[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket No. EERE-2012-STD- 0020]

RIN: 1904-AC77

Energy Conservation Program: Energy Conservation Standards for Commercial Clothes Washers

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

ACTION: Notice of proposed rulemaking (NOPR) and public meeting.

SUMMARY: The Energy Policy and Conservation Act of 1975 (EPCA), as amended, prescribes energy conservation standards for various consumer products and certain commercial and industrial equipment, including commercial clothes washers. EPCA also requires the U.S. Department of Energy (DOE) to determine whether amended standards would be technologically feasible and economically justified, and would save a significant amount of energy. In this notice, DOE proposes to amend the energy conservation standards for commercial clothes washers. The notice also announces a public meeting to receive comment on these proposed standards and associated analyses and results.

DATES: DOE will hold a public meeting on Monday, April 21, 2014 from 9 a.m. to 4 p.m., in Washington, DC. The meeting will also be broadcast as a webinar. See section VII Public Participation for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

DOE will accept comments, data, and information regarding this notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than [**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER PUBLICATION**]. See section VII Public Participation for details.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E-086, 1000 Independence Avenue, SW., Washington, DC 20585. To attend, please notify Ms. Brenda Edwards at (202) 586–2945. Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE as soon as possible by contacting Ms. Edwards to initiate the necessary procedures. Please also note that those wishing to bring laptops into the Forrestal Building will be required to obtain a property pass. Visitors should avoid bringing laptops, or allow an extra 45 minutes. Persons can attend the public meeting via webinar. For more information, refer to the Public Participation section near the end of this notice.

Any comments submitted must identify the NOPR for Energy Conservation Standards for commercial clothes washers, and provide docket number EERE-2012-STD-

0020 and/or regulatory information number (RIN) number 1904-AC77. Comments may be submitted using any of the following methods:

1. Federal eRulemaking Portal: www.regulations.gov. Follow the instructions for submitting comments.
2. E-mail: CommClothesWashers-2012-STD-0020@ee.doe.gov. Include the docket number and/or RIN in the subject line of the message.
3. Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a CD. It is not necessary to include printed copies.
4. Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

Written comments regarding the burden-hour estimates or other aspects of the collection-of-information requirements contained in this proposed rule may be submitted to Office of Energy Efficiency and Renewable Energy through the methods listed above and by e-mail to Chad_S_Whiteman@omb.eop.gov .

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

Docket: The docket, which includes Federal Register notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at regulations.gov. The docket for this rulemaking can be accessed by searching for the docket at http://www.regulations.gov/#!docketDetail;D=EERE-2012-BT-STD-0020 and/or Docket No. EERE-2012-BT-STD-0020 at the regulations.gov website. All documents in the docket are listed in the regulations.gov index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available. The regulations.gov web page contains simple instructions on how to access all documents, including public comments, in the docket.

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

FOR FURTHER INFORMATION CONTACT:

Mr. John Cymbalsky, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202)–586–2192. E-mail: commercial_clothes_washers@ee.doe.gov .

Ms. Elizabeth Kohl, U.S. Department of Energy, Office of the General Counsel,

Mailstop GC–71, 1000 Independence Avenue, SW, Washington, DC 20585-0121.

Telephone: (202) 586-7796. E-mail: Elizabeth.Kohl@hq.doe.gov .

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Summary of the Proposed Rule

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C.6291, et seq; “EPCA”), Pub. L. 94-163, sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012)). Part C of title III, which for editorial reasons was re-designated as Part A-1 upon incorporation into the U.S. Code (42 U.S.C. 6311–6317, as codified), establishes the "Energy Conservation Program for Certain Industrial Equipment." These include commercial clothes washers (CCW), the subject of today’s notice. (42 U.S.C. 6311(1)(H)).

Pursuant to EPCA, any new or amended energy conservation standard must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and 6316(a)). Furthermore, the new or amended standard must result in a significant conservation of energy. (42 U.S.C. 6295(o)(3)(B) and 6316(a)). In accordance with these and other statutory provisions discussed in this notice, DOE proposes amended energy conservation standards for commercial clothes washers. The proposed standards, which are expressed for each product class in terms of a minimum modified energy factor

(MEF_{J2})[1] and a maximum integrated water factor (IWF), are shown in Table I.1. These proposed standards, if adopted, would apply to all products listed in Table I.1 and manufactured in, or imported into, the United States on or after the date three years after the publication of the final rule for this rulemaking.

Table I.1. Proposed Energy Conservation Standards for Commercial Clothes Washers

Product Class	Minimum MEF_{J2}*	Maximum IWF†
Top-Loading	1.35	8.8
Front-Loading	2.00	4.1

*MEF_{J2} (appendix J2 modified energy factor) is calculated as the clothes container capacity in cubic feet divided by the sum, expressed in kilowatt-hours (kWh), of: (1) the total weighted per-cycle hot water energy consumption; (2) the total weighted per-cycle machine electrical energy consumption; and (3) the per-cycle energy consumption for removing moisture from a test load.

†IWF (integrated water factor) is calculated as the sum, expressed in gallons per cycle, of the total weighted per-cycle water consumption for all wash cycles divided by the clothes container capacity in cubic feet.

A. Benefits and Costs to Consumers

Table I.2 presents DOE's evaluation of the economic impacts of the proposed standards on consumers of commercial clothes washers, as measured by the average life-cycle cost (LCC) savings and the median payback period. The average LCC savings are positive for all product classes for which consumers are impacted by the proposed standards. The PBPs reflect the very small incremental cost necessary to achieve the proposed standards.

[1] DOE proposes to use the "MEF_{J2}" metric to distinguish these new standards from the MEF metric on which the current energy conservation standards are based. MEF is calculated according to the test procedures at 10 CFR 430, subpart B, appendix J1; whereas MEF_{J2} is defined in 10 CFR 431.154(b)(1) and is equivalent to the MEF calculation in 10 CFR 430, subpart B, appendix J2. See Section III.C for a comparison of the current standards, measured using appendix J1, with these proposed standards measured using the same appendix. The proposed standards comply with 42 U.S.C. 6295(o)(1).

Table I.2. Impacts of Proposed Standards on Consumers of Commercial Clothes Washers: Multi-Family Application

Product Class	Average LCC Savings (2012$)	Median Payback Period (years)
Front-loading	$285	0.02
Top-Loading	$259	0.00

Table I.3. Impacts of Proposed Standards on Consumers of Commercial Clothes Washers: Laundromat Application

Product Class	Average LCC Savings (2012$)	Median Payback Period (years)
Front-loading	$235	0.01
Top-Loading	$145	0.00

B. Impact on Manufacturers

The industry net present value (INPV) is the sum of the discounted cash flows to the industry from the base year through the end of the analysis period (2014 to 2047). Using a real discount rate of 8.6 percent, DOE estimates that the industry net present value (INPV) for manufacturers of commercial clothes washers is $124.2 million in 2012$. Under the proposed standards, DOE expects that manufacturers may lose up to 4.9 percent of their INPV, which is approximately $6.0 million in 2012$. Additionally, based on DOE's interviews with the manufacturers of commercial clothes washers, DOE does not expect any plant closings or significant loss of employment as a result of today's standards.

C. National Benefits[2]

DOE's analyses indicate that the proposed standards would save a significant amount of energy. The lifetime savings for front-loading and top-loading commercial clothes washers purchased in the 30-year period that begins in the year of compliance with amended standards (2018–2047) amount to 0.11 quads. This is equivalent to 0.6% percent of total U.S. commercial energy use in 2012.

The cumulative net present value (NPV) of total consumer costs and savings of the proposed standards for front-loading and top-loading commercial clothes washers ranges from $405 million (at a 7-percent discount rate) to $938 million (at a 3-percent discount rate). This NPV expresses the estimated total value of future operating-cost savings minus the estimated increased product costs for products purchased in 2018–2047.

In addition, the proposed standards would have significant environmental benefits. The energy savings would result in cumulative emission reductions of 5.9 million metric tons (Mt)[3] of carbon dioxide (CO_2), 50.1 thousand tons of methane, 4.4 thousand tons of sulfur dioxide (SO_2), 9.1 thousand tons of nitrogen oxides (NO_X) and 0.01 tons of mercury (Hg).[4]

[2] All monetary values in this section are expressed in 2012 dollars and are discounted to 2013.
[3] A metric ton is equivalent to 1.1 short tons. Results for NO_X and Hg are presented in short tons.
[4] DOE calculated emissions reductions relative to the Annual Energy Outlook (AEO) 2013 Reference case, which generally represents current legislation and environmental regulations for which implementing regulations were available as of December 31, 2012.

The value of the CO_2 reductions is calculated using a range of values per metric ton of CO_2 (otherwise known as the Social Cost of Carbon, or SCC) developed by an interagency process. The derivation of the SCC values is discussed in section IV.M. Using discount rates appropriate for each set of SCC values, DOE estimates the present monetary value of the CO_2 emissions reduction is between $0.04 billion and $0.56 billion. DOE also estimates the present monetary value of the NO_X emissions reduction, is $4.9 million at a 7-percent discount rate and $11.4 million at a 3-percent discount rate.[5]

Table I.4 summarizes the national economic costs and benefits expected to result from the proposed standards for commercial clothes washers.

[5] DOE is currently investigating valuation of avoided Hg and SO2 emissions.

Table I.4. Summary of National Economic Benefits and Costs of Proposed Energy Conservation Standards for Front-loading and Top-loading CCW *

Category	Present Value Billion 2012$	Discount Rate
Benefits		
Operating Cost Savings	0.405	7%
	0.938	3%
CO_2 Reduction Monetized Value ($11.8/t case)**	0.04	5%
CO_2 Reduction Monetized Value ($39.7/t case)**	0.18	3%
CO_2 Reduction Monetized Value ($61.2/t case)**	0.29	2.5%
CO_2 Reduction Monetized Value ($117/t case)**	0.56	3%
NO_X Reduction Monetized Value (at $2,639/ton)**	0.0049	7%
	0.0114	3%
Total Benefits†	0.59	7%
	1.13	3%
Costs		
Incremental Installed Costs	0.0	7%
	0.0	3%
Total Net Benefits		
Including Emissions Reduction Monetized Value†	0.59	7%
	1.13	3%

* This table presents the costs and benefits associated with front-loading and top-loading CCW units shipped in 2018−2047. These results include benefits to consumers which accrue after 2047 from the products purchased in 2018−2047. The results account for the incremental variable and fixed costs incurred by manufacturers due to the standard, some of which may be incurred in preparation for the rule.
** The CO_2 values represent global monetized values of the SCC, in 2012$, in 2018 under several scenarios of the updated SCC values. The first three cases use the averages of SCC distributions calculated using 5%, 3%, and 2.5% discount rates, respectively. The fourth case represents the 95th percentile of the SCC distribution calculated using a 3% discount rate. The SCC time series used by DOE incorporate an escalation factor. The value for NO_X is the average of the low and high values used in DOE's analysis.
† Total Benefits for both the 3% and 7% cases are derived using the series corresponding to average SCC with 3-percent discount rate.

The benefits and costs of today's proposed standards, for products sold in 2018-2047, can also be expressed in terms of annualized values. The annualized monetary values are the sum of (1) the annualized national economic value of the benefits from consumer operation of products that meet the proposed standards (consisting primarily of

operating cost savings from using less energy, minus increases in equipment purchase and installation costs, which is another way of representing consumer NPV), and (2) the annualized monetary value of the benefits of emission reductions, including CO_2 emission reductions.[6]

Although combining the values of operating savings and CO_2 emission reductions provides a useful perspective, two issues should be considered. First, the national operating savings are domestic U.S. consumer monetary savings that occur as a result of market transactions while the value of CO_2 reductions is based on a global value. Second, the assessments of operating cost savings and CO_2 savings are performed with different methods that use different time frames for analysis. The national operating cost savings is measured for the lifetime of commercial clothes washers shipped in 2018–2047. The SCC values, on the other hand, reflect the present value of some future climate-related impacts resulting from the emission of one ton of carbon dioxide in each year. These impacts continue well beyond 2100.

Estimates of annualized benefits and costs of the proposed standards are shown in Table I.5. The results under the primary estimate are as follows. Using a 7-percent

[6] DOE used a two-step calculation process to convert the time-series of costs and benefits into annualized values. First, DOE calculated a present value in 2013, the year used for discounting the NPV of total consumer costs and savings, for the time-series of costs and benefits using discount rates of three and seven percent for all costs and benefits except for the value of CO_2 reductions. For the latter, DOE used a range of discount rates, as shown in Table I.4. From the present value, DOE then calculated the fixed annual payment over a 30-year period (2018 through 2047) that yields the same present value. The fixed annual payment is the annualized value. Although DOE calculated annualized values, this does not imply that the time-series of cost and benefits from which the annualized values were determined is a steady stream of payments.

discount rate for benefits and costs other than CO_2 reduction, for which DOE used a 3-percent discount rate along with the average SCC series that uses a 3-percent discount rate, the cost of the standards proposed in today's rule is $0.02 million per year in increased equipment costs, while the benefits are $31 million per year in reduced equipment operating costs, $9 million in CO_2 reductions, and $0.37 million in reduced NO_X emissions. In this case, the net benefit amounts to $40 million per year. Using a 3-percent discount rate for all benefits and costs and the average SCC series, the cost of the standards proposed in today's rule is $0.02 million per year in increased equipment costs, while the benefits are $46 million per year in reduced operating costs, $9 million in CO_2 reductions, and $0.57 million in reduced NO_X emissions. In this case, the net benefit amounts to $56 million per year.

Table I.5. Annualized Benefits and Costs of Proposed Energy Conservation Standards for Commercial Clothes Washers

	Discount Rate	Primary Estimate*	Low Net Benefits Estimate*	High Net Benefits Estimate*
		million 2012$/year		
Benefits				
Operating Cost Savings	7%	31	27	38
	3%	46	40	60
CO_2 Reduction Monetized Value ($11.8/t case)*	5%	2	2	3
CO_2 Reduction Monetized Value ($39.7/t case)*	3%	9	8	11
CO_2 Reduction Monetized Value ($61.2/t case)*	2.5%	13	12	17
CO_2 Reduction Monetized Value ($117/t case)*	3%	28	25	34
NO_X Reduction Monetized Value (at $2,639/ton)**	7%	0.37	0.33	0.45
	3%	0.57	0.51	0.70
Total Benefits†	7% plus CO_2 range	33 to 58	29 to 52	42 to 73
	7%	40	35	50
	3% plus CO_2 range	49 to 75	43 to 66	64 to 95
	3%	56	49	72
Costs				
Incremental Product Costs	7%	0.02	0.02	0.02
	3%	0.02	0.03	0.02
Net Benefits				
Total†	7% plus CO_2 range	33 to 58	29 to 52	42 to 73
	7%	40	35	50
	3% plus CO_2 range	49 to 75	43 to 66	64 to 95
	3%	56	49	72

* This table presents the annualized costs and benefits associated with commercial clothes washer equipment shipped in 2018−2047. These results include benefits to consumers which accrue after 2047 from the products purchased in 2018−2047. The results account for the incremental variable and fixed costs incurred by manufacturers due to the standard, some of which may be incurred in preparation for the rule. . The Primary, Low Benefits, and High Benefits Estimates utilize projections of energy prices from the AEO2013 Reference case, Low Estimate, and High Estimate, respectively. In addition, incremental product costs reflect a flat rate for projected product price trends in the Primary Estimate, a low decline rate for projected product price trends in the Low Benefits Estimate, and a high decline rate for projected product price trends in the High Benefits Estimate. The methods used to derive projected price trends are explained in section IV.

** The CO_2 values represent global monetized values of the SCC, in 2012$, in 2015 under several scenarios of the updated SCC values. The first three cases use the averages of SCC distributions calculated using 5%, 3%, and 2.5% discount rates, respectively. The fourth case represents the 95^{th} percentile of the SCC distribution calculated using a 3% discount rate. The SCC time series used by DOE incorporate an escalation factor. The value for NO_X is the average of the low and high values used in DOE's analysis.

† Total Benefits for both the 3-percent and 7-percent cases are derived using the series corresponding to average SCC with 3-percent discount rate. In the rows labeled "7% plus CO_2 range" and "3% plus CO_2 range," the operating cost and NO_X benefits are calculated using the labeled discount rate, and those values are added to the full range of CO_2 values.

DOE has tentatively concluded that the proposed standards represent the maximum improvement in energy efficiency that is technologically feasible and economically justified, and would result in the significant conservation of energy. DOE further notes that products achieving these standard levels are already commercially available for the product classes covered by today's proposal. Based on the analyses described above, DOE has tentatively concluded that the benefits of the proposed standards to the nation (energy savings, positive NPV of consumer benefits, consumer LCC savings, and emission reductions) would outweigh the burdens (loss of INPV for manufacturers and LCC increases for some consumers).

DOE also considered higher energy efficiency levels as a trial standard level, and is still considering them in this rulemaking. However, DOE has tentatively concluded that the potential burdens of the higher energy efficiency levels would outweigh the projected

benefits. Based on consideration of the public comments DOE receives in response to this notice and related information collected and analyzed during the course of this rulemaking effort, DOE may adopt energy efficiency levels presented in this notice that are either higher or lower than the proposed standards, or some combination of level(s) that incorporate the proposed standards in part.

II. Introduction

The following section discusses the statutory authority underlying today's proposal, as well as some of the relevant historical background related to the establishment of standards for commercial clothes washers.

A. Authority

As noted in section I, Title III of EPCA establishes the "Energy Conservation Program for Certain Industrial Equipment." This equipment includes commercial clothes washers, the subject of this rulemaking. (42 U.S.C. 6311(1)(H)).

EPCA established energy conservation standards for commercial clothes washers and directed DOE to conduct two rulemakings to determine whether the established standards should be amended. (42 U.S.C. 6313(e)) DOE published its first final rule amending commercial clothes washer standards on January 8, 2010 ("January 2010 final rule"), which apply to commercial clothes washers manufactured on or after January 8, 2013. The second final rule determining whether standards should be amended must be published by January 1, 2015. Any amended standards would apply to commercial clothes washers manufactured three years after the date on which the final amended

standard is published. (42 U.S.C. 6313(e)(2)(B)) This current rulemaking will satisfy the requirement to publish the second final rule by January 1, 2015.

Pursuant to EPCA, DOE's energy conservation program for covered products consists essentially of four parts: (1) testing; (2) labeling; (3) the establishment of Federal energy conservation standards; and (4) certification and enforcement procedures. Subject to certain criteria and conditions, DOE is required to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of each covered product. (42 U.S.C. 6314(a)(2)) Manufacturers of covered products must use the prescribed DOE test procedure as the basis for certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA and when making representations to the public regarding the energy use or efficiency of those products. (42 U.S.C. 6314(d)) Similarly, DOE must use these test procedures to determine whether the products comply with standards adopted pursuant to EPCA.

