g'' Force	Warm soak		Cold soak	
	15 min. spin	4 min. spin	15 min. spin	4 min. spin
50				
200				
350				
500				

2.6.5.1 The standard extractor RMC tests shall be run in a Bock Model 215 extractor (having a basket diameter of 19.5 inches, length of 12 inches, and volume of 2.1 ft ^{3}), with a variable speed drive [Bock Engineered Products, P.O. Box 5127, Toledo, OH 43611] or an equivalent extractor with same basket design (*i.e.* diameter, length, volume, and hole configuration) and variable speed drive.

2.6.5.2 *Test Load.* Test cloths shall be preconditioned in accordance with 2.6.3. The load size shall be 8.4 lbs., consistent with section 3.8.1.

2.6.5.3 *Procedure.*

2.6.5.3.1 Record the ''bone-dry'' weight of the test load (WI).

2.6.5.3.2 Soak the test load for 20 minutes in 10 gallons of soft (< 17 ppm) water. The entire test load shall be submerged. The water temperature shall be 100°F ±5°F.

2.6.5.3.3 Remove the test load and allow water to gravity drain off of the test cloths. Then manually place the test cloths in the basket of the extractor, distributing them evenly by eye. Spin the load at a fixed speed corresponding to the intended centripetal acceleration level (measured in units of the acceleration of gravity, g) ±1 g for the intended time period ±5 seconds.

2.6.5.3.4 Record the weight of the test load immediately after the completion of the extractor spin cycle (WC).

2.6.5.3.5 Calculate the RMC as (WC–WI)/WI.

2.6.5.3.6 The RMC of the test load shall be measured at three (3) g levels: 50g; 200g; and 350g, using two different spin times at each g level: 4 minutes; and 15 minutes. If a clothes washer design can achieve spin speeds in the 500g range than the RMC of the test load shall be measured at four (4) g levels: 50g; 200g; 350g; and 500g, using two different spin times at each g level: 4 minutes; and 15 minutes.

2.6.5.4 Repeat 2.6.5.3 using soft (<17 ppm) water at 60°F ±5°F.

2.6.6 *Calculation of RMC correction curve.*

2.6.6.1 Average the values of 3 test runs and fill in Table 2.6.5. Perform a linear least-squares fit to relate the standard RMC ($RMC_{standard}$) values (shown in Table 2.6.6.1) to the values measured in 2.6.5 (RMC_{cloth}): $RMC_{standard} \sim A * RMC_{cloth} + B$

Where A and B are coefficients of the linear least squares fit.

TABLE 2.6.6.1.—STANDARD RMC VALUES ($RMC_{standard}$)

G	RMC percent			
	Warm soak		Cold soak	
	15 min. spin	4 min. spin	15 min. spin	4 min. spin
50	50.4	55.7	52.8	59.0
200	35.6	40.4	37.9	43.1
350	29.6	33.1	30.6	35.8
500	24.2	28.7	25.5	30.0

2.6.6.2 Check accuracy of linear least squares fit using the following method:

The root mean square value of

$$\left(\sum_{i=1}^{12} \frac{\left(RMC_{standard\_i} - RMC_{corr\_i} \right)^2}{10} \right)^{1/2}$$

shall be less than 2 percent, where a sum is taken over all of the different tests, where $RMC_{standard\_i}$ is the RMC standard value measured for the I-th test, and RMC_{corr3_i} is the corrected RMC value for the I-th cloth test. This equation is valid only for the use with three (3) g force values therefore when using the 500g requirement; replace the 500g value instead of the 350g value.

2.6.7 *Application of RMC correction curve.*

2.6.7.1 Using the coefficients, A and B calculated in section 2.6.6.1:

$RMC_{corr} = A * RMC + B$

2.6.7.2 Substitute RMC_{corr} values in calculations in section 3.8.

* * * * *

6. Appendix J1 to subpart B of part 430 is amended, in section 4.1.5, by revising the definition of ''ER_x, ER_a, ER_n'' to read as follows:

4. CALCULATION OF DERIVED RESULTS FROM TEST MEASUREMENTS

* * * * *

4.1.5 * * * ER_x, ER_a, ER_n, are reported electrical energy consumption values, in kilowatt-hours per cycle, at maximum, average, and minimum test loads, respectively, for the warm rinse cycle per definitions in section 3.7.2.

* * * * *

7. Section 430.32 of subpart C, 10 CFR part 430 is amended by revising paragraph (g) to read as follows:

§ 430.32 Energy and water conservation standards and effective dates.

* * * * *

(g) *Clothes washers.*

(1) Clothes washers manufactured before January 1, 2004, shall have an energy factor no less than:

Product class	Energy factor (cu.ft./Kwh/cycle) as of January 1, 1988	Energy factor (cu.ft./Kwh/cycle) as of May 14, 1988
i. Top Loading, Compact (less than 1.6 ft.^{3} capacity).	Not Applicable.[1]	0.9.
ii. Top Loading, Standard (1.6 ft.^{3} or greater capacity).	Not Applicable.[1]	1.18.
iii. Top Loading, Semi-Automatic	Not Applicable.[1]	Not Applicable.[1]
iv. Front Loading	Not Applicable.[1]	Not Applicable.[1]
v. Suds saving	Not Applicable.[1]	Not Applicable.[1]

[1] Must have an unheated rinse water option.

(2) Clothes washers manufactured after January 1, 2004, shall have amodified energy factor no less than:

Product Class	Modified Energy factor (cu.ft./Kwh/cycle) as of January 1, 2004	Modified Energy factor (cu.ft./Kwh/cycle) as of January 1, 2007
i. Top Loading, Compact (less than 1.6 ft.^{3} capacity)..	0.65	0.65.
ii. Standard (1.6 ft.^{3} or greater capacity.	1.04	1.26.
iii. Top Loading, Semi-Automatic	Not Applicable.[1]	Not Applicable.[1]
iv. Front Loading	1.04	1.26.
v. Suds saving	Not Applicable.[1]	Not Applicable.[1]

[1] Must have an unheated rinse water option.

* * * * *

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