The DOE test procedures for commercial clothes washers is codified at title 10 of the Code of Federal Regulations (CFR) part 430, subpart B, appendix J1 (hereafter, "appendix J1"). On March 7, 2012, DOE published a final rule amending its test procedures for clothes washers **(**"March 2012 final rule"**).** (77 FR 13888**)** The March 2012 final rule included minor amendments to appendix J1 and also established a new test procedure at appendix J2 (hereafter, "appendix J2"). Beginning March 7, 2015, manufacturers of commercial clothes washers may use either appendix J1 or appendix J2 to demonstrate compliance with the current standards established by the January 2010

final rule. Manufacturers using appendix J2 would be required to use conversion equations to translate the measured efficiency metrics into equivalent appendix J1 values, as proposed in a separate commercial clothes washer test procedure NOPR published February 11, 2014. (79 FR 8112)[7] The use of appendix J2 would be required to demonstrate compliance with any amended energy conservation standards established as a result of this rulemaking, and the conversion equations would no longer be used at that time.

DOE must follow specific statutory criteria for prescribing amended standards for covered products. As indicated above, any amended standard for a covered product must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and 6316(a)) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6295(o)(3) and 6316(a)) Moreover, DOE may not prescribe a standard: (1) for certain products, including commercial clothes washers, if no test procedure has been established for the product, or (2) if DOE determines by rule that the proposed standard is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)(A)-(B) and 6316(a)) In deciding whether a proposed standard is economically justified, DOE must determine whether the benefits of the standard exceed its burdens. (42 U.S.C. 6295(o)(2)(B)(i) and 6316(a)) DOE must

[7] Additional details regarding the commercial clothes washer test procedure NOPR are available at DOE's rulemaking webpage: http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=86. All rulemaking documents are also available at www.regulations.gov, under Docket # EERE-2013-BT-TP-0002.

make this determination after receiving comments on the proposed standard, and by considering, to the greatest extent practicable, the following seven factors:

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

2. The savings in operating costs throughout the estimated average life of the covered products in the type (or class) compared to any increase in the price, initial charges, or maintenance expenses for the covered products that are likely to result from the imposition of the standard;

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

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

5. The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard;

6. The need for national energy and water conservation; and

7. Other factors the Secretary of Energy (Secretary) considers relevant. (42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII) and 6316(a))

EPCA, as codified, also contains what is known as an "anti-backsliding" provision, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required

energy efficiency of a covered product. (42 U.S.C. 6295(o)(1) and 6316(a)) Also, the Secretary may not prescribe an amended or new standard if interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States of any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States. (42 U.S.C. 6295(o)(4) and 6316(a))

Further, EPCA, as codified, establishes a rebuttable presumption that a standard is economically justified if the Secretary finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy savings during the first year that the consumer will receive as a result of the standard, as calculated under the applicable test procedure. (42 U.S.C. 6295(o)(2)(B)(iii) and 6316(a)). DOE conducts the analysis required by 6295(o) to determine economic justification and confirm the results of the rebuttable presumption analysis.

Additionally, EPCA specifies requirements when promulgating a standard for a type or class of covered product that has two or more subcategories. DOE must specify a different standard level than that which applies generally to such type or class of products for any group of covered products that have the same function or intended use if DOE determines that products within such group (A) consume a different kind of energy from that consumed by other covered products within such type (or class); or (B) have a

capacity or other performance-related feature which other products within such type (or class) do not have and such feature justifies a higher or lower standard. (42 U.S.C. 6295(q)(1) and 6316(a)). In determining whether a performance-related feature justifies a different standard for a group of products, DOE must consider such factors as the utility to the consumer of the feature and other factors DOE deems appropriate. Any rule prescribing such a standard must include an explanation of the basis on which such higher or lower level was established. (42 U.S.C. 6295(q)(2) and 6316(a))

Federal energy conservation requirements generally supersede State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a)–(c) and 6316(a)) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions set forth under 42 U.S.C. 6297(d) and 6316(a)).

B. Background

1. Current Standards

In a final rule published on January 8, 2010 ("January 2010 final rule"), DOE prescribed the current energy conservation standards for commercial clothes washers manufactured on or after January 8, 2013. The current standards are set forth in Table II.1.

Table II.1. Current Federal Energy Efficiency Standards for Commercial Clothes Washers

Product Class	Minimum MEF* cu.ft/kWh/cycle	Maximum WF† gal/cu.ft./cycle
Top-Loading	1.60	8.5
Front-Loading	2.00	5.5

*MEF (appendix J1 modified energy factor) is calculated as the clothes container capacity in cubic feet divided by the sum, expressed in kilowatt-hours (kWh), of: (1) the total weighted per-cycle hot water energy consumption; (2) the total weighted per-cycle machine electrical energy consumption; and (3) the per-cycle energy consumption for removing moisture from a test load.

†WF (water factor) is calculated as the weighted per-cycle water consumption for the cold wash/cold rinse cycle, expressed in gallons per cycle, divided by the clothes container capacity in cubic feet.

2. History of Standards Rulemaking for Commercial Clothes Washers

As described in Section II.A, EPCA established energy conservation standards for commercial clothes washers and directed DOE to conduct two rulemakings to determine whether the established standards should be amended. (42 U.S.C. 6313(e)) DOE published its first final rule amending commercial clothes washer standards on January 8, 2010 ("January 2010 final rule").

This current rulemaking will satisfy the requirement to publish the second final rule determining whether the standards should be amended by January 1, 2015. DOE published a notice of public meeting and availability of the framework document for this rulemaking, available at http://www.regulations.gov/#!documentDetail;D=EERE-2012-BT-STD-0020-0001 ("August 2012 notice"). DOE also requested public comment on the document. 77 FR 48108 (August 13, 2012). The framework document is available at http://www.regulations.gov/#!documentDetail;D=EERE-2012-BT-STD-0020-0002. The framework document described the procedural and analytical approaches that DOE

anticipated using to evaluate energy conservation standards for commercial clothes washers and identified various issues to resolve during the rulemaking.

On September 24, 2012, DOE held the framework document public meeting and discussed the issues detailed in the framework document. DOE also described the analyses that it planned to conduct during the rulemaking. Through the public meeting, DOE sought feedback from interested parties on these subjects and provided information regarding the rulemaking process that DOE would follow. Interested parties discussed the following major issues at the public meeting: rulemaking schedule; test procedure revisions; product classes; technology options; efficiency levels; and approaches for each of the analyses performed by DOE as part of the rulemaking process. DOE considered the comments received since publication of the August 2012 notice, including those received at the September 2012 framework public meeting, in developing today's proposed standards for commercial clothes washers.

Following the framework meeting, DOE gathered additional information, held discussions with manufacturers, performed product testing and teardowns, and performed the various analyses described in the framework document, including the engineering, life-cycle cost, payback period, manufacturer impact, and national impact analyses. The results of these analyses are presented in this NOPR.

III. General Discussion

A. General Rulemaking Issues

In the framework document and framework public meeting, DOE discussed using the analyses performed during the previous commercial clothes washer rulemaking in the development of the proposed rule.

The Association of Home Appliances Manufacturers (AHAM) commented that the publishing of the framework document on August 13, 2012 was premature given that the amended standards from the January 2010 final rule would not become mandatory until January 8, 2013. AHAM stated that neither DOE nor stakeholders know what the market will look like once compliance with the new standards is required. AHAM further commented that DOE should issue an advance notice of proposed rulemaking (ANOPR) to seek comments after the new standards effective date of January 8, 2013. AHAM believes doing so would allow stakeholders to meaningfully comment on DOE's proposed analysis prior to the notice of proposed rulemaking. AHAM does not feel it is appropriate for DOE to streamline the rulemaking process by not publishing an ANOPR in this case. (AHAM, No. 6 at pp. 1-3; Whirlpool, No. 7 at p. 1)[8,9] Alliance Laundry Systems (ALS) commented that it understands the EPCA statutory requirements for the timeframe that DOE must follow for this rulemaking, but that this rulemaking is premature in asking for information regarding the market assessment before the January 8, 2013 standards take effect. (ALS, No. 16 at p. 2; ALS, Public Meeting Transcript, No.

[8] A notation in this form provides a reference for information that is in the docket for DOE's rulemaking to develop energy conservation standards for commercial clothes washers (Docket No. EERE-2012-BT-STD-0020), which is maintained at www.regulations.gov. This notation indicates that AHAM's statement preceding the reference can be found in document number 6 in the docket, and appears at pages 1-3 of that document.

[9] Whirlpool Corporation submitted a written comment stating that it worked closely with AHAM in the development of AHAM's submitted comments, and that Whirlpool supports and echoes the positions taken by AHAM. Throughout this NOPR, reference to AHAM's written comments (document number 6 in the docket) should be considered reflective of Whirlpool's position as well.

12 at p. 41) The National Resources Defense Council and Appliance Standards Awareness Project (NRDC and ASAP) commented that DOE should specify the portions of the 2010 rulemaking analysis that will be reused in the current rulemaking, and to what extent data and methodology will be updated. (NRDC and ASAP, No. 11 at p. 2)

DOE conducted the market and technology assessment, engineering analysis, and manufacturer impact analysis for today's proposal subsequent to the January 8, 2013 effective date of the current commercial clothes washer standards. The information DOE has gathered through product testing, teardowns, and confidential manufacturer interviews since the framework meeting accurately reflect the state of the commercial clothes washer market following the January 2013 product transitions.

B. Product Classes and Scope of Coverage

1. Product Classes

EPCA defines a "commercial clothes washer" as a soft-mount front-loading or soft-mount top-loading clothes washer that:

(A) has a clothes container compartment that:

(i) for horizontal-axis clothes washers, is not more than 3.5 cubic feet; and

(ii) for vertical-axis clothes washers, is not more than 4.0 cubic feet; and

(B) is designed for use in:

(i) applications in which the occupants of more than one household will be using the clothes washer, such as multi-family housing common areas and coin laundries; or

(ii) other commercial applications.

(42 U.S.C. 6311(21))

When evaluating and establishing energy conservation standards, DOE divides covered products into product classes by the type of energy used or by capacity or other performance-related features that justifies a different standard. In making a determination whether a performance-related feature justifies a different standard, DOE must consider such factors as the utility to the consumer of the feature and other factors DOE determines are appropriate. (42 U.S.C. 6295(q) and 6316(a)).

Existing energy conservation standards divide commercial clothes washers into two product classes based on the axis of loading: top-loading and front-loading. For the reasons explained below, DOE maintained these product class distinctions in the framework document and today's proposal.

AHAM commented that it supports DOE's proposal to retain the two product classes based on the location of access. AHAM agrees that the longer cycle times of front-loading commercial clothes washers versus cycle times for top-loading commercial clothes washers significantly impact consumer utility. (AHAM, No. 6 at p. 4; AHAM, Public Meeting Transcript, No. 12 at p. 46) ALS commented that it also supports continuing with two separate product classes, top-loading and front-loading. (ALS, No. 16 at p. 2)

Pacific Gas and Electric Company, Southern California Gas Company, and San Diego Gas and Electric Company (collectively, the "California Utilities") commented that DOE should establish one standard that applies to both top-loading and front-loading commercial clothes washers. The California Utilities believe that the method of loading no longer provides unique utility, and thus should not continue to be treated as a unique "feature" warranting separate product classes. Specifically, the California Utilities stated that front-loading clothes washers are now available with cycle times equivalent to top-loading clothes washers, and provided a table listing example cycle times for a selection of top-loading and front-loading residential clothes washer models. In addition, the California Utilities believe that even with a single standard, top-loading commercial clothes washers would still be able to meet such a standard using technologically feasible design considerations. The submitted comment includes a table comparing the top-loading efficiency levels considered by DOE during the most recent energy conservation standards rulemaking for residential clothes washers to the front-loading efficiency levels proposed for consideration in this rulemaking. Furthermore, the California Utilities believe that the technologies, design, and operating characteristics of the residential clothes washer market are transferrable to the commercial clothes washer market. They believe that the split incentive between the purchaser of the equipment (e.g., route operator) and those paying the utility bill (e.g., coin-operated laundry owner) creates a split incentive that has created a barrier for motivating the manufacture and sale of higher-efficiency top-loaders, and that a single standard would correct this market inefficiency. (California Utilities, No. 8 at pp. 2-3)

NEEA commented that DOE should reconsider defining a single product class for commercial clothes washers. NEEA stated that in the current market, cycle times are similar for both top-loading and front-loading clothes washers, and as a result, cycle time is no longer a unique utility associated with one method of loading. NEEA also stated that technology to improve the efficiency of top-loading clothes washers has advanced. (NEEA, No. 10 p. 1)

NRDC and ASAP commented that DOE should reconsider the division of commercial clothes washers into separate product classes for top-loading and front-loading machines. NRDC stated that the prior determination of cycle times was based largely on a Consumer Reports article on residential clothes washers that contrasted cycle times of 50 to 115 minutes for front-loading clothes washers to 30-85 minutes for top-loading clothes washers. NRDC and ASAP stated that commercial clothes washer manufacturers now offer cycle times on front-loading machines comparable to cycle times on top-loading machines, and provided examples from multiple commercial clothes washer manufacturers. NRDC and ASAP believe that the similarity in cycle times obviates the need for separate product classes. (NRDC and ASAP, No. 11 at pp. 2-3; NRDC, Public Meeting Transcript, No. 12 at pp. 44-46).

In response to these comments, DOE notes that in prior rulemakings for residential clothes washers, DOE has concluded that the axis of loading represents a distinct consumer utility-related feature, and, consequently, established separate product classes for top-loading and front-loading residential clothes washers. 56 FR 22263 (May

14, 1991) and 77 FR 32319 (May 31, 2012). DOE has concluded that the same justification applies to commercial clothes washers.

As noted by commenters, DOE also determined during the previous energy conservation standards rulemaking for commercial clothes washers that the longer cycle times of front-loading commercial clothes washers versus top-loading clothes washers was likely to significantly impact consumer utility and thereby constituted a performance-related utility under the meaning of 42 U.S.C. 6295(q), which warranted separate product classes. 75 FR 1122, 1130-34. As part of the engineering analysis conducted for the current rulemaking, DOE measured total cycle times on a representative sample of top-loading and front-loading commercial clothes washers during appendix J2 testing, as described fully in chapter 5 of the TSD. Top-loading cycle times for the maximum load size ranged from 29-31 minutes, with an average of 30 minutes.[10] Front-loading cycle times for the maximum load size ranged from 30-37 minutes, with an average of 34 minutes. The longer average cycle time of front-loading machines results in fewer possible "turns" per day compared to top-loading machines, which is more significant in a laundromat or multi-family laundry setting for consumers waiting on the machine to finish its cycle, as well as laundromat owners and multi-family laundry route operators looking to maximize daily laundry throughput. Therefore, although the magnitude of the difference in cycle times for CCWs is smaller than for residential clothes washers, DOE has determined that the longer average cycle time of front-loading machines warrants consideration of separate product classes.

[10] This excludes one outlier top-loading model with a cycle time of 50 minutes.

In addition, DOE research indicates that the technologies, designs, and operating characteristics of the maximum efficiency top-loading residential clothes washers are not transferrable to commercial clothes washers. The standard level proposed for front-loading commercial clothes washers in this NOPR corresponds closely to the max-tech top-loading level considered by DOE during the residential clothes washer rulemaking. Achieving that level of efficiency in a top-loading machine requires design features such as extra-large capacity, a non-agitator "impeller" wash plate, spin speed greater than 1,000 rpm, and water recirculation. With regards to capacity, DOE notes that a larger clothes container capacity is considered a detriment to commercial clothes washer buyers because a larger capacity tub may result in fewer wash cycles performed by the end-user customer. In competitive markets, coin-operated laundries may not be able to sustain higher vend fares to compensate for the lower number of "turns" per day. In addition, based on discussions with manufacturers, larger tub capacities encourage the over-loading of machines by end-user customers. Regarding the use of non-agitator impeller wash plates, DOE research indicates that this feature also encourages machine overloading in a coin laundry environment, and that this technology is more susceptible to producing poorer wash performance when overloaded compared to a traditional agitator design. Spin speeds greater than 1,000 rpm and water recirculation are also not features that currently exist in the commercial clothes washer market., and DOE research indicates that these features are unlikely to be suitable for commercial clothes washers because of concerns regarding potential impacts on machine reliability as a result of machine overloading or other extreme usage scenarios experienced in a coin-operated

laundry environment. Chapter 3 and 4 of the TSD provide a detailed discussion of design options considered for this rulemaking.

For these reasons, DOE concludes that separate product classes are justified for top-loading and front-loading commercial clothes washers based on the criteria established in EPCA. (42 U.S.C. 6295(o)(4) and (q)(1), 6316(a)) Today's proposal thus maintains separate standards for top-loading and front-loading product classes.

C. Test Procedures

1. Appendix J2

The amended standards proposed in this rulemaking are based on energy and water metrics as measured using appendix J2 of 10 CFR part 430. DOE published a test procedure NOPR on February 11, 2014 ("February 2014 TP NOPR") proposing to amend its test procedures for commercial clothes washers to add equations for translating MEF and water factor (WF) values as measured using appendix J2 into their equivalent values as measured using appendix J1. 79 FR 8112 These translation equations would be codified at 10 CFR 429.46 and would be used when using the appendix J2 test procedure to demonstrate compliance with the current commercial clothes washer standards established by the January 2010 final rule, which were based on MEF and WF as measured using Appendix J1. These crosswalk equations would not be used to demonstrate compliance with the proposed amended standards in today's NOPR because the proposed amended standard levels are based metrics as measured using the appendix J2 test procedure.

Table III.1 shows the equivalent appendix J1 and appendix J2 values for the current energy conservation standards for commercial clothes as set forth at 10 CFR 431.156, and the proposed amended energy conservation standards. As required by section 6295(o) of EPCA, the proposed standards do not increase the maximum allowable energy or water use, or decrease the minimum required energy efficiency, of commercial clothes washers.

Table III.1. Current and Proposed Energy Conservation Standards for Commercial Clothes Washers, Equivalent Appendix J1 and J2 Values

	Minimum Energy Standards				Maximum Water Standards			
	Appendix J1		Appendix J2		Appendix J1		Appendix J2	
Product Class	**Current MEF***	**Proposed MEF***	**Current MEF_{J2}***	**Proposed MEF_{J2}***	**Current WF†**	**Proposed WF†**	**Current IWF‡**	**Proposed IWF‡**
Top-Loading	1.60	1.70	1.15	1.35	8.5	8.4	8.9	8.8
Front-Loading	2.00	2.40	1.65	2.00	5.5	4.0	5.2	4.1

*MEF (appendix J1 modified energy factor) and MEF_{J2} (appendix J2 modified energy factor) are calculated as the clothes container capacity in cubic feet divided by the sum, expressed in kilowatt-hours (kWh), of: (1) the total weighted per-cycle hot water energy consumption; (2) the total weighted per-cycle machine electrical energy consumption; and (3) the per-cycle energy consumption for removing moisture from a test load.
†WF (water factor) is calculated as the weighted per-cycle water consumption for the cold wash/cold rinse cycle, expressed in gallons per cycle, divided by the clothes container capacity in cubic feet.
‡IWF (integrated water factor) is calculated as the weighted per-cycle water consumption for all wash cycles, expressed in gallons per cycle, divided by the clothes container capacity in cubic feet.

During the framework meeting and through subsequent written comments, interested parties submitted comments regarding these crosswalk equations and other issues including:

- Dryer energy calculations

- Water heating calculations
- Load size usage factors
- Temperature usage factors

DOE has addressed these comments related to the test procedure in the February 2014 TP NOPR. (79 FR 8112)

2. Energy Metric

The amended energy efficiency standards proposed in this rulemaking are based on the MEF_{J2} metric. In the framework document, DOE stated it would consider establishing amended energy efficiency standards for commercial clothes washers on the IMEF metric, which would incorporate standby and off mode power.

AHAM and ALS commented that they do not oppose new standards for commercial clothes washers based on IMEF; however, DOE should not use the same analysis it used for standby and off mode for residential clothes washers. AHAM and ALS stated that residential and commercial clothes washers have different use patterns, and encouraged DOE to conduct studies on consumer usage to determine the appropriate usage patterns for commercial clothes washers, such as time spent in active mode versus standby mode. AHAM and ALS added that commercial clothes washers are used on a more continuous basis than residential clothes washers, and thus, spend more time in active mode and less time in standby mode compared to residential clothes washers. In addition, AHAM stated that the displays on commercial clothes washers must remain

activated longer than residential clothes washer displays so that users know that the commercial machine is available for use. Finally, AHAM suggested that the definition of standby mode should be different for commercial clothes washers than for residential clothes washers. (AHAM, No. 6, at p. 3; AHAM, Public Meeting Transcript, No. 12 at pp. 29-30; ALS, No. 16 at p. 1)

The California Utilities support DOE's proposal to develop new standards that take into account standby and off-mode power, stating that they believe such standards would more accurately reflect the total energy consumed by commercial clothes washers. (California Utilities, No. 8 at p. 2) NRDC and ASAP also support establishing new efficiency standards based on the IMEF metric to capture standby and off-mode power. (NRDC and ASAP, No. 11 at p. 2)

As part of its market assessment and engineering analysis for this rulemaking, DOE evaluated the standby and off mode power characteristics of a representative sample of commercial clothes washer spanning a wide range of display types, payment systems, and communication features. Although interested parties generally supported establishing new energy standards based on the IMEF metric, DOE is not proposing amended standards for commercial clothes washers based on an integrated energy metric in today's rule.

3. Water Metric

The amended water efficiency standards proposed in this rulemaking are based on the IWF metric contained in appendix J2. In the framework document, DOE stated it

would consider establishing amended water efficiency standards for commercial clothes washers based on the IWF metric, which incorporates water consumption from all the temperature cycles included as part of the energy test cycle in appendix J2. DOE believes that the IWF metric provides a more representative measure of water consumption than the WF metric.

AHAM and ALS stated that they do not oppose DOE's proposal to establish amended water standards based on the IWF metric. ALS added that they already record all the water used by a commercial clothes washer during their DOE tests. (AHAM, No. 6 at p. 3; ALS, No. 16 at p. 1)

The Northwest Energy Efficiency Alliance (NEEA) and NRDC and ASAP support establishing new water efficiency standards based on the IWF metric to capture water consumption from all temperature cycles to reflect typical usage patterns by consumers. (NEEA, No. 10 at p. 2; NRDC and ASAP, No. 11 at p. 2)

DOE received no comments objecting to the use of the IWF metric. Therefore, for the reasons stated above, the amended water efficiency standards proposed in this rulemaking are based on the IWF metric.

D. Technological Feasibility

1. General

In each standards rulemaking, DOE conducts a screening analysis based on information gathered on all current technology options and prototype designs that could improve the efficiency of the products or equipment that are the subject of the rulemaking. As the first step in such an analysis, DOE develops a list of technology options for consideration in consultation with manufacturers, design engineers, and other interested parties. DOE then determines which of those means for improving efficiency are technologically feasible. DOE considers technologies incorporated in commercially available products or in working prototypes to be technologically feasible. 10 CFR 430, subpart C, appendix A, section 4(a)(4)(i). For further details on the technology options DOE considered for this rulemaking, see chapter 3 of the NOPR TSD.

After DOE has determined that particular technology options are technologically feasible, it further evaluates each technology option in light of the following additional screening criteria: (1) practicability to manufacture, install, or service; (2) adverse impacts on product utility or availability; and (3) adverse impacts on health or safety. Section IV of this notice summarizes the results of DOE's screening analysis, particularly the designs DOE considered, those it screened out, and those that are the basis for the TSLs in this rulemaking. For further details on the screening analysis for this rulemaking, see chapter 4 of the NOPR TSD.

2. Maximum Technologically Feasible Levels

When DOE proposes to adopt an amended standard for a type or class of covered product, it must determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible for such product. (42 U.S.C. 6295(p)(1)) Accordingly, in the engineering analysis, DOE determined the maximum technologically feasible ("max-tech") improvements in energy efficiency for commercial clothes washers using the design parameters for the most efficient products available on the market. The max-tech levels that DOE determined for this rulemaking are described in section IV.C.4 and IV.C.5of this proposed rule. For further details on the engineering analysis for this rulemaking, see chapter 5 of the NOPR TSD.

E. Energy Savings

1. Determination of Savings

For each TSL, DOE projected energy savings from the products that are the subject of this rulemaking purchased in the 30-year period that begins in the year of compliance with amended standards (2018–2047). The savings are measured over the entire lifetime of products purchased in the 30-year period.[11] DOE quantified the energy savings attributable to each TSL as the difference in energy consumption between each standards case and the base case. The base case represents a projection of energy consumption in the absence of amended efficiency standards, and considers market forces and policies that affect demand for more efficient products.

[11] In previous rulemakings, DOE presented energy savings results for only the 30-year period that begins in the year of compliance. In the calculation of economic impacts, however, DOE considered operating cost savings measured over the entire lifetime of products purchased in the 30-year period. DOE has modified its presentation of national energy savings consistent with the approach used for its national economic analysis.

DOE used its national impact analysis (NIA) spreadsheet model to estimate energy savings from amended standards for the products that are the subject of this rulemaking. The NIA spreadsheet model (described in section IV of this notice) calculates energy savings in site energy, which is the energy directly consumed by products at the locations where they are used. For electricity, DOE reports national energy savings in terms of the savings in the energy that is used to generate and transmit the site electricity. To calculate this quantity, DOE derives annual conversion factors from the model used to prepare the Energy Information Administration's (EIA) Annual Energy Outlook (AEO).

DOE also estimates full-fuel-cycle energy savings in its energy conservation standards rulemakings. 76 FR 51282 (Aug. 18, 2011), as amended at 77 FR 49701 (August 17, 2012). The full-fuel-cycle (FFC) metric includes the energy consumed in extracting, processing, and transporting primary fuels (i.e., coal, natural gas, petroleum fuels), and thus presents a more complete picture of the impacts of energy efficiency standards. DOE's approach is based on calculation of an FFC multiplier for each of the energy types used by covered products. For more information on FFC energy savings, see section IV.H.2.

2. Significance of Savings

As noted above, 42 U.S.C. 6295(o)(3)(B) prevents DOE from adopting a standard for a covered product unless such standard would result in "significant" energy savings.

Although 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), indicated that Congress intended "significant" energy savings in this context to be savings that were not "genuinely trivial." The energy savings for all of the TSLs considered in this rulemaking (presented in section V.C) are nontrivial, and, therefore, DOE considers them "significant" within the meaning of section 325 of EPCA.

F. Economic Justification

1. Specific Criteria

EPCA provides seven factors to be evaluated in determining whether a potential energy conservation standard is economically justified. (42 U.S.C. 6295(o)(2)(B)(i) and 6316(a)) The following sections discuss how DOE has addressed each of those seven factors in this rulemaking.

a. Economic Impact on Manufacturers and Consumers

In determining the impacts of an amended energy conservation standard on manufacturers, DOE first uses an annual cash-flow approach to determine the quantitative impacts. This step includes both a short-term assessment—based on the cost and capital requirements during the period between when a regulation is issued and when entities must comply with the regulation—and a long-term assessment over a 30-year period. The industry-wide impacts analyzed include industry net present value (INPV), which values the industry on the basis of expected future cash flows; cash flows by year; changes in revenue and income; and other measures of impact, as appropriate. Second,

DOE analyzes and reports the impacts on different types of manufacturers, including impacts on small manufacturers. Third, DOE considers the impact of standards on domestic manufacturer employment and manufacturing capacity, as well as the potential for standards to result in plant closures and loss of capital investment. Finally, DOE takes into account cumulative impacts of various DOE regulations and other regulatory requirements on manufacturers.

For individual consumers, measures of economic impact include the changes in LCC and payback period (PBP) associated with new or amended standards. These measures are discussed further in the following section. For consumers in the aggregate, DOE also calculates the national net present value of the economic impacts applicable to a particular rulemaking. DOE also evaluates the LCC impacts of potential standards on identifiable subgroups of consumers that may be affected disproportionately by a national standard.

b. Savings in Operating Costs Compared to Increase in Price

EPCA requires DOE to consider the savings in operating costs throughout the estimated average life of the covered product compared to any increase in the price of the covered product that are likely to result from the imposition of the standard. (42 U.S.C. 6295(o)(2)(B)(i)(II) and 6316(a)) DOE conducts this comparison in its LCC and PBP analysis. The LCC is the sum of the purchase price of a product (including its installation) and the operating expense (including energy, maintenance, and repair expenditures) discounted over the lifetime of the product. To account for uncertainty and

variability in specific inputs, such as product lifetime and discount rate, DOE uses a distribution of values, with probabilities attached to each value. For its analysis, DOE assumes that consumers will purchase the covered products in the first year of compliance with amended standards.

The LCC savings and the PBP for the considered efficiency levels are calculated relative to a base case that reflects projected market trends in the absence of amended standards. DOE identifies the percentage of consumers estimated to receive LCC savings or experience an LCC increase, in addition to the average LCC savings associated with a particular standard level.

c. Energy Savings

Although significant conservation of energy is a separate statutory requirement for imposing an energy conservation standard, EPCA requires DOE, in determining the economic justification of a standard, to consider the total projected energy savings that are expected to result directly from the standard. (42 U.S.C. 6295(o)(2)(B)(i)(III) and 6316(a)) As discussed in section IV, DOE uses the NIA spreadsheet to project national energy savings.

d. Lessening of Utility of Products

In establishing classes of products, and in evaluating design options and the impact of potential standard levels, DOE evaluates standards that would not lessen the utility of the considered products. (42 U.S.C. 6295(o)(2)(B)(i)(IV) and 6316(a)) The

standards proposed in today's notice will not reduce the utility of the products under consideration in this rulemaking.

e. Impact of Any Lessening of Competition

EPCA directs DOE to consider the impact of any lessening of competition, as determined in writing by the Attorney General, which is likely to result from the imposition of a standard. (42 U.S.C. 6295(o)(2)(B)(i)(V) It also directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a proposed standard and to transmit such determination to the Secretary within 60 days of the publication of a proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(ii)) DOE will transmit a copy of today's proposed rule to the Attorney General with a request that the Department of Justice (DOJ) provide its determination on this issue. DOE will address the Attorney General's determination in the final rule.

f. Need for National Energy Conservation

The energy savings from the proposed standards are likely to provide improvements to the security and reliability of the nation's energy system. Reductions in the demand for electricity also may result in reduced costs for maintaining the reliability of the nation's electricity system. DOE conducts a utility impact analysis to estimate how standards may affect the nation's needed power generation capacity.

The proposed standards also are likely to result in environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases associated with energy production. DOE reports the emissions impacts from today's standards, and from each TSL it considered, in section V of this notice. DOE also reports estimates of the economic value of emissions reductions resulting from the considered TSLs.

g. Other Factors

EPCA 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. (42 U.S.C. 6295(o)(2)(B)(i)(VII)) DOE did not consider any other factors for today's NOPR.

2. Rebuttable Presumption

As set forth in 42 U.S.C. 6295(o)(2)(B)(iii) and 6316(a), EPCA creates a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the consumer of a product that meets the standard is less than three times the value of the first year's energy savings resulting from the standard, as calculated under the applicable DOE test procedure. DOE's LCC and PBP analyses generate values used to calculate the effects that proposed energy conservation standards would have on the payback period for consumers. These analyses include, but are not limited to, the 3-year payback period contemplated under the rebuttable-presumption test. In addition, DOE routinely conducts an economic analysis that considers the full range of impacts to consumers, manufacturers, the nation, and the environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this analysis serve as the basis for DOE's

evaluation of the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification). The rebuttable presumption payback calculation is discussed in section IV of this NOPR.

IV. Methodology and Discussion of Related Comments

DOE used four analytical tools to estimate the impact of today's proposed standards. The first tool is a spreadsheet that calculates LCCs and PBPs of potential new energy conservation standards. The second tool includes a model that provides shipments forecasts, and a framework in a spreadsheet that calculates national energy savings and net present value resulting from potential amended energy conservation standards. DOE uses the third spreadsheet tool, the Government Regulatory Impact Model (GRIM), to assess manufacturer impacts.

Additionally, DOE estimated the impacts of energy conservation standards for CCW on utilities and the environment. DOE used a version of EIA's National Energy Modeling System (NEMS) for the utility and environmental analyses. The NEMS model simulates the energy sector of the U.S. economy. EIA uses NEMS to prepare its Annual Energy Outlook (AEO), a widely known energy forecast for the United States. The version of NEMS used for appliance standards analysis is called NEMS-BT[12] and is

[12] BT stands for DOE's Building Technologies Program.

based on the AEO version with minor modifications.[13] The NEMS-BT model accounts for the interactions between the various energy supply and demand sectors and the economy as a whole.

A. Market and Technology Assessment

1. Market Assessment

In the framework document, DOE requested information that would contribute to the market assessment for the commercial clothes washers covered in this rulemaking (e.g., current product features and efficiencies, product feature and efficiency trends, and historical product shipments and prices).

AHAM provided commercial clothes washer shipment data and shipment-weighted average efficiency data for 2010 and 2011, disaggregated by product class. AHAM also provided market share efficiency data for 2010 and 2011, disaggregated by product class. (AHAM, No. 13 at pp. 2-4) AHAM commented that the timing of its data submittal was too early to be able to provide shipment data for products complying with the new standards that became effective January 8, 2013. (AHAM, No. 8 at pp. 3-4).

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

DOE requests information on historical product shipments and market share efficiency data, disaggregated by product class, for 2012 and 2013 as those data become available.

NRDC and ASAP commented that DOE should confirm the split between the coin laundry and multi-family housing sectors of the market, noting that the different operating characteristics of these sub-sectors have significant influence on the life-cycle costs and payback period analysis. (NRDC and ASAP, No. 11 at p. 2)

DOE has incorporated the shipments data from AHAM throughout the NOPR analysis. DOE confirmed through discussions with manufacturers that the split between coin laundry and multi-family housing used for the last rulemaking (15 percent and 85 percent, respectively) remains valid for this rulemaking. The NOPR analysis reflects this breakdown.

2. Technology Assessment

In the framework document, DOE presented a table of design options it believes represent the most viable options for commercial clothes washers to achieve higher efficiencies. DOE requested comment on whether any of the technologies should be removed from consideration, or whether any other technologies not listed in the table should be considered as technology options.

ALS recommended that DOE remove "ozonated laundering" from consideration, because testing ALS has performed on ozone laundering indicates it does not replace the need for heated water and detergent to clean clothes. Therefore, ALS believes ozonated laundry does not improve energy efficiency. (ALS, No. 16 at p. 2) As described in greater detail in Chapter 3 and chapter 4 of the TSD, DOE retained ozonated laundering as a design option because it may improve energy efficiency, but eliminated it from consideration as a result of the screening analysis.

The California Utilities recommended that DOE consider all of the design options evaluated in the most recent residential clothes washer standards rulemaking. The commenters believe that all such design options are likely to be applicable and transferrable to commercial clothes washers. (California Utilities, No. 8 at p. 4) As described in the framework document, DOE eliminated from consideration those design options from the prior commercial clothes washer and residential clothes washer rulemakings that DOE has determined would provide negligible, if any, energy savings. DOE also eliminated technologies that it determined were not relevant to the commercial clothes washer market. Chapter 3 and chapter 4 of the TSD provide detailed information regarding DOE's analysis of each design option.

NRDC and ASAP suggested that DOE add temperature-differentiated pricing controls to the list of technology options that manufacturers can use to reduce energy consumption in machine operation. The commenters noted that this feature is already being offered by Whirlpool and Alliance Laundry Systems. NRDC and ASAP stated that

temperature-differentiated pricing offers launderers the incentive to opt for lower temperature settings than they might otherwise select under undifferentiated pricing. Such controls would allow a machine's owner to pass through a share of the resulting hot water energy savings to the end user, thus incentivizing energy savings. NRDC and ASAP suggested that the test procedure for commercial clothes washers could allow credit for inclusion of such a feature without altering the mechanics of the test procedure itself. (NRDC, Public Meeting Transcript, No. 12 at p. 47-48; NRDC and ASAP, No. 11 at p. 3)

Temperature-differentiated pricing offers the potential to incentive energy savings by providing favorable vend pricing for lower- temperature settings. DOE's market analysis confirmed the availability of this feature on multiple clothes washer models from multiple manufacturers. DOE has therefore added temperature-differentiated pricing controls to the list of technology options for consideration. DOE does not have any information, however, regarding the degree to which this feature changes the temperature selection frequencies of end users. Therefore, as described in further detail in Chapter 5 of the TSD, DOE was not able to consider this technology for further evaluation in its engineering analysis.

B. Screening Analysis

Following the development of the initial list of design options, DOE conducts a screening analysis of each design option based on the following factors: (1) technological feasibility; (2) practicability to manufacture, install and service; (3) adverse impacts on

product utility or product availability; and (4) adverse impacts on health or safety. (10 CFR part 430, subpart C, appendix A, section 4(a)(3) and (4)).

DOE did not receive any comments objecting to the proposed design options based on these screening criteria. DOE did, however, receive general comments regarding the impacts of higher efficiency levels on product utility, which DOE addressed as part of its engineering analysis.

C. Engineering Analysis

1. General Approach

The purpose of the engineering analysis is to characterize the relationship between the incremental manufacturing cost and efficiency improvements of commercial clothes washers. DOE used this cost-efficiency relationship as input to the PBP, LCC, and NES analyses. As proposed in the framework document, DOE conducted the engineering analysis for this rulemaking using the efficiency-level approach supplemented with a design-option approach. Using the efficiency-level approach, DOE examined the aggregated incremental increases in manufacturer selling price at each of the efficiency levels analyzed. DOE also conducted a reverse-engineering analysis, including testing and teardowns of models at each efficiency level, to identify the incremental cost and efficiency improvement associated with each design option or design option combination, supplementing the efficiency-level approach with a design-option approach as needed. Chapter 5 of the TSD contains a detailed discussion of the engineering analysis methodology.

ALS commented that it supports DOE's proposal to use an efficiency level approach supplemented by a design option approach as needed. (ALS, No. 16 at p. 4)

AHAM commented that it believes DOE erroneously stated in the framework document that it would measure the energy and water consumption of representative units at each efficiency level under consideration using DOE's test procedure at appendix J1. (AHAM, No. 6 at p. 6; AHAM, Public Meeting Transcript, No. 12 at p. 52) DOE intended to reference both appendix J1 and appendix J2 in this instance. DOE performed energy and water consumption testing using both test procedures, which enabled DOE to translate the appendix J1-based efficiency levels into equivalent levels based on appendix J2. DOE used the appendix J2 energy and water consumption data for its engineering analysis and all "downstream" analyses, including the LCC, PBP, and NES.

2. Appendix J2 Efficiency Level Translations

In the framework document, DOE proposed baseline and higher efficiency levels based on the current metrics MEF and WF, which are determined according to the appendix J1 test procedure. As discussed in prior sections, DOE has proposed amended standards for commercial clothes washers in terms of MEF_{J2} and IWF as measured using appendix J2. DOE performed testing on a representative sample of commercial clothes washer models to determine, for each baseline and higher efficiency level considered in the analysis, the equivalent appendix J2 efficiency levels corresponding to each appendix J1 efficiency level. Chapter 5 of the TSD describes the methodology DOE used to

perform the translations between appendix J1 MEF/WF values and appendix J2 MEF/IWF values.

3. Baseline Efficiency Levels

DOE proposed in the framework document to use the amended energy conservation standards effective January 8, 2013 to characterize the baseline models for both the top-loading and front-loading product classes.

ALS commented that it supports using the 2013 minimum efficiency levels as the baseline levels for this rulemaking. (ALS, No. 16 at p. 2) DOE did not receive any comments objecting to the proposed baseline efficiency levels. Therefore, as proposed, DOE used the January 8, 2013 amended energy conservation standards as the baseline efficiency levels for this rulemaking.

4. Front-Loading Higher Efficiency Levels

In the framework document, DOE proposed analyzing the higher efficiency levels shown in Table IV.1 for the front-loading product class. The efficiency levels presented in the framework document were based on MEF and WF as measured using appendix J1. Table IV.1 also provides the equivalent levels based on MEF_{J2} and IWF as measured using appendix J2 test procedure. DOE invited comment on the appropriateness of these front-loading efficiency levels.

Table IV.1. Front-Loading Efficiency Levels

Level	Efficiency Level Source	Appendix J1 Metrics		Appendix J2 Metrics	
		MEF	WF	MEF_{J2}	IWF
Baseline	DOE Standard	2.00	5.5	1.65	5.2
1	CEE Tier 2	2.20	4.5	1.80	4.5
2	CEE Tier 3	2.40	4.0	2.00	4.1
3	Maximum Available	2.60	3.7	2.20	3.9

AHAM commented that rinsing performance could become a concern at some of the levels DOE has proposed, noting that every manufacturer would have its own opinion at which level, if any, this would occur. AHAM stated that measuring the impact of the proposed levels on cleaning and rinsing performance may be difficult because currently no test procedures are available to link cleaning and rinsing performance with the energy performance measured in DOE's test procedure. (AHAM, No. 6 at pp. 4-5)

ALS commented that it strongly opposes any consideration of higher efficiency levels for front-loading commercial clothes washers. ALS stated that its tests on competitive front-loading products with more stringent efficiency levels have shown that with large load sizes, the clothing in the center of the load does not get wetted by water during the wash portion of the cycle. ALS believes it would not be appropriate for DOE to propose stricter standards that would create this kind of result in a front-loading commercial clothes washer. (ALS, No. 16 at p. 3)

The California Utilities suggested that DOE include two additional front-loading efficiency levels corresponding to the top two efficiency levels considered during the

most recent residential clothes washer rulemaking: 2.60 MEF/3.8 WF and 2.89 MEF/3.7 WF, as measured using appendix J1.

NRDC commented that while DOE proposed the "maximum available" efficiency level in the framework document, DOE did not indicate the maximum efficiency level that is technologically feasible (i.e., the "max tech" level). (NRDC, Public Meeting Transcript, No. 12 at p. 55)

DOE notes that it developed its list of front-loading efficiency levels based on a review of commercial clothes washer products currently on the market. DOE confirmed through its market assessment that products are available for purchase at each of the identified efficiency levels. DOE performed appendix J1 and appendix J2 testing on a representative sample of commercial clothes washer models at each proposed efficiency level. To investigate concerns regarding potential impacts on cleaning performance, rinsing performance, and solid particle removal, DOE performed additional testing on each model using AHAM's HLW-1-2010 test method: Performance Evaluation Procedures for Household Clothes Washers (hereafter, "AHAM HLW-1-2010"). Specifically, DOE performed the soil/stain removal, rinsing effectiveness, and sand removal tests provided in HLW-1-2010. DOE's testing indicated that front-loading commercial clothes washers are available on the market at the proposed amended standard level that provide equivalent washing, rinsing, and solid particle removal as current baseline units. Chapter 5 of the TSD describes these test results in greater detail.

Regarding the higher efficiency levels considered in the residential clothes washer rulemaking, DOE notes that the 2.60 MEF/3.8 WF efficiency level suggested by the commenter corresponds closely with the maximum level proposed by DOE, 2.60 MEF/3.7 WF. DOE does not believe that the more stringent level of 2.89 MEF/3.7 WF would be appropriate for consideration in this commercial clothes washer rulemaking. First, no commercial clothes washer models are currently available on the market at that efficiency level. Second, some of the design options that would be required to achieve that efficiency level could negatively wash basket size and cycle time. Most notably, achieving the highest efficiency levels in the front-loading residential clothes washer market requires large-capacity wash baskets greater than 3.9 cubic feet and cycle times of 50 minutes or longer. DOE notes that EPCA's product coverage definition of a front-loading commercial clothes washer specifies a maximum capacity of 3.5 cubic feet, so machines with the larger capacity wash baskets would not be considered covered equipment subject to DOE's energy conservation standards. (42 U.S.C. 6311(21)) In addition, as noted previously, a larger clothes container capacity is considered a detriment to commercial clothes washer owners because a larger capacity wash tub may result in fewer wash cycles performed by the end-user customer. In competitive markets, coin-operated laundries may not be able to sustain higher vend fares to compensate for the lower number of turns per day. Furthermore, cycle times of 50 minutes would constitute a substantial increase over the current 34 minute average cycle time as measured by DOE. Longer cycle times decrease the number of possible turns per day on a given clothes washer, which is more significant in a laundromat or multi-family laundry setting for

consumers waiting on the machine to finish its cycle, as well as laundromat owners and multi-family laundry route operators looking to maximize daily laundry throughput.

Based on the results of its market and technology assessment and engineering analysis, DOE has tentatively determined that the maximum available efficiency level identified in the framework document represents the maximum efficiency level that is technologically feasible for front-loading commercial clothes washers.

5. Top-Loading Higher Efficiency Levels

In the framework document, DOE stated that it was unaware at the time of any top-loading commercial clothes washers that exceeded the January 8, 2013 baseline efficiency level of 1.60 MEF/8.5 WF. Therefore, DOE did not specify any higher efficiency levels for top-loading commercial clothes washers in the framework document. DOE also stated, however, that should manufacturers develop models above the baseline efficiency level, or should working prototypes above the baseline efficiency level become available, DOE would consider incorporating additional efficiency levels in its analysis.

Since the publishing of the framework document, DOE has become aware of multiple top-loading clothes washers on the market, from multiple manufacturers, at higher efficiency levels than the baseline level represented by the January 8, 2013 amended standards. Accordingly, DOE analyzed the higher efficiency levels shown in Table IV.2 for the top-loading product class. Table IV.2 shows the efficiency levels in

terms of MEF and WF as measured using appendix J1, as well as MEF_{J2} and IWF as measured using appendix J2.

Table IV.2. Top-Loading Efficiency Levels

Level	Efficiency Level Source	Appendix J1 Metrics		Appendix J2 Metrics	
		MEF	WF	MEF_{J2}	IWF
Baseline	DOE Standard	1.60	8.5	1.15	8.9
1	Gap Fill	1.70	8.4	1.35	8.8
3	Maximum Available	1.85	6.9	1.55	6.9

AHAM commented that more efficient standard levels for top-loading commercial clothes washers are not justified, believing that standards more stringent than the current level could create performance concerns. AHAM stated that as hot water and water levels are reduced, cleaning and rinse performance will suffer and may no longer meet consumer expectations at standard levels beyond the January 2013 levels. AHAM also expressed concern that amended standards could require changes in the spin speed, heavier lids, and door locks, and that such changes could negatively impact consumer and end-user utility. AHAM noted, for example, that consumers may find it more difficult to use a clothes washer with a heavier lid or may not be able to add clothing mid-cycle due to door locking. (AHAM, No. 6 at pp. 4-5)

ALS opposes any consideration of higher efficiency levels for top-loading commercial clothes washers. At the time of its comment submittal, ALS was not aware of any top-loading products that exceed the January 2013 standard level. ALS stated that not

enough time has elapsed to evaluate consumer response or acceptability resulting from deploying new top-loading models at the January 2013 standard level. Accordingly, ALS believes the appropriate max-tech level for top-loading commercial clothes washers is the 2013 DOE minimum standard. ALS stated that it had opposed DOE's decision during the prior rulemaking to establish the amended standard level at the max-tech level, and that it had commented that removing hot water from the wash cycle to achieve the proposed max-tech level would reduce cleaning performance and negatively impact utility. ALS further commented that "hot" water is commonly recognized as 120 degrees Fahrenheit and above; yet, according to ALS, the max-tech model from the prior rulemaking provides 112 degrees wash water, which is commonly recognized as "warm". ALS believes that further increasing the top-loading standard level would further decrease consumer utility. (ALS, No. 16 at pp. 3-4)

The California Utilities suggested that DOE analyze higher efficiency levels for top-loading commercial clothes washers corresponding to the higher efficiency levels that DOE had analyzed during the most recent residential clothes washer rulemaking. The California Utilities recommended levels ranging from 1.72MEF/8.0WF to 2.47MEF/3.6 WF at the max-tech level, as measured using appendix J1. (California Utilities, No. 8 at p. 4)

NEEA commented that top-loading clothes washer technology has advanced, but that it is not clear that the marketplace has incorporated the newest technologies. NEEA

recommended that DOE review the max-tech level for top-loading commercial clothes washers. (NEEA, No. 10 at p. 2)

NRDC and ASAP commented that the absence of products on the market at a particular efficiency level above the baseline level does not necessarily mean that efficiency levels above the baseline are not technologically feasible. NRDC and ASAP added that should DOE retain separate product classes for top-loading and front-loading commercial clothes washers, DOE must identify a max-tech level for the top-loading product class, noting that technology options may exist for improving efficiency that have not yet been incorporated into current products. (NRDC and ASAP, No. 11 at p. 4)

DOE developed its list of top-loading efficiency levels based on a review of commercial clothes washer products currently on the market. DOE gathered information through product testing and teardowns since the framework meeting that reflect the state of the commercial clothes washer market following the January 2013 product transitions.

DOE confirmed through its market assessment that products are available for purchase at each of the identified efficiency levels. DOE performed appendix J1 and appendix J2 testing on a representative sample of top-loading commercial clothes washer models at each proposed efficiency level. To investigate concerns regarding potential impacts on cleaning performance, rinsing performance, and solid particle removal, DOE performed additional testing on each model using AHAM's HLW-1-2010 test method. DOE testing indicated that top-loading commercial clothes washers are available on the

market at the proposed amended standard level that provide equivalent washing performance, rinsing performance, and solid particle removal as current baseline units. Chapter 5 of the TSD describes these test results in greater detail. Regarding potential consumer utility impacts associated with door locks, DOE's market analysis indicates that top-loading models without door locks are currently available on the market at the proposed amended standard level.

Regarding the higher efficiency levels considered in the residential clothes washer rulemaking, DOE does not believe that the more stringent levels above the identified maximum available level would be appropriate for consideration in this commercial clothes washer rulemaking, for many of the same reasons described previously for the front-loading efficiency levels. First, no commercial clothes washer models are currently available on the market above 1.85MEF/6.9 WF, as measured using appendix J1. Second, some of the design options that would be required to achieve those higher efficiency levels could be perceived by the machine owners and/or end users as negatively impacting wash basket size. Most notably, achieving the highest efficiency levels in the residential clothes washer market requires implementing large-capacity wash baskets greater than 4.3 cubic feet. DOE notes that EPCA's product coverage definition of a top-loading commercial clothes washer specifies a maximum capacity of 4.0 cubic feet, so units with the larger-capacity wash baskets would not be covered equipment subject to DOE's energy conservation standards. (42 U.S.C. 6311(21)) In addition, as noted previously, a larger clothes container capacity is considered a detriment to commercial clothes washer owners because a larger-capacity tub may result in fewer wash cycles

performed by the end-user customer. Furthermore, the max-tech residential clothes washers lack an agitator and instead use a circular wash plate that requires different loading instructions than clothes washers with traditional agitators. Manufacturers typically instruct users not to load garments directly over the center of the wash plate, so that the center of the wash plate remains visible when loaded. It is unlikely that such specialized loading instructions would be implementable in a commercial laundry environment such that the wash performance of the unit would be maintained.

Based on the results of its market and technology assessment and engineering analysis, DOE has determined that the maximum available efficiency level identified in Table IV.2 represents the maximum efficiency level that is technologically feasible for top-loading commercial clothes washers.

6. Impacts on Cleaning Performance

As mentioned in the discussion of front-loading and top-loading higher efficiency levels, DOE conducted performance testing to quantitatively evaluate potential impacts on cleaning performance, rinsing performance, and solid particle removal as a result of higher standard levels. As described in greater detail in Chapter 5 of the TSD, DOE tested a representative sample of commercial clothes washers at each efficiency level using AHAM's HLW-1-2010 test procedure. For each clothes washer, DOE tested the maximum load size specified in appendix J2, rounded to the nearest pound, using the warm wash/cold rinse cycle. Manufacturers indicated that the maximum load size is particularly relevant to commercial clothes washer owners and operators because end-

users often overload the machines in order to limit their total laundry cost. DOE notes that the warm wash/cold rinse temperature selection has the highest usage factor in appendix J2. The test results indicate that units meeting the proposed new standard levels are capable of providing washing performance, rinsing performance, and solid particle removal results equivalent to current baseline products.

ALS commented that no industry test method currently exists for measuring the cleaning performance of commercial clothes washers, nor has the industry agreed upon an acceptable range of performance characteristics. ALS acknowledged AHAM's HLW-1 Performance Evaluation Procedures for Household Clothes Washers, but stated that it may not be fully appropriate for measuring the performance of commercial clothes washers. (ALS, No. 16 at p. 4)

DOE consulted with a number of manufacturers who indicated that AHAM HLW-1-2010 would be the most appropriate test method to determine relative cleaning performance across different commercial clothes washer models. DOE recognizes that AHAM HLW-1-2010 is typically used to measure the performance of residential clothes washers, but given the similarities in physical construction, DOE believes the test procedure is appropriate for commercial clothes washers. DOE also acknowledges that the commercial clothes washer industry has not agreed upon acceptable ranges of performance characteristics; therefore, DOE's test results should be used for relative comparison purposes only.

D. Markups Analysis

The markups analysis develops appropriate markups in the distribution chain to convert the estimates of manufacturer selling price derived in the engineering analysis to customer prices. ("Customer" refers to purchasers of the equipment being regulated.) DOE calculates overall baseline and incremental markups based on the equipment markups at each step in the distribution chain. The incremental markup relates the change in the manufacturer sales price of higher efficiency models (the incremental cost increase) to the change in the customer price.

For the three key CCW market segments − laundromats, private multi-family housing, and large institutions − data indicate that an overwhelming majority of commercial clothes washers are sold through either distributors or route operators. For today's NOPR, DOE used two distribution channels used in the 2010 Final Rule – manufacturer to distributor to owner/lessee, and manufacturer to route operator to owner/lessee. For purposes of developing the markups for commercial clothes washers, DOE estimated that the markups and the resulting consumer equipment prices determined for the distribution channel involving distributors would be representative of the prices paid by customers acquiring their equipment from route operators.

DOE based the distributor markups for commercial clothes washers on financial data for the sector Machinery, Equipment and Supplies Merchant Wholesalers from the 2007 U.S. Census Business Expenses Survey (BES), which is the most recent available

survey.[14] This sector includes the subsector Laundry Machinery, Equipment, and Supplies, Commercial, Merchant Wholesalers, which specifically sells commercial clothes washers. DOE calculated overall baseline and incremental markups based on the equipment markups at the intermediate step in the distribution chain. The incremental markup relates the change in the manufacturer sales price of higher efficiency models (the incremental cost increase) to the change in the customer price. Chapter 6 of the NOPR TSD provides further detail on the estimation of markups.

E. Energy and Water Use Analysis

The energy and water use analysis provides estimates of the annual energy and water consumption of commercial clothes washer units at the considered efficiency levels. DOE uses these values in the LCC and PBP analyses and in the NIA. DOE developed energy and water consumption estimates for all equipment classes analyzed in the engineering analysis. The analysis seeks to capture the range of CCW use in the field.

The framework document outlined DOE's intention to base the energy and water use analysis on the energy and water use per cycle and the number of cycles per year.

The test procedure uses a single value for number of cycles, which is based on residential use. For the energy and water use analysis, DOE established an appropriate range of usage specific to CCW in the field. Because the predominant applications of

[14] U.S. Census Bureau, *Economic Census, Business Expenses Survey, Wholesale Trade, Machinery, Equipment and Supplies Merchant Wholesalers,* 2007. (Last accessed February, 2013.

CCWs are in multi-family buildings and laundromats, DOE focused on these two building applications to determine appropriate values for number of CCW cycles per year.

NRDC and ASAP commented that DOE should include all major product categories in its analysis for this rulemaking. The commenters noted that "other commercial applications" in the statutory definition of commercial clothes washers include washers used for on-premise laundry. Further, the commenters stated that the on-premise laundry category (such as in the hospitality industry) was largely ignored in the technical analysis for the January 2010 final rule. The commenters added that while the total unit count may be smaller than coin laundries and multi-housing laundry, this subgroup may have distinctive usage factors that will influence total energy and water use for covered commercial clothes washers. (NRDC and ASAP, No. 11 at p. 1)

DOE acknowledges that the "other commercial applications" category in the statutory definition would include applications other than coin-operated laundry and multi-family housing laundry. However, DOE is not aware of any data indicating the prevalence of covered products in other applications such on-premise laundries or the hospitality industry. Furthermore, DOE is not aware of any data indicating how the usage patterns of such products would compare to the usage patterns of coin-operated and multi-housing laundries. Therefore, DOE has no information on which to base a separate analysis for on-premise laundry usage. Further, discussions with manufacturers have supported DOE's understanding that applications other than coin-operated laundries and

multi-family housing laundries constitute a small minority of installations of covered commercial clothes washers. For these reasons, DOE's analysis for this NOPR focuses on the coin-operated laundry and multi-housing laundry applications, which represent the large majority of commercial clothes washer usage.

ALS suggested that DOE seek stakeholder input on new sources for data that can assist in characterizing the cycles per year for CCWs. (ALS, No. 97 at p. 5) DOE included all available studies on CCW usage to establish representative usage. DOE welcomes information on data sources other than those mentioned in today's NOPR.

For the NOPR analysis, DOE relied on several research studies to arrive at a range of annual use cycles. The average values are 1,074 and 1,483 for multi-family and laundromat applications, respectively. The data sources that informed these usage numbers include Multi-Housing Laundry Association (MLA) and the Coin Laundry Association (CLA), Southern California Edison, and San Diego Gas and Electric, as well as research sponsored by the MLA and the CLA. Chapter 7 of the NOPR TSD describes these sources in detail.[15]

To calculate the energy and water use per cycle, DOE used the new Appendix J2 test procedure, as described in the paragraphs that follow. (77 FR 13888, Mar. 7, 2012). Based on the known MEF_{J2}, IWF, and remaining moisture content (RMC) of the washer,

[15] DOE did not rely on the Commercial Building Energy Consumption Survey (CBECS) conducted by DOE's Energy Information Administration (EIA) because energy and water consumption is not specified for buildings identified with laundry facilities in the CBECS dataset.

the test procedure provides algorithms to derive energy and water use per cycle. The energy use analysis for today's NOPR consists of three related parts – the machine energy use, the dryer energy use and the water heating energy use.

DOE determined the per-cycle machine energy use from the tests results of the considered models, performed using the current DOE test procedure (77 FR 13888, Mar. 7, 2012).

DOE determined the per-cycle clothes drying energy use by using remaining moisture content (RMC) values contained in the cost/efficiency data set developed in the engineering analysis. The energy required to remove moisture from clothes, i.e., the dryer energy, is a significant component of total clothes washer energy consumption. The equation used to determine this energy component is as described in the current DOE test procedure.

DOE determined the per-cycle water-heating energy use by first determining the total per-cycle energy use (the clothes container volume divided by the MEF_{J2}) and then subtracting from it the per-cycle clothes-drying and machine energy.

Southern Company noted the importance of water heating energy and dryer energy in the consideration of CCW energy use, and raised concerns about the validity of the parameters specified in the test procedure. Regarding water heating energy, Southern Company stated that the assumed efficiency in the 2010 final rule DOE of 100% for

electric water heaters and 75% for gas water heaters was reasonable, but the values should be updated as the weighted average efficiency of installed water heaters changes over time. (Southern, No. 9 at p. 1) DOE research indicates that the efficiency of the stock of commercial water heaters is changing very slowly, so for today's NOPR it used the same efficiencies as in the 2010 final rule.

Regarding dryer energy, Southern Company stated that energy use for drying clothes is highly dependent on consumer behavior, and noted that commercial dryers are usually equipped with a timer and do not have moisture sensors. Southern also questioned the value used for variable DEF, the nominal energy required for a clothes dryer to remove moisture from clothes. It stated that the currently used DEF of 0.5 kWh per pound appears to assume perfect operation and efficiency of drying. They recommend DOE consider adjustments to the assumed benefits of reduced clothing moisture for dryer operation. (Southern, No. 9 at p. 2)

DOE's current approach for quantifying reduction in dryer energy use from an increase in CCW efficiency is based on the existing test procedure for residential clothes washers. DOE acknowledges that operating conditions for commercial dryers may differ from the conditions of residential dryers, but DOE did not find any data to support changing the dryer energy use calculation. However, in response to comments received, DOE considered a sensitivity in the LCC and PBP analysis in which the reduction in dryer energy use is half of what is assumed in the test procedure.

Southern Company also stated that it is aware of a small soon-to-be-completed study conducted by the Electric Power Research Institute that found no measurable savings for high efficiency equipment for direct energy use by residential washers and dryers. (Southern, No. 9 at p. 2) DOE attempted to obtain the study on observed energy savings from washers in the field, but EPRI indicated that the study was available only to EPRI members. Thus, DOE was not able to evaluate the findings. In addition, DOE has concerns regarding both the sample size and the applicability of a study of residential equipment to the commercial equipment that is the subject of this analysis.

F. Life-Cycle Cost and Payback Period Analysis

The purpose of the LCC and PBP analysis is to analyze the effects of potential amended energy conservation standards on customers of commercial clothes washers by determining how a potential amended standard affects their operating expenses (usually decreased) and their total installed costs (usually increased).

The LCC is the total customer expense over the life of the equipment, consisting of equipment and installation costs plus operating costs over the lifetime of the equipment (expenses for energy use, maintenance, and repair). DOE discounts future operating costs to the time of purchase using customer discount rates. The PBP is the estimated amount of time (in years) it takes customers to recover the increased total installed cost (including equipment and installation costs) of a more efficient type of equipment through lower operating costs. DOE calculates the PBP by dividing the

change in total installed cost (normally higher) due to a standard by the change in annual operating cost (normally lower) that results from the standard.

For any given efficiency level, DOE measures the PBP and the change in LCC relative to an estimate of the base-case efficiency distribution. The base-case estimate reflects the market in the absence of amended energy conservation standards, including the market for equipment that exceeds the current energy conservation standards.

DOE typically develops a consumer sample for determining PBPs and LCC impacts. Because EIA's Commercial Building Energy Consumption Survey (CBECS) does not provide the necessary data to develop one for CCWs, DOE established the variability and uncertainty in energy and water use by defining the uncertainty and variability in the use (cycles per day) of the equipment. The variability in energy and water pricing was characterized by regional differences in energy and water prices.

DOE expresses the LCC and PBP results as the number of units experiencing economic impacts of different magnitudes. DOE models both the uncertainty and the variability in the inputs to the LCC and PBP analysis using Monte Carlo simulation and probability distributions.[16] As a result, the LCC and PBP results are displayed as distributions of impacts compared to the base case conditions.

[16] The Monte Carlo process statistically captures input variability and distribution without testing all possible input combinations. Therefore, while some atypical situations may not be captured in the analysis, DOE believes the analysis captures an adequate range of situations in which small, large, and very large air-cooled commercial package air conditioning and heating equipment operate.

DOE conducted LCC and PBP analysis separately for two applications in each of the equipment classes: laundromats and multi-family buildings. These applications have different usage characteristics.

Inputs to the LCC and PBP analysis are categorized as: (1) inputs for establishing the total installed cost and (2) inputs for calculating the operating expense. The following sections contain brief discussions of comments on the inputs and key assumptions of DOE's LCC and PBP analysis and explain how DOE took these comments into consideration.

1. Equipment Costs

To calculate the equipment prices faced by CCW purchasers, DOE multiplied the manufacturing costs developed from the engineering analysis by the supply chain markups it developed (along with sales taxes).

For projecting future CCW prices, AHAM stated that DOE should not rely on experience curves for the same reasons that it expressed in comments for the microwave oven rulemaking. (AHAM, No. 19 at p. 5) To develop an equipment price trend for the NOPR, DOE examined the commercial laundry and dry-cleaning machinery PPI for the period 1993-2012. This index, adjusted for inflation, shows a rising trend. However, the inflation adjusted trend for household laundry equipment (which more closely matches CCW units because the considered products in this rulemaking are mostly residential-style units and exclude the larger commercial laundry equipment) shows a long-term

declining trend.[17] Given the uncertainty, DOE decided to use a constant price for the default case for CCW units. For the NIA, DOE also analyzed the sensitivity of results to alternative price forecasts. (See section IV.X)

In the previous CCW rulemaking, DOE based the LCC analysis on the assumption that any increase in the cost of a more efficient unit that is leased gets passed on to the building owners through the contracting arrangements between route operators and building owners. NRDC recommended that DOE seek information on contracting arrangements between route operators and building owners. (NRDC, No. 12 at p. 81) DOE was unable to obtain information about contracting arrangements between route operators and building owners. The assumption that any increase in the cost of a more efficient unit that is leased gets passed on is consistent with what one would expect in a competitive business environment. To the extent that costs are not passed on, the LCC savings for building owners from higher-efficiency CCWs would be larger than indicated in today's NOPR.

2. Installation Costs

Installation costs include labor, overhead, and any miscellaneous materials and parts. For today's NOPR, DOE used data from the RS Means Mechanical Cost Data, 2013 on labor requirements to estimate installation costs for CCWs. DOE estimates that installation costs do not increase with equipment efficiency.

[17] 2012-04 Direct Final Rule Technical Support Document - Appendix 8-E. Estimation of Equipment Price Trends for Residential Clothes Washers. http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0019-0047

3. Unit Energy Consumption

The calculation of annual per-unit energy consumption at each considered efficiency level is described above in section IV.E.

4. Energy and Water Prices

DOE used commercial sector energy and water prices for both multi-family and laundromat applications. DOE assumes that common area laundry facilities are mainly found in large multi-family buildings that receive commercial energy and water rates.

a. Energy Prices

DOE derived average electricity and natural gas prices for 27 geographic areas. DOE estimated commercial electricity prices for each of the 27 states and group of states based on 2012 data from EIA Form 861, Annual Electric Power Industry Report.[18] DOE first estimated an average commercial price for each utility, and then calculated an average price for each area by weighting each utility with customers in an area by the number of commercial customers served in that area.

DOE estimated average commercial natural gas prices in each of the 27 geographic areas based on 2012 data from the EIA publication Natural Gas Monthly.[19] DOE calculated an average natural gas price for each area by first calculating the average prices for each state, and then calculating a regional price by weighting each state in a

[18] http://www.eia.gov/electricity/data/eia861/
[19] http://www.eia.gov/naturalgas/monthly/

region by its population.

To estimate the trends in electricity and natural gas prices, DOE used the price forecasts in AEO 2013. To arrive at prices in future years, DOE multiplied the average prices described above by the forecast of annual average changes in national-average commercial electricity and natural gas prices. Because the AEO forecasts prices only to 2040, DOE used the average rate of change during 2025–2040 to estimate the price trends beyond 2040.

The spreadsheet tools used to conduct the LCC and PBP analysis allow users to select either the AEO's high-growth case or low-growth case price forecasts to estimate the sensitivity of the LCC and PBP to different energy price forecasts.

b. Water and Wastewater Prices

DOE obtained commercial water and wastewater price data from the Water and Wastewater Rate Survey conducted by Raftelis Financial Consultants (RFC) and the American Water Works Association (AWWA).[20] NRDC and ASAP suggested that DOE use the most recent AWWA/Raftelis survey for calculating water and wastewater prices. (NRDC, No. 11 at p. 4) DOE obtained the water and wastewater price data from the 2012 Water and Wastewater Rate Survey, the most recent survey conducted by RFC and AWWA. The survey covers approximately 290 water utilities and 214 wastewater utilities from 44 states and the District of Columbia, with water and wastewater utilities

[20] Raftelis Financial Consultants, Inc. 2012 RFC/AWWA Water and Wastewater Rate Survey. 2013. Charlotte, NC, Kansas City, MO, and Pasadena, CA. www.raftelis.com/ratessurvey.html

analyzed separately. The samples that DOE obtained of the water and waste water utilities are not large enough to calculate regional prices for all 27 states and group of states. Hence, DOE calculated average values at the Census region level (Northeast, South, Midwest, and West) by weighting each state in a region by its population.

To estimate the future trend for water and wastewater prices, DOE used data on the historic trend in the national water price index (U.S. city average) provided by the Bureau of Labor Statistics (BLS), adjusted for inflation. Generally, DOE extrapolated a future trend based on the linear growth from 1970 to 2012. However, using the linear fit would have resulted in a price decline in the near-term, which does not seem plausible because historically, water prices have not declined in the country. Therefore, rather than use the extrapolated trend to forecast the near-term trend after 2012, DOE pinned the annual price to the value in 2012 until 2020. Beyond 2020, DOE used the extrapolated trend to forecast prices out to 2047.

5. Repair and Maintenance Costs

Repair costs are associated with repairing or replacing components that have failed in the appliance; maintenance costs are associated with maintaining the operation of the equipment. For the January 2010 Final Rule, DOE included increased repair costs for higher efficiency CCWs based on an algorithm developed by DOE for central air conditioners and heat. This algorithm calculates annualized repair and maintenance costs by dividing half of the equipment retail price over the equipment lifetime. DOE requested industry input to estimate changes in repair and maintenance costs with an increase in

efficiency of CCW units. AHAM stated that higher efficiency levels could impact the maintenance and repair costs for CCW units. (AHAM, No. 6 at p. 5) Since DOE did not receive any new inputs from manufacturers or national route operators specific to repair and maintenance costs, it continued with the approach used in the January 2010 Final Rule for today's NOPR. This approach does show rising maintenance and repair costs as efficiency increases.

6. Lifetime

Equipment lifetime is the age at which the equipment is retired from service. For the 2010 Final Rule, DOE used a variety of sources to establish low, average, and high estimates for equipment lifetime in years. DOE characterized CCW lifetime with a Weibull probability distribution. ALS suggested that DOE should expand its sources (including route operators) for determining the average lifetime of CCW units for multi-family and laundry applications. (ALS, No. 12 at p. 2) DOE utilized the contact list submitted during the 2010 Final Rule to reach out to national route operators to seek information on various inputs to the analysis, including lifetime of the units, but was unable to obtain information from them. For this NOPR, DOE updated its data sources (as described in chapter 8 of the NOPR TSD), and found the same average CCW lifetimes (11.3 years for multi-family building applications and 7.1 years for laundromat applications) as used in the 2010 Final Rule. DOE used the same lifetime for each equipment class.

7. Discount Rate

The discount rate is the rate at which future expenditures are discounted to estimate their present value. The cost of capital is commonly used to estimate the present value of cash flows to be derived from a typical company project or investment. Most companies use both debt and equity capital to fund investments, so the cost of capital is the weighted-average cost to the firm of equity and debt financing. DOE uses the capital asset pricing model (CAPM) to calculate the equity capital component, and financial data sources to calculate the cost of debt financing.

For the 2010 Final Rule, DOE estimated the weighted-average cost of capital of publicly traded firms in the key sectors that purchase CCWs (i.e., personal services, educational services, hotels, and R.E.I.T – building and apartment complex owners). For the current rulemaking, DOE updated its data sources for calculating this cost. More details regarding DOE's estimates of customer discount rates are provided in chapter 8 of the NOPR TSD.

8. Base Case Efficiency Distribution

For the LCC and PBP analysis, DOE analyzes higher efficiency levels relative to a baseline efficiency level. Some consumers, however, may already purchase equipment with efficiencies greater than the baseline equipment levels. To accurately estimate the percentage of consumers that would be affected by a particular standard level, DOE estimates the distribution of equipment efficiencies that consumers are expected to purchase under the base case (i.e., the case without amended energy efficiency

standards). DOE refers to this distribution of equipment energy efficiencies as a base-case efficiency distribution.

For today's NOPR, DOE utilized the shipment weighted efficiency distributions for 2010-2011submitted by AHAM to establish the base-case efficiency distributions. Because the data are not sufficient to capture any definite trend in efficiency, DOE used the 2011 distribution to represent the market in the compliance year (2018). NRDC and ASAP stated that Energy Star unit shipment data should be used in considering efficiency trends. (NRDC, No. 11 at p. 4) DOE found that the Energy Star shipments data matched closely with the data submitted by AHAM. Table IV.3 presents the market shares of the efficiency levels in the base case for CCWs. See chapter 8 of the TSD for further details on the development of CCW base-case market shares.

Table IV.3.Commercial Clothes Washers: Base Case Efficiency Distribution

Top-Loading				Front-Loading			
Standard Level	**MEF_{J2}**	**IWF**	**Market Share**	**Standard Level**	**MEF_{J2}**	**IWF**	**Market Share**
Baseline	1.15	8.9	99.5%	Baseline	1.65	5.2	28%
1	1.35	8.8	0.3%	1	1.80	4.5	34%
2	1.55	6.9	0.3%	2	2.00	4.1	38%
				3	2.20	3.9	0%

9. Compliance Date

DOE calculated the LCC and PBP for all customers as if each were to purchase new equipment in the year that compliance with amended standards is required. EPCA, as amended, directs DOE to publish a final rule amending the standard for the products

covered by today's NOPR by January 1, 2015. Any amended standards would apply to commercial clothes washers manufactured three years after the date on which the final amended standard is published. (42 U.S.C. 6313(e)(2)(B)) Therefore, for purposes of its analysis, DOE used 2018 as the first year of compliance with amended standards.

10. Payback Period Inputs

The payback period is the amount of time it takes the consumer to recover the additional installed cost of more efficient equipment, compared to baseline equipment, through energy cost savings. Payback periods are expressed in years. Payback periods that exceed the life of the product mean that the increased total installed cost is not recovered in reduced operating expenses.

The inputs to the PBP calculation are the total installed cost of the product to the customer for each efficiency level and the average annual operating expenditures for each efficiency level. The PBP calculation uses the same inputs as the LCC analysis, except that discount rates are not needed.

11. Rebuttable-Presumption Payback Period

EPCA establishes a rebuttable presumption that a standard is economically justified if the Secretary finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy (and, as applicable, water) savings during the first year that the consumer will receive as a result of the standard, as calculated under the test

procedure in place for that standard. For each considered efficiency level, DOE determines the value of the first year's energy savings by calculating the quantity of those savings in accordance with the applicable DOE test procedure, and multiplying that amount by the average energy price forecast for the year in which compliance with the amended standards would be required.

G. Shipments Analysis

DOE uses projections of product shipments to calculate the national impacts of standards on energy use, NPV, and future manufacturer cash flows. DOE develops shipment projections based on historical data and an analysis of key market drivers for each product. Historical shipments data are used to build up an equipment stock and also to calibrate the shipments model.

In projecting CCW shipments, DOE accounted for three market segments: (1) new construction; (2) existing buildings (i.e., replacing failed equipment); and (3) retired units not replaced. DOE used the non-replacement market segment to calibrate the shipments model to historical shipments data.

Based on historical CCW price and shipments data, DOE determined that the considered standards would be unlikely to affect CCW shipments.

Table IV.4 summarizes the approach and data DOE used to derive the inputs to the shipments analysis for today's NOPR. DOE projected CCW shipments (for both

equipment classes) for the new construction and replacement markets, and also accounted for non-replacement of retired units. DOE then allocated shipments to each of the two equipment classes based on the current market share of each class. Based on data submitted by AHAM, DOE estimated that top-loading washers comprise 64 percent of the market while front-loading washers comprise 36 percent. DOE implemented change in the market share for the projection period based on the historical trend that shows a gradual market shift towards front-loading units, with the market stabilizing at 52 percent and 48 percent for top-loading and front-loading by 2047.

Table IV.4. Approach and Data Used to Derive the Inputs to the Shipments Analysis

Inputs	Approach
Number of Equipment Classes	Two: top-loading washers and front-loading washers. Shipments forecasts established for all CCWs and then disaggregated into the two equipment classes based on the market share of top- and front-loading washers.
New Construction Shipments	Determined by multiplying multi-housing forecasts by forecasted saturation of CCWs for new multi-housing. Multi-housing forecasts with AEO 2013. Verified frozen saturations with data from the U.S. Census Bureau's American Housing Survey (AHS) for 1997–2011.
Replacements	Determined by tracking total equipment stock by vintage and establishing the failure of the stock using retirement functions from the LCC and PBP analysis. Retirement functions revised to be based on Weibull lifetime distributions.
Retired Units not Replaced (i.e., non-replacements)	Used to calibrate shipments model to historical shipments data. Froze the percentage of non-replacements at 31.6 percent for the period 2012─2047 to account for the increased saturation rate of in-unit washers in the multi-family stock between 2000 and 2011 timeframe shown

	by the AHS.
Historical Shipments	Data sources include AHAM data submittal, Appliance Magazine, and U.S. Bureau of Economic Analysis' quantity index data for commercial laundry. Relative market shares of the two equipment applications, common-area laundry facilities in multi-family housing and laundromats, estimated to be 85 and 15 percent, respectively.

DOE implemented a cross-price elasticity to capture the response to a change in price of one equipment class on the demand of the other equipment class. Due to insufficient data on CCW units, DOE was not able to estimate cross-price impacts on the market share of top-loading and front-loading commercial clothes washers and instead relied on its analysis performed for the 2012 residential clothes washers rulemaking.[21] The regression results suggest that a 10% increase in the price of front-loading washers would lead to a 10.7% decrease in top-loading washers' market share, holding other variables constant and measured as changes from the reference case using average values for each variable. In this case, the front-loading cross-price impact (percent change in top-loading market share over percent change in front-loading price) is 1.07. The results indicate that a 20% price increase for top-loading washers would yield a 21.49 percent increase in front-loading market share. Thus, in this example, the top-loading washer cross-price impact is also 1.07. For further details on this estimation, please refer to chapter 9 of the NOPR TSD.

[21] See chapter 9 in Direct Final Rule Technical Support Document. http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0019-0047

1. Shipments by Market Segment

For the new construction market, DOE assumed shipments are driven solely by multi-family construction starts. Implicit in this assumption is the fact that a certain percentage of multi-family residents will need to wash their laundry in either a common-area laundry facility (within the multi-family building) or a laundromat.

For existing buildings replacing broken equipment, the shipments model uses a stock accounting framework. Given the equipment entering the stock in each year and a retirement function based on the lifetime distribution developed in the LCC analysis, the model predicts how many units reach the end of their lifetime in each year. DOE typically refers to new shipments intended to replace retired units as "replacement" shipments. Such shipments are usually the largest part of total shipments.

Historical data show a rise in shipments in the 2nd half of the 1990s followed by a significant drop in1999−2002, and a slower decline since then. DOE believes that a large part of the decline was due to growth of in-unit washers in multi-family housing (possibly due to conversions of rental property to condominiums), leading to non-replacement of failed commercial clothes washers in common-area laundry facilities.[22] To account for the decline and to reconcile the historical shipments with the accounting model, DOE assumed that every retired unit is not replaced. Starting in 1999 and extending to 2011, DOE estimated the share of retired units that were not replaced (as discussed in chapter 9

[22] Data from the American Housing Survey as well as RECS indicate that there has been growth of in-unit washer saturation in the multi-family housing stock over the last 10-15 years. See chapter 9 of the NOPR TSD for further discussion.

of the NOPR TSD).

H. National Impact Analysis

The NIA assesses the national energy savings (NES) and the national NPV of total customer costs and savings that would be expected to result from amended standards at specific efficiency levels.

DOE used an MS Excel spreadsheet model to calculate the energy savings and the national customer costs and savings from each TSL.[23] The NIA calculations are based on the annual energy consumption and total installed cost data from the energy use analysis and the LCC analysis. DOE projected the lifetime energy savings, energy cost savings, equipment costs, and NPV of customer benefits for each equipment class for equipment sold from 2018 through 2047.

DOE evaluated the impacts of potential amended standards for front-loading and top-loading CCW by comparing base-case projections with standards-case projections. The base-case projections characterize energy use and customer costs for each equipment class in the absence of amended energy conservation standards.

Table IV.5 briefly describes the key inputs for the NIA. The sections following provide further details, as does chapter 10 of the NOPR TSD.

[23] DOE's use of MS Excel as the basis for the spreadsheet models provides interested parties with access to the models within a familiar context. In addition, the TSD and other documentation that DOE provides during the rulemaking help explain the models and how to use them, and interested parties can review DOE's analyses by changing various input quantities within the spreadsheet.

Table IV.5. Inputs for the National Impact Analysis

Input	Description
Shipments	Annual shipments from shipments model.
Compliance date	January 1, 2018.
Base case efficiency	Based on the current market distribution of efficiencies, with the option of a frozen, 1%, and 2% growth in efficiency.
Standards case efficiency	Based on a "Roll up" scenario to establish a 2018 shipment weighted efficiency.
Annual energy and water consumption per unit	Calculated for each efficiency level and equipment class based on inputs from the energy and water use analysis.
Total installed cost per unit	Calculated equipment prices by efficiency level using manufacturer selling prices and weighted-average overall markup values. Installation costs vary in direct proportion to the weight of the equipment.
Electricity and water expense per unit	Annual energy use for each equipment class is multiplied by the corresponding average energy and water and wastewater price.
Escalation of electricity and water prices	AEO 2013 forecasts (to 2040) and extrapolation beyond 2040 for electricity and gas prices. BLS's historical Consumer Price Index for water for projecting the prices beyond 2020.
Electricity site-to-primary energy conversion	A time series conversion factor; includes electric generation, transmission, and distribution losses.
Discount rates	3% and 7% real.
Present year	2013.

1. Efficiency Trends

A key component of DOE's estimates of NES and NPV is the equipment energy and water efficiencies forecasted over time for the base case and for each of the standards

cases. For the base case, DOE considered the lack of change in the historical trends and assumed that efficiency would remain constant at the 2018 levels derived in the LCC and PBP analysis. DOE provides a 1% and 2% efficiency growth rates as options for sensitivities.

To estimate the impact that standards would have in the year compliance becomes required, DOE used a "roll-up" scenario, which assumes that equipment efficiencies in the base case that do not meet the standard level under consideration would "roll up" to meet the new standard level and equipment shipments at efficiencies above the standard level under consideration are not affected. In each standards case, the efficiency distributions remain constant at the 2018 levels for the remainder of the shipments forecast period.

2. National Energy and Water Savings

For each year in the forecast period, DOE calculates the national energy and water savings for each standard level by multiplying the shipments of front-loading and top-loading by the per-unit annual energy and water savings. Cumulative energy and water savings are the sum of the annual energy and water savings over the lifetime of all equipment shipped during 2018–2047.

The annual energy consumption per unit depends directly on equipment efficiency. DOE used the shipment-weighted energy and water efficiencies associated with the base case and each standards case, in combination with the annual energy and

water use data, to estimate the shipment-weighted average annual per-unit energy and water consumption under the base case and standards cases. The national energy consumption is the product of the annual energy consumption per unit and the number of units of each vintage, which depends on shipments. DOE calculates the total annual site energy savings for a given standards case by subtracting total energy use in the standards case from total energy use in the base case. Note that shipments are the same in the standards cases as in the base case.

DOE converted the site electricity consumption and savings to primary energy (power sector energy consumption) using annual conversion factors derived from the AEO 2013 version of the NEMS. Cumulative primary energy and water savings are the sum of the national energy and water savings for each year in which equipment shipped during 2018–2047 continue to operate.

DOE has historically presented national energy savings in terms of primary energy savings. In response to the recommendations of a committee on "Point-of-Use and Full-Fuel-Cycle Measurement Approaches to Energy Efficiency Standards" appointed by the National Academy of Science, DOE announced its intention to use full-fuel-cycle (FFC) measures of energy use and greenhouse gas and other emissions in the national impact analyses and emissions analyses included in future energy conservation standards rulemakings. 76 FR 51281 (August 18, 2011). While DOE stated in that notice that it intended to use the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model to conduct the analysis, it also said it would review

alternative methods, including the use of EIA's National Energy Modeling System (NEMS). After evaluating both models and the approaches discussed in the August 18, 2011 notice, DOE published a statement of amended policy in the Federal Register in which DOE explained its determination that NEMS is a more appropriate tool for this specific use. 77 FR 49701 (August 17, 2012). Therefore, DOE is using NEMS to conduct FFC analyses. The approach used for today's NOPR, and the FFC multipliers that were applied, are described in appendix 10-A of the NOPR TSD.

3. Net Present Value of Customer Benefit

The inputs for determining the NPV of the total costs and benefits experienced by customers of the considered equipment are: (1) total annual installed cost; (2) total annual savings in operating costs; and (3) a discount factor. DOE calculates the lifetime net savings for equipment shipped each year as the difference between the base case and each standards case in total savings in lifetime operating costs and total increases in installed costs. DOE calculates lifetime operating cost savings over the life of each front-loading and top-loading CCW unit shipped during the forecast period.

a. Total Annual Installed Cost

The total installed cost includes both the equipment price and the installation cost. For each equipment class, DOE calculated equipment prices by efficiency level using manufacturer selling prices and weighted-average overall markup values (weights based on shares of the distribution channels used). Because DOE calculated the total installed cost as a function of equipment efficiency, it was able to determine annual total

installed costs based on the annual shipment-weighted efficiency levels determined in the shipments model.

As noted in section IV.F.1, DOE assumed no change in front-loading and top-loading CCW equipment prices over the analysis period. However, DOE conducted sensitivity analyses using alternative price trends: one in which prices decline after 2013, and one in which prices rise. These price trends, and the NPV results from the associated sensitivity cases, are described in appendix 10-B of the NOPR TSD.

b. Total Annual Operating Cost Savings

The per-unit energy and water savings were derived as described in section IV.H.2. To calculate future electricity and natural gas prices, DOE applied the projected trend in national-average commercial electricity and natural gas price from the AEO 2013 Reference case, which extends to 2040, to the prices derived in the LCC and PBP analysis. DOE used the trend from 2025 to 2040 to extrapolate beyond 2040. To calculate future water prices, DOE applied the historical price trend based on the consumer price index of water, published by the Bureau of Labor Statistics.

In addition, DOE analyzed scenarios that used the energy price projections in the AEO 2013 Low Economic Growth and High Economic Growth cases. These cases have higher and lower energy price trends compared to the Reference case. These price trends, and the NPV results from the associated cases, are described in appendix 10-C of the NOPR TSD.

DOE estimated that annual maintenance costs (including minor repairs) do not vary with efficiency within each equipment class, so they do not figure into the annual operating cost savings for a given standards case. In addition, as noted previously, DOE developed annualized repair costs using the approach described in Section IV.F.5.

In calculating the NPV, DOE multiplies the net dollar savings in future years by a discount factor to determine their present value. DOE estimates the NPV using both a 3-percent and a 7-percent real discount rate, in accordance with guidance provided by the Office of Management and Budget (OMB) to Federal agencies on the development of regulatory analysis.[24] The discount rates for the determination of NPV are in contrast to the discount rates used in the LCC analysis, which are designed to reflect a consumer's perspective. The 7-percent real value is an estimate of the average before-tax rate of return to private capital in the U.S. economy. The 3-percent real value represents the "social rate of time preference," which is the rate at which society discounts future consumption flows to their present value.

I. Customer Subgroup Analysis

In analyzing the potential impacts of new or amended standards, DOE evaluates impacts on identifiable groups (i.e., subgroups) of customers that may be disproportionately affected by a national standard. For the NOPR, DOE evaluated

[24] OMB Circular A-4, section E (Sept. 17, 2003). Available at: http://www.whitehouse.gov/omb/circulars_a004_a-4.

impacts on a small business subgroup using the LCC spreadsheet model. The customer subgroup analysis is discussed in detail in chapter 11 of the NOPR TSD.

J. Manufacturer Impact Analysis

1. Overview

DOE performed an MIA to estimate the impacts of amended energy conservation standards on manufacturers of commercial clothes washers. The MIA has both quantitative and qualitative aspects and includes analyses of forecasted industry cash flows, the INPV, investments in research and development (R&D) and manufacturing capital, and domestic manufacturing employment. Additionally, the MIA seeks to determine how amended energy conservation standards might affect manufacturing capacity, and competition, as well as how standards contribute to overall regulatory burden. Finally, the MIA serves to identify any disproportionate impacts on manufacturer subgroups.

The quantitative part of the MIA relies primarily on the Government Regulatory Impact Model (GRIM), an industry cash flow model with inputs specific to this rulemaking. The key GRIM inputs include data on the industry cost structure, unit production costs, product shipments, manufacturer markups, and investments in R&D and manufacturing capital required to produce compliant products. The key GRIM outputs are the INPV, which is the sum of industry annual cash flows over the analysis period, discounted using the industry weighted average cost of capital, and the impact to domestic manufacturing employment. The model estimates the impacts of amended

energy conservation standards on a given industry by comparing changes in INPV and domestic manufacturing employment between a base case and the various TSLs in the standards case. To capture the uncertainty relating to manufacturer pricing strategy following amended standards, the GRIM estimates a range of possible impacts under different markup scenarios.

The qualitative part of the MIA addresses manufacturer characteristics and market trends. Specifically, the MIA considers such factors as manufacturing capacity, competition within the industry, the cumulative impact of other regulations, and impacts on manufacturer subgroups. The complete MIA is outlined in chapter 12 of the NOPR TSD.

DOE conducted the MIA for this rulemaking in three phases. In Phase 1 of the MIA, DOE prepared a profile of the commercial clothes washer manufacturing industry. DOE used public sources of information to derive preliminary financial inputs for the GRIM (e.g., revenues; materials, labor, overhead, and depreciation expenses; selling, general, and administrative expenses (SG&A); and R&D expenses). Sources of data used in this initial characterization of the commercial clothes washer manufacturing industry included company filings of form 10-K from the Securities and Exchange Commission (SEC), corporate annual reports, the U.S. Census Bureau's Economic Census, and reports from Dun & Bradstreet.

In Phase 2 of the MIA, DOE prepared an industry cash flow analysis to quantify the impacts of new and amended energy conservation standards. The GRIM uses several factors to determine a series of annual cash flows starting with the announcement of the standard and extending over a 30-year period following the effective date of the standard. These factors include annual expected revenues, costs of sales, SG&A and R&D expenses, taxes, and capital expenditures. In general, energy conservation standards can affect manufacturer cash flow in three distinct ways: (1) create a need for increased investment; (2) raise production costs per unit; and (3) alter revenue due to higher per-unit prices and changes in sales volumes.

In Phase 3 of the MIA, DOE interviewed representative manufacturers. During these interviews, DOE discussed engineering, manufacturing, procurement, and financial topics to validate assumptions used in the GRIM and to identify key issues or concerns. See section IV.J.4 for a description of the key issues raised by manufacturers during the interviews. As part of Phase 3, DOE also evaluated subgroups of manufacturers that may be disproportionately impacted by amended standards or that may not be accurately represented by the average cost assumptions used to develop the industry cash flow analysis. In addition to small business manufacturers, such manufacturer subgroups may include low volume manufacturers (LVMs), niche players, and/or manufacturers exhibiting a cost structure that largely differs from the industry average. DOE identified two subgroups for which average cost assumptions may not hold: small businesses and LVMs.

Based on the size standards published by the SBA and available at http://www.sba.gov/content/table-small-business-size-standards, to be categorized as a small business manufacturer of commercial clothes washers under North American Industry Classification System (NAICS) 333318, "Other commercial and service industry machinery manufacturing," a commercial laundry equipment manufacturer and its affiliates may employ a maximum of 1000 employees. The 1000-employee threshold includes all employees in a business's parent company and any other subsidiaries. Using this classification in conjunction with a search of industry databases and the SBA member directory, DOE did not identify any manufacturers of commercial clothes washers that qualify as small businesses.

Unlike small business manufacturers, there is no employment limit associated with LVMs. Instead, LVMs are characterized by their low overall production volumes relative to their competitors, often associated with specialization within a singular industry. In the industry characterization from Phase 1, DOE identified two manufacturers that represent over 90 percent of commercial clothes washer shipments.[25] DOE categorized one of these manufacturers as a LVM because of the concentration of its business in commercial clothes washers relative to its competitors. In 2012, the LVM derived 98 percent of its revenues from the sale of laundry equipment and service parts, while, for its main competitor, this percentage was 30 percent. Within the washer segment, DOE estimates that the LVM derived 88 percent of its washer equipment revenues from the sale of commercial clothes washers covered by this rulemaking.

Because the commercial clothes washer industry itself is characterized by low total shipments, with less than 200,000 units sold annually in the U.S., the concentration of this manufacturer's business in this industry qualifies them as an LVM. Where the LVM operates at a much smaller scale and does not manufacture products across a broad range of industries, this rulemaking could have disproportionate impacts on the LVM compared to its large, diversified competitors. Accordingly, DOE performed an in-depth analysis of the issues relating to the commercial clothes washer LVM. The manufacturer subgroup analysis is discussed in greater detail in Chapter 12 of the NOPR TSD and in section V.B.2.d of this notice.

2. Government Regulatory Impact Model

DOE uses the GRIM to quantify the changes in industry cash flows resulting from amended energy conservation standards. The GRIM uses manufacturer costs, markups, shipments, and industry financial information to arrive at a series of base-case annual cash flows absent new or amended standards, beginning with the present year, 2013, and continuing through 2047. The GRIM then models changes in costs, investments, shipments, and manufacturer margins that may result from new or amended energy conservation standards and compares these results against those in the base-case forecast of annual cash flows. The primary quantitative output of the GRIM is the INPV, which DOE calculates by summing the stream of annual discounted cash flows over the full analysis period. For manufacturers of commercial clothes washers, DOE used a real discount rate of 8.6 percent, the weighted average cost of capital derived from industry

financials and modified based on feedback received during confidential interviews with manufacturers.

The GRIM calculates cash flows using standard accounting principles and compares changes in INPV between the base case and the various TSLs. The difference in INPV between the base case and a standards case represents the financial impact of the amended standard on manufacturers at that particular TSL. As discussed previously, DOE collected the necessary information to develop key GRIM inputs from a number of sources, including publicly available data and interviews with manufacturers (described in the next section). The GRIM results are shown in section V.B.2.a. Additional details about the GRIM can be found in chapter 12 of the NOPR TSD.

a. Government Regulatory Impact Model Key Inputs

Manufacturer Production Costs

Manufacturing a higher efficiency product is typically more expensive than manufacturing a baseline product due to the use of more complex and typically more costly components. The changes in the MPCs of the analyzed products can affect the revenues, gross margins, and cash flow of the industry, making product cost data key GRIM inputs for DOE's analysis. For each efficiency level of each equipment class, DOE used the MPCs developed in the engineering analysis, as described in section IV.A.2 and further detailed in chapter 5 of the NOPR TSD. Additionally, DOE used information from its teardown analysis, described in section IV.C to disaggregate the

MPCs into material and labor costs. These cost breakdowns and equipment markups were validated with manufacturers during manufacturer interviews.

Base-Case Shipments Forecast

The GRIM estimates manufacturer revenues based on total unit shipment forecasts and the distribution of shipments by efficiency level. Changes in sales volumes and efficiency mix over time can significantly affect manufacturer finances. For this analysis, the GRIM uses the NIA's annual shipment forecasts derived from the shipments analysis from 2013, the base year, to 2047, the end of the analysis period. See chapter 9 of the NOPR TSD for additional details.

Standards-Case Shipments Forecast

For each standards case, the GRIM assumes that shipments of products below the projected minimum standard levels would roll up to the standard efficiency levels in response to an increase in energy conservation standards. The GRIM also assumes that demand for high-efficiency equipment is a function of price, and is independent of the standard level. Additionally, the standards case shipments forecast includes a partial shift of shipments from one equipment class to another depending on the standard level, reflecting positive cross-price elasticity of demand, as one equipment class becomes relatively more expensive than the other to produce and for consumers to purchase. A decrease in shipments offsets the relative increase in costs to produce at a given TSL for a given equipment class. See Chapter 9 of the NOPR TSD for additional details.

Product and Capital Conversion Costs

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

Stranded Assets

If new or amended energy conservation standards require investment in new manufacturing capital, there also exists the possibility that they will render existing manufacturing capital obsolete. If this obsolete manufacturing capital is not fully depreciated at the time new or amended standards go into effect, this would result in the stranding of these assets, and would necessitate the expensing of the residual un-depreciated value.

DOE used multiple sources of data to evaluate the level of product and capital conversion costs and stranded assets manufacturers would likely face to comply with amended energy conservation standards. DOE used manufacturer interviews to gather data on the level of investment anticipated at each proposed efficiency level and validated

these assumptions using estimates of capital requirements derived from the product teardown analysis and engineering model described in section IV.C. These estimates were then aggregated and scaled to derive total industry estimates of product and capital conversion costs and to protect confidential information.

In general, DOE assumes that all conversion-related investments occur between the year the final rule is published and the year by which manufacturers must comply with the new or amended standards. The investment figures used in the GRIM can be found in section V.B.2 of this notice. For additional information on the estimated product conversion and capital conversion costs, see chapter 12 of the NOPR TSD.

b. Government Regulatory Impact Model Scenarios

Markup Scenarios

As discussed in section IV.D, MSPs include direct manufacturing production costs (i.e., labor, material, overhead, and depreciation estimated in DOE's MPCs) and all non-production costs (i.e., SG&A, R&D, and interest), along with profit. To calculate the MSPs in the GRIM, DOE applied manufacturer markups to the MPCs estimated in the engineering analysis. Modifying these markups in the standards case yields different sets of impacts on manufacturers. For the MIA, DOE modeled two standards-case markup scenarios to represent the uncertainty regarding the potential impacts on prices and profitability for manufacturers following the implementation of amended energy

conservation standards: (1) a preservation of gross margin[26] (percentage) scenario; and (2) a preservation of operating profits (in absolute dollars) scenario. These scenarios lead to different markups values that, when applied to the MPCs, result in varying revenue and cash flow impacts.

Under the preservation of gross margin percentage scenario, DOE applied a single, uniform "gross margin percentage" markup across all efficiency levels. As production costs increase with efficiency, this scenario implies that the absolute dollar markup will increase as well. Based on publicly available financial information for manufacturers of commercial clothes washers and comments from manufacturer interviews, DOE assumed the industry average markup on production costs to be 1.285. Because this markup scenario assumes that manufacturers would be able to maintain their gross margin percentage as production costs increase in response to an amended energy conservation standard, it represents a lower bound of industry impacts (higher industry profitability) under an amended energy conservation standard.

In the preservation of operating profits (in absolute dollars) scenario, manufacturer markups are calibrated so that operating profits (in absolute dollars) in the year after the compliance date of the amended energy conservation standard is the same as in the base case. Under this scenario, as the cost of production goes up, manufacturers are generally required to reduce the markups on their minimally compliant products to

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

maintain a cost competitive offering. The implicit assumption behind this scenario is that the industry can only maintain operating profits after compliance with the amended standard is required. Therefore, gross margin (as a percentage) shrinks in the standards cases. This markup scenario represents an upper bound of industry impacts (lower profitability) under an amended energy conservation standard.

3. Discussion of Comments

At the Framework public meeting, AHAM commented that DOE should interview the customers of commercial clothes washer manufacturers, as customers will have valuable information on issues including the impact of higher efficiency standards on end user utility and whether standards will increase maintenance and repair costs (AHAM, No. 13 at pp. 5). Because commercial clothes washer customers have direct access to the end user, these customers may have information concerning consumer usage patterns and utility, as well as maintenance and repair costs. DOE attempted to contact, but did not receive any affirmative responses, from national route operators and trade groups representing multi-housing laundry providers and coin laundry owners, all of whom purchase CCWs. . DOE will continue to solicit feedback from route operators prior to publishing the final rule.

4. Manufacturer Interviews

To inform the MIA, DOE interviewed manufacturers with an estimated combined market share of 95 percent. The information gathered during these interviews enabled DOE to tailor the GRIM to reflect the unique financial characteristics of the commercial

clothes washer industry. These interviews provided information that DOE used to evaluate the impacts of amended energy conservation standards on manufacturer cash flows, manufacturing capacities, and employment levels.

During the interviews, DOE asked manufacturers to describe their major concerns about this rulemaking. The following sections describe the most significant issues identified by manufacturers. DOE also includes additional concerns in chapter 12 of the NOPR TSD.

a. Impacts to Cleaning Performance

All of the manufacturers interviewed expressed concerns that future energy conservation standards would have an adverse impact on cleaning performance and reliability. One manufacturer asserted that products currently considered to be at the max-tech efficiency level are not truly commercial products. Another manufacturer noted that reaching the max-tech level would require higher spin speeds, which could decrease the reliability of the product. Two manufacturers expressed concerns that the max-tech level for top loaders pushes the boundary of acceptable water level in terms of both cleaning performance and market acceptance. The lower water level of max-tech products would necessitate lighter loads in order to maintain cleaning performance. A lighter load size requirement would contradict consumer tendencies to overload machines. As discussed in section IV.C.6, and further in chapter 5 of the TSD, DOE has determined that the proposed standards would not negatively impact the cleaning performance of commercial clothes washers.

b. Consumer Behavior

All manufacturers noted that energy efficiency efforts are inherently less effective in the commercial clothes washer market than in markets for residential appliances, including residential clothes washers. They attributed this to the usage patterns of commercial clothes washer end users, reflecting the fact that end users: 1) do not own the machines, and 2) pay by the load to use machines. Such usage patterns include tendencies to put too much detergent into machines (leading to "suds lock", a condition where the clothes washer is unable to achieve full spin speed due to the friction caused by detergent suds in gap between the inner wash basket and outer wash tub), overfilling machines with oversized loads, choosing to use hot water when it is unnecessary to do so, and washing clothes twice to counteract the effect of having used too much detergent.

Platform changes and reduced water levels of higher efficiency products exacerbate these issues. One manufacturer noted that there is a steep learning curve for end users relating to adaptation to low-water machines. For instance, end users should be using high efficiency detergents in recommended quantities, yet are unlikely to do so. Concerns that machines are not functioning properly leads to increased service calls. Another manufacturer noted that end user dissatisfaction with high efficiency products may drive the need for selectable cycle modifiers, which would allow end users to choose less efficient settings to reach an acceptable level of cleaning performance to resolve the performance issues caused by incorrect use of the machines. Selectable modifiers would undermine the energy savings otherwise achievable with higher efficiency machines.

As discussed in section IV.C.6, and further in chapter 5 of the TSD, DOE has determined that the proposed standards would not negatively impact the cleaning performance of commercial clothes washers. Furthermore, DOE has determined that the proposed standards would not require significant design (platform) changes to either top-loading or front-loading CCWs, and thus would not require changes in user operation compared to current baseline products. Therefore, the consumer behaviors noted by commenters would not be exacerbated by the proposed amended standards. In addition, DOE notes that since viable products are readily available at the proposed standard levels, the use of optional selectable cycle modifiers will not be necessary to achieve acceptable levels of cleaning performance.

c. Disproportionate Impacts

Several manufacturers expressed concerns relating to competitive impacts caused by future energy conservation standards. One manufacturer specifically noted that a genuine and comprehensive approach to redesigning products to meet DOE standards will result in a competitive disadvantage relative to other manufacturers. As this company's revenue is so closely tied to commercial clothes washers, they predict that any increase in standards will impact their business disproportionately. For a detailed discussion of the manufacturer subgroup analysis, see chapter 12 of the NOPR TSD.

d. Market Model Challenges

The majority of the manufacturers interviewed emphasized that the profit structure of the commercial clothes washer market fundamentally opposes increased levels of product efficiency, and that an amended conservation standard would negatively impact the profits of manufacturers' customers, in addition to their own.

Commercial clothes washer manufacturers sell their products to either route-operators, distributors, or both. Route-operators lease the machines to multi-family housing unit owners under 5- to 15-year contract agreements, and typically provide a 1-2 day service guarantee on their machines. Distributors sell commercial clothes washers to owners of laundromats.

The profits of both route-operators and laundromat owners are driven by throughput, which is maximized by small capacity machines with short cycle times (less than 35 minutes). In addition to maximizing throughput, one manufacturer noted that consistency of cycle times (at approximately 32 minutes) is necessary for ensuring the correct number of washers and dryers in a given premise or laundromat.

Thus, commercial clothes washer manufacturers are constrained by capacity and cycle time limits in any efforts to further increase the efficiency of their machines. Also, due to the length of route-operators lease contracts with their customers, if energy efficiency improvements necessitate an increase in manufacturing selling price, any required replacement of units before lease contracts are expired will likely squeeze route-

operators' profits, as they will not be able to pass-through increased unit costs to lessees. One manufacturer noted that in instances where route-operators and laundromat owners are able to pass-through the costs of energy efficiency improvements, this will negatively impact end users who are often the least able to bear increased costs, as users of commercial laundry machines tend to be from lower income consumer subgroups.

Finally, several manufacturers asserted that higher efficiency machines require more complex designs and hence more time and money to repair. Additionally, efficiency changes, such as reduced water levels, are likely to be ill-received by end users and will lead to increases in service calls and failures. Both outcomes will again potentially cut into route-operator and laundromat owner profits.

As discussed in section IV.C and chapter 5 of the TSD, DOE has determined that the proposed standard levels would not require any major changes in the design complexity of CCWs. Wash basket size and cycle time under the proposed standards will remain within the acceptable ranges described by manufacturers. Section IV.F.5. describes DOE's approach for considering changes in repair and maintenance costs as a result of amended standards.

K. Emissions Analysis

In the emissions analysis, DOE estimated the reduction in power sector emissions of carbon dioxide (CO_2), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and mercury (Hg) from potential energy conservation standards for commercial clothes washers. In addition, DOE estimates emissions impacts in production activities (extracting,

processing, and transporting fuels) that provide the energy inputs to power plants. These are referred to as "upstream" emissions. Together, these emissions account for the full-fuel-cycle (FFC). In accordance with DOE's FFC Statement of Policy (76 FR 51282 (Aug. 18, 2011))[27], the FFC analysis includes impacts on emissions of methane (CH_4) and nitrous oxide (N_2O), both of which are recognized as greenhouse gases.

DOE primarily conducted the emissions analysis using emissions factors for CO_2 and most of the other gases derived from data in the Energy Information Agency's (EIA's) Annual Energy Outlook 2013 (AEO 2013). Combustion emissions of CH_4 and N_2O were estimated using emissions intensity factors published by the Environmental Protection Agency (EPA), GHG Emissions Factors Hub.[28] Site emissions of CO_2 and NO_X (from gas water heaters) were estimated using emissions intensity factors from an EPA publication.[29] DOE developed separate emissions factors for power sector emissions and upstream emissions. The method that DOE used to derive emissions factors is described in chapter 13 of the NOPR TSD.

For CH_4 and N_2O, DOE calculated emissions reduction in tons and also in terms of units of carbon dioxide equivalent (CO_2eq). Gases are converted to CO_2eq by multiplying the physical units by the gas' global warming potential (GWP) over a 100-

[27] DOE's FFC was amended in 2012 for reasons unrelated to the inclusion of CH_4 and N_2O. 77 FR 49701 (Aug. 17, 2012).
[28] http://www.epa.gov/climateleadership/guidance/ghg-emissions.html
[29] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. 1998. http://www.epa.gov/ttn/chief/ap42/index.html

year time horizon. Based on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,[30] DOE used GWP values of 25 for CH_4 and 298 for N_2O.

EIA prepares the Annual Energy Outlook using the National Energy Modeling System (NEMS). Each annual version of NEMS incorporates the projected impacts of existing air quality regulations on emissions. AEO 2013 generally represents current legislation and environmental regulations, including recent government actions, for which implementing regulations were available as of December 31, 2012.

SO_2 emissions from affected electric generating units (EGUs) are subject to nationwide and regional emissions cap-and-trade programs. Title IV of the Clean Air Act sets an annual emissions cap on SO_2 for affected EGUs in the 48 contiguous states and the District of Columbia (D.C.). SO_2 emissions from 28 eastern states and D.C. were also limited under the Clean Air Interstate Rule (CAIR; 70 FR 25162 (May 12, 2005)), which created an allowance-based trading program that operates along with the Title IV program. CAIR was remanded to the U.S. Environmental Protection Agency (EPA) by the U.S. Court of Appeals for the District of Columbia Circuit but it remained in effect. See North Carolina v. EPA, 550 F.3d 1176 (D.C. Cir. 2008); North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008). On July 6, 2011 EPA issued a replacement for CAIR, the Cross-State Air Pollution Rule (CSAPR). 76 FR 48208 (August 8, 2011). On August 21,

[30] Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn,G. Raga, M. Schulz and R. Van Dorland. 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller, Editors. 2007. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. p. 212.

2012, the D.C. Circuit issued a decision to vacate CSAPR. See EME Homer City Generation, LP v. EPA, No. 11-1302, 2012 WL 3570721 at *24 (D.C. Cir. Aug. 21, 2012). The court ordered EPA to continue administering CAIR. The AEO 2013 emissions factors used for today's NOPR assumes that CAIR remains a binding regulation through 2040.

The attainment of emissions caps is typically flexible among EGUs and is enforced through the use of emissions allowances and tradable permits. Under existing EPA regulations, any excess SO_2 emissions allowances resulting from the lower electricity demand caused by the adoption of an efficiency standard could be used to permit offsetting increases in SO_2 emissions by any regulated EGU. In past rulemakings, DOE recognized that there was uncertainty about the effects of efficiency standards on SO_2 emissions covered by the existing cap-and-trade system, but it concluded that negligible reductions in power sector SO_2 emissions would occur as a result of standards.

Beginning in 2015, however, SO_2 emissions will fall as a result of the Mercury and Air Toxics Standards (MATS) for power plants, which were announced by EPA on December 21, 2011. 77 FR 9304 (Feb. 16, 2012). In the final MATS rule, EPA established a standard for hydrogen chloride as a surrogate for acid gas hazardous air pollutants (HAP), and also established a standard for SO_2 (a non-HAP acid gas) as an alternative equivalent surrogate standard for acid gas HAP. The same controls are used to reduce HAP and non-HAP acid gas; thus, SO_2 emissions will be reduced as a result of the control technologies installed on coal-fired power plants to comply with the MATS

requirements for acid gas. AEO 2013 assumes that, in order to continue operating, coal plants must have either flue gas desulfurization or dry sorbent injection systems installed by 2015. Both technologies, which are used to reduce acid gas emissions, also reduce SO_2 emissions. Under the MATS, NEMS shows a reduction in SO_2 emissions when electricity demand decreases (e.g., as a result of energy efficiency standards). Emissions will be far below the cap established by CAIR, so it is unlikely that excess SO_2 emissions allowances resulting from the lower electricity demand would be needed or used to permit offsetting increases in SO_2 emissions by any regulated EGU. Therefore, DOE believes that efficiency standards will reduce SO_2 emissions in 2015 and beyond.

CAIR established a cap on NO_x emissions in 28 eastern states and the District of Columbia. Energy conservation standards are expected to have little effect on NO_x emissions in those states covered by CAIR because excess NO_x emissions allowances resulting from the lower electricity demand could be used to permit offsetting increases in NO_x emissions. However, standards would be expected to reduce NO_x emissions in the states not affected by the caps, so DOE estimated NO_x emissions reductions from the standards considered in today's NOPR for these states.

The MATS limit mercury emissions from power plants, but they do not include emissions caps and, as such, DOE's energy conservation standards would likely reduce Hg emissions. DOE estimated mercury emissions reduction using emissions factors based on AEO 2013, which incorporates the MATS.

L. Monetizing Carbon Dioxide and Other Emissions Impacts

As part of the development of this proposed rule, DOE considered the estimated monetary benefits from the reduced emissions of CO_2 and NO_X that are expected to result from each of the TSLs considered. To make this calculation similar to the calculation of the NPV of consumer benefit, DOE considered the reduced emissions expected to result over the lifetime of equipment shipped in the forecast period for each TSL. This section summarizes the basis for the monetary values used for each of these emissions and presents the values considered in this rulemaking.

For today's NOPR, DOE is relying on a set of values for the social cost of carbon (SCC) that was developed by an interagency process. A summary of the basis for these values is provided below, and a more detailed description of the methodologies used is provided as an appendix to chapter 14 of the NOPR TSD.

1. Social Cost of Carbon

The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services. Estimates of the SCC are provided in dollars per metric ton of carbon dioxide. A domestic SCC value is meant to reflect the value of damages in the United States resulting from a unit change in carbon dioxide emissions, while a global SCC value is meant to reflect the value of damages worldwide.

Under section 1(b)(6) of Executive Order 12866, "Regulatory Planning and Review," 58 FR 51735 (Oct. 4, 1993), agencies must, to the extent permitted by law, assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. The purpose of the SCC estimates presented here is to allow agencies to incorporate the monetized social benefits of reducing CO_2 emissions into cost-benefit analyses of regulatory actions that have small, or "marginal," impacts on cumulative global emissions. The estimates are presented with an acknowledgement of the many uncertainties involved and with a clear understanding that they should be updated over time to reflect increasing knowledge of the science and economics of climate impacts.

As part of the interagency process that developed the SCC estimates, technical experts from numerous agencies met on a regular basis to consider public comments, explore the technical literature in relevant fields, and discuss key model inputs and assumptions. The main objective of this process was to develop a range of SCC values using a defensible set of input assumptions grounded in the existing scientific and economic literatures. In this way, key uncertainties and model differences transparently and consistently inform the range of SCC estimates used in the rulemaking process.

a. Monetizing Carbon Dioxide Emissions

When attempting to assess the incremental economic impacts of carbon dioxide emissions, the analyst faces a number of serious challenges. A recent report from the National Research Council points out that any assessment will suffer from uncertainty, speculation, and lack of information about: (1) future emissions of greenhouse gases; (2) the effects of past and future emissions on the climate system; (3) the impact of changes in climate on the physical and biological environment; and (4) the translation of these environmental impacts into economic damages. As a result, any effort to quantify and monetize the harms associated with climate change will raise serious questions of science, economics, and ethics and should be viewed as provisional.

Despite the serious limits of both quantification and monetization, SCC estimates can be useful in estimating the social benefits of reducing carbon dioxide emissions. Most Federal regulatory actions can be expected to have marginal impacts on global emissions. For such policies, the agency can estimate the benefits from reduced emissions in any future year by multiplying the change in emissions in that year by the SCC value appropriate for that year. The net present value of the benefits can then be calculated by multiplying the future benefits by an appropriate discount factor and summing across all affected years. This approach assumes that the marginal damages from increased emissions are constant for small departures from the baseline emissions path, an approximation that is reasonable for policies that have effects on emissions that are small relative to cumulative global carbon dioxide emissions. For policies that have a large (non-marginal) impact on global cumulative emissions, there is a separate question of

whether the SCC is an appropriate tool for calculating the benefits of reduced emissions. This concern is not applicable to this rulemaking, however.

It is important to emphasize that the interagency process is committed to updating these estimates as the science and economic understanding of climate change and its impacts on society improves over time. In the meantime, the interagency group will continue to explore the issues raised by this analysis and consider public comments as part of the ongoing interagency process.

b. Social Cost of Carbon Values Used in Past Regulatory Analyses

Economic analyses for Federal regulations have used a wide range of values to estimate the benefits associated with reducing carbon dioxide emissions. In the final model year 2011 CAFE rule, the U.S. Department of Transportation (DOT) used both a "domestic" SCC value of $2 per metric ton of CO_2 and a "global" SCC value of $33 per metric ton of CO_2 for 2007 emission reductions (in 2007$), increasing both values at 2.4 percent per year. DOT also included a sensitivity analysis at $80 per metric ton of CO_2.[31] A 2008 regulation proposed by DOT assumed a domestic SCC value of $7 per metric ton of CO_2 (in 2006$) for 2011 emission reductions (with a range of $0–$14 for sensitivity analysis), also increasing at 2.4 percent per year.[32] A regulation for packaged terminal air

[31] See Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011, 74 FR 14196 (March 30, 2009) (Final Rule); Final Environmental Impact Statement Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011-2015 at 3-90 (Oct. 2008) (Available at: http://www.nhtsa.gov/fuel-economy) (Last accessed December 2012).

[32] See Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011-2015, 73 FR 24352 (May 2, 2008) (Proposed Rule); Draft Environmental Impact Statement Corporate Average Fuel

conditioners and packaged terminal heat pumps finalized by DOE in October of 2008 used a domestic SCC range of $0 to $20 per metric ton CO_2 for 2007 emission reductions (in 2007$). 73 FR 58772, 58814 (Oct. 7, 2008). In addition, EPA's 2008 Advance Notice of Proposed Rulemaking on Regulating Greenhouse Gas Emissions Under the Clean Air Act identified what it described as "very preliminary" SCC estimates subject to revision. 73 FR 44354 (July 30, 2008). EPA's global mean values were $68 and $40 per metric ton CO_2 for discount rates of approximately 2 percent and 3 percent, respectively (in 2006$ for 2007 emissions).

In 2009, an interagency process was initiated to offer a preliminary assessment of how best to quantify the benefits from reducing carbon dioxide emissions. To ensure consistency in how benefits are evaluated across agencies, the Administration sought to develop a transparent and defensible method, specifically designed for the rulemaking process, to quantify avoided climate change damages from reduced CO_2 emissions. The interagency group did not undertake any original analysis. Instead, it combined SCC estimates from the existing literature to use as interim values until a more comprehensive analysis could be conducted. The outcome of the preliminary assessment by the interagency group was a set of five interim values: global SCC estimates for 2007 (in 2006$) of $55, $33, $19, $10, and $5 per metric ton of CO_2. These interim values represented the first sustained interagency effort within the U.S. government to develop an SCC for use in regulatory analysis. The results of this preliminary effort were presented in several proposed and final rules.

Economy Standards, Passenger Cars and Light Trucks, Model Years 2011-2015 at 3-58 (June 2008) (Available at: http://www.nhtsa.gov/fuel-economy) (Last accessed December 2012).

c. Current Approach and Key Assumptions

Since the release of the interim values, the interagency group reconvened on a regular basis to generate improved SCC estimates. Specifically, the group considered public comments and further explored the technical literature in relevant fields. The interagency group relied on three integrated assessment models commonly used to estimate the SCC: the FUND, DICE, and PAGE models. These models are frequently cited in the peer-reviewed literature and were used in the last assessment of the Intergovernmental Panel on Climate Change. Each model was given equal weight in the SCC values that were developed.

Each model takes a slightly different approach to model how changes in emissions result in changes in economic damages. A key objective of the interagency process was to enable a consistent exploration of the three models while respecting the different approaches to quantifying damages taken by the key modelers in the field. An extensive review of the literature was conducted to select three sets of input parameters for these models: climate sensitivity, socio-economic and emissions trajectories, and discount rates. A probability distribution for climate sensitivity was specified as an input into all three models. In addition, the interagency group used a range of scenarios for the socio-economic parameters and a range of values for the discount rate. All other model features were left unchanged, relying on the model developers' best estimates and judgments.

In 2010, the interagency group selected four sets of SCC values for use in regulatory analyses.[33] Three sets of values are based on the average SCC from three integrated assessment models, at discount rates of 2.5 percent, 3 percent, and 5 percent. The fourth set, which represents the 95th-percentile SCC estimate across all three models at a 3-percent discount rate, is included to represent higher-than-expected impacts from climate change further out in the tails of the SCC distribution. The values grow in real terms over time. Additionally, the interagency group determined that a range of values from 7 percent to 23 percent should be used to adjust the global SCC to calculate domestic effects, although preference is given to consideration of the global benefits of reducing CO_2 emissions. Table IV.6 presents the values in the 2010 interagency group report, which is reproduced in appendix 14-A of the NOPR TSD.

[33] Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Interagency Working Group on Social Cost of Carbon, United States Government, February 2010. http://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf.

Table IV.6. Annual SCC Values from 2010 Interagency Report, 2010–2050 (in 2007 dollars per metric ton CO_2)

Year	Discount Rate %			
	5	3	2.5	3
	Average	Average	Average	95th Percentile
2010	4.7	21.4	35.1	64.9
2015	5.7	23.8	38.4	72.8
2020	6.8	26.3	41.7	80.7
2025	8.2	29.6	45.9	90.4
2030	9.7	32.8	50.0	100.0
2035	11.2	36.0	54.2	109.7
2040	12.7	39.2	58.4	119.3
2045	14.2	42.1	61.7	127.8
2050	15.7	44.9	65.0	136.2

The SCC values used for today's notice were generated using the most recent versions of the three integrated assessment models that have been published in the peer-reviewed literature.[34] Table IV.7 shows the updated sets of SCC estimates from the 2013 interagency update in five-year increments from 2010 to 2050. Appendix 14-B of the NOPR TSD provides the full set of values. The central value that emerges is the average SCC across models at 3-percent discount rate. However, for purposes of capturing the uncertainties involved in regulatory impact analysis, the interagency group emphasizes the importance of including all four sets of SCC values.

[34] Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Interagency Working Group on Social Cost of Carbon, United States Government. May 2013; revised November 2013. http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf

Table IV.7. Annual SCC Values from 2013 Interagency Update, 2010–2050 (in 2007 dollars per metric ton CO_2)

Year	Discount Rate %			
	5	3	2.5	3
	Average	Average	Average	95th Percentile
2010	11	32	51	89
2015	11	37	57	109
2020	12	43	64	128
2025	14	47	69	143
2030	16	52	75	159
2035	19	56	80	175
2040	21	61	86	191
2045	24	66	92	206
2050	26	71	97	220

NRDC and ASAP indicated that DOE's current approach to monetizing carbon underestimates the benefits. (NRDC and ASAP, No. 11 at p.5) The range of SCC estimates used by DOE has been closely reviewed by the interagency group and was updated in 2013. The range includes a set of values that represents the 95th-percentile SCC estimate across all three models at a 3-percent discount rate, which was included to represent higher-than-expected impacts from climate change further out in the tails of the SCC distribution. DOE acknowledges that the estimates will continue to evolve over time as the science and economic understanding of climate change and its impact on society improves.

It is important to recognize that a number of key uncertainties remain, and that current SCC estimates should be treated as provisional and revisable since they will evolve with improved scientific and economic understanding. The interagency group also

recognizes that the existing models are imperfect and incomplete. The National Research Council report mentioned above points out that there is tension between the goal of producing quantified estimates of the economic damages from an incremental ton of carbon and the limits of existing efforts to model these effects. There are a number of concerns and problems that should be addressed by the research community, including research programs housed in many of the Federal agencies participating in the interagency process to estimate the SCC. The interagency group intends to periodically review and reconsider those estimates to reflect increasing knowledge of the science and economics of climate impacts, as well as improvements in modeling.

In summary, in considering the potential global benefits resulting from reduced CO_2 emissions resulting from today's rule, DOE used the values from the 2013 interagency report, adjusted to 2012$ using the Gross Domestic Product price deflator. For each of the four SCC cases specified, the values used for emissions in 2015 were $11.8, $39.7, $61.2, and $117 per metric ton avoided (values expressed in 2012$). DOE derived values after 2050 using the relevant growth rates for the 2040-2050 period in the interagency update.

DOE multiplied the CO_2 emissions reduction estimated for each year by the SCC value for that year in each of the four cases. To calculate a present value of the stream of monetary values, DOE discounted the values in each of the four cases using the specific discount rate that had been used to obtain the SCC values in each case.

2. Valuation of Other Emissions Reductions

As noted above, DOE has taken into account how new or amended energy conservation standards would reduce NOx emissions in those 22 states not affected by the CAIR. DOE estimated the monetized value of NOx emissions reductions resulting from each of the TSLs considered for today's NOPR based on estimates found in the relevant scientific literature. Estimates of monetary value for reducing NOx from stationary sources range from $468 to $4,809 per ton in 2012$.[35] DOE calculated monetary benefits using a medium value for NO_X emissions of $2,639 per short ton (in 2012$), and real discount rates of 3-percent and 7-percent.

DOE is evaluating appropriate monetization of avoided SO_2 and Hg emissions in energy conservation standards rulemakings. It has not included monetization in the current analysis.

M. Utility Impact Analysis

The utility impact analysis estimates several effects on the power generation industry that would result from the adoption of new or amended energy conservation standards. In the utility impact analysis, DOE analyzes the changes in installed electricity capacity and generation that would result for each trial standard level. The utility impact

[35] U.S. Office of Management and Budget, Office of Information and Regulatory Affairs, 2006 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities, Washington, DC.

analysis uses a variant of NEMS,[36] which is a public domain, multi-sectored, partial equilibrium model of the U.S. energy sector. DOE uses a variant of this model, referred to as NEMS-BT,[37] to account for selected utility impacts of new or amended energy conservation standards. DOE's analysis consists of a comparison between model results for the most recent AEO Reference Case and for cases in which energy use is decremented to reflect the impact of potential standards. The energy savings inputs associated with each TSL come from the NIA. Chapter 15 of the NOPR TSD describes the utility impact analysis in further detail.

N. Employment Impact Analysis

Employment impacts from new or amended energy conservation standards include direct and indirect impacts. Direct employment impacts are any changes in the number of employees of manufacturers of the equipment subject to standards; the MIA addresses those impacts. Indirect employment impacts are changes in national employment that occur due to the shift in expenditures and capital investment caused by the purchase and operation of more efficient equipment. Indirect employment impacts from standards consist of the jobs created or eliminated in the national economy, other than in the manufacturing sector being regulated, due to: (1) reduced spending by end users on energy; (2) reduced spending on new energy supply by the utility industry; (3)

[36] For more information on NEMS, refer to the U.S. Department of Energy, Energy Information Administration documentation. A useful summary is *National Energy Modeling System: An Overview 2003*, DOE/EIA-0581(2003) (March, 2003).

[37] 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 this analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on DOE/EIA assumptions, DOE refers to it by the name "NEMS-BT" ("BT" is DOE's Building Technologies Program, under whose aegis this work has been performed).

increased consumer spending on the purchase of new equipment; and (4) the effects of those three factors throughout the economy.

One method for assessing the possible effects on the demand for labor of such shifts in economic activity is to compare sector employment statistics developed by the Labor Department's Bureau of Labor Statistics (BLS). BLS regularly publishes its estimates of the number of jobs per million dollars of economic activity in different sectors of the economy, as well as the jobs created elsewhere in the economy by this same economic activity. Data from BLS indicate that expenditures in the utility sector generally create fewer jobs (both directly and indirectly) than expenditures in other sectors of the economy. There are many reasons for these differences, including wage differences and the fact that the utility sector is more capital-intensive and less labor-intensive than other sectors. Energy conservation standards have the effect of reducing consumer utility bills. Because reduced consumer expenditures for energy likely lead to increased expenditures in other sectors of the economy, the general effect of efficiency standards is to shift economic activity from a less labor-intensive sector (i.e., the utility sector) to more labor-intensive sectors (e.g., the retail and service sectors). Thus, based on the BLS data alone, DOE believes net national employment may increase because of shifts in economic activity resulting from amended standards.

For the standard levels considered in the NOPR, DOE estimated indirect national employment impacts using an input/output model of the U.S. economy called Impact of Sector Energy Technologies, Version 3.1.1 (ImSET). ImSET is a special-purpose version

of the "U.S. Benchmark National Input-Output" (I–O) model, which was designed to estimate the national employment and income effects of energy-saving technologies. The ImSET software includes a computer-based I–O model having structural coefficients that characterize economic flows among the 187 sectors. ImSET's national economic I–O structure is based on a 2002 U.S. benchmark table, specially aggregated to the 187 sectors most relevant to industrial, commercial, and residential building energy use. DOE notes that ImSET is not a general equilibrium forecasting model, and understands the uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis. Because ImSET does not incorporate price changes, the employment effects predicted by ImSET may over-estimate actual job impacts over the long run. For the NOPR, DOE used ImSET only to estimate short-term employment impacts.

For more details on the employment impact analysis, see chapter 16 of the NOPR TSD.

V. Analytical Results

A. Trial Standard Levels

At the NOPR stage, DOE develops Trial Standard Levels (TSLs) for consideration. TSLs are formed by grouping different efficiency levels, which are potential standard levels for each equipment class. Table V.1 presents the TSLs analyzed and the corresponding efficiency level for each CCW equipment class. TSL 3 is comprised of the max-tech efficiency levels. TSL 2 is comprised of efficiency level 2 for

front-loading CCWs and efficiency level 1 for top-loading CCWs. TSL 1 is comprised of efficiency level 1 for each equipment class.

Table V.1. Summary of TSLs for Front-loading and Top-loading Commercial Clothes Washers

Equipment Class	TSL 1	TSL 2	TSL 3
	Efficiency Level*		
Front Loading CCW Units	1	2	3
Top Loading CCW Units	1	1	2

* For the MEF_{J2} and IWF that correspond to efficiency levels 1 through 3, see Table IV.3.

B. Economic Justification and Energy Savings

As discussed in section II.A, EPCA provides seven factors to be evaluated in determining whether a more stringent standard for front-loading and top-loading commercial clothes washers is economically justified. (42 U.S.C. 6313(a)(6)(B)(ii)) The following sections discuss how DOE addresses each of those factors in this rulemaking.

1. Economic Impacts on Individual Customers

DOE analyzed the economic impacts on front-loading and top-loading commercial clothes washers customers by looking at the effects potential standards would have on the LCC and PBP. DOE also examined the impacts of potential standards on customer subgroups. These analyses are discussed below.

a. Life-Cycle Cost and Payback Period

To evaluate the net economic impact of standards on front-loading and top-loading CCW customers, DOE conducted LCC and PBP analyses for each TSL. Section

IV.F of this notice discusses the inputs DOE used for calculating the LCC and PBP.

For each representative unit, the key outputs of the LCC analysis are a mean LCC savings and a median PBP relative to the base case, as well as the fraction of customers for which the LCC will decrease (net benefit), increase (net cost), or exhibit no change (no impact) relative to the base case. No impacts occur when the base-case efficiency equals or exceeds the efficiency at a given TSL. Table V.2 through Table V.5 show the key results for each representative unit.

Table V.2. Summary Life-Cycle Cost and Payback Period Results for Front-loading, Multi-Family Application Commercial Clothes Washer Units

Trial Standard Level	**1**	**2**	**3**
Efficiency Level	1	2	3
MEF_{J2}/IWF	1.80/4.50	2.00/4.10	2.20/3.90
Total Installed Cost ($)	1853.19	1853.69	1884.93
Mean LCC Savings ($)	229	285	8
Customers with LCC Increase (Cost) (%)*	0	0	46
Customers with LCC Decrease (Benefit) (%)*	27	61	53
Customers with No Change in LCC (%)*	73	39	0
Median PBP (Years)	0.0	0.0	3.8

* Rounding may cause some items to not total 100 percent.

Table V.3. Summary Life-Cycle Cost and Payback Period Results for Front-loading, Laundromat Application Commercial Clothes Washer Units

Trial Standard Level	1	2	3
Efficiency Level	1	2	3
MEF_{J2}/IWF	1.80/4.50	2.00/4.10	2.20/3.90
Total Installed Cost ($)	1853.19	1853.69	1884.93
Mean LCC Savings ($)[†]	198	235	(19)
Customers with LCC Increase (Cost) (%)*	0	0	72
Customers with LCC Decrease (Benefit) (%)*	27	61	28
Customers with No Change in LCC (%)*	73	39	0
Median PBP (Years)	0.0	0.0	8.0

* Rounding may cause some items to not total 100 percent.
[†] Values in parentheses are negative values.

Table V.4. Summary Life-Cycle Cost and Payback Period Results for Top-loading, Multi-Family Application Commercial Clothes Washer Units

Trial Standard Level	1	2	3
Efficiency Level	1	1	2
MEF_{J2}/IWF	1.35/8.80	1.35/8.80	1.55/6.90
Total Installed Cost ($)	1251.06	1251.06	1313.40
Mean LCC Savings ($)	259	259	813
Customers with LCC Increase (Cost) (%)*	0	0	0
Customers with LCC Decrease (Benefit) (%)*	99	99	100
Customers with No Change in LCC (%)*	1	1	0
Median PBP (Years)	0.0	0.0	0.6

* Rounding may cause some items to not total 100 percent.

Table V.5. Summary Life-Cycle Cost and Payback Period Results for Top-loading, Laundromat Application Commercial Clothes Washer Units

Trial Standard Level	1	2	3
Efficiency Level	1	1	2
MEF_{J2}/IWF	1.35/8.80	1.35/8.80	1.55/6.90
Total Installed Cost ($)	1251.06	1251.06	1313.40
Mean LCC Savings ($)	145	145	654
Customers with LCC Increase (Cost) (%)*	0	0	0
Customers with LCC Decrease (Benefit) (%)*	99	99	100
Customers with No Change in LCC (%)*	1	1	0
Median PBP (Years)	0.0	0.0	0.6

* Rounding may cause some items to not total 100 percent.

b. Customer Subgroup Analysis

In the customer subgroup analysis, DOE estimated the impacts of the considered TSLs on small business customers. The LCC savings and payback periods for small business customers are similar to the impacts for all customers. Chapter 11 of the NOPR TSD presents detailed results of the customer subgroup analysis.

c. Rebuttable Presumption Payback

As discussed in section III.E.2, EPCA establishes a rebuttable presumption that an energy conservation standard is economically justified if the increased purchase cost for equipment that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. DOE calculated a rebuttable-presumption PBP for each TSL.

DOE based the calculations on average usage profiles. As a result, DOE calculated a single rebuttable-presumption payback value, and not a distribution of PBPs, for each TSL. Table V.6 and Table V.7 show the rebuttable-presumption PBPs for the considered TSLs. In addition to the rebuttable presumption analysis, however, DOE routinely conducts an economic analysis that considers the full range of impacts to the customer, manufacturer, nation, and environment, as required by EPCA. The results of that analysis serve as the basis for DOE to evaluate the economic justification for a potential standard level (thereby supporting or rebutting the results of any three-year PBP analysis). Section V.C addresses how DOE considered the range of impacts to select today's proposed standards.

Table V.6. Rebuttable-Presumption Payback Periods (years) for Front-loading and Top-loading Commercial Clothes Washer Units: Multi-Family Application

Trial Standard Level	1	2	3
Efficiency Level	FL: EL1 TL:EL1	FL: EL2 TL:EL1	FL: EL3 TL:EL2
Front Loading CCW Units	0.00	0.04	8.77
Top Loading CCW Units	0.0	0.0	2.3

Table V.7. Rebuttable-Presumption Payback Periods (years) for Front-loading and Top-loading Commercial Clothes Washer Units: Laundromat Application

Trial Standard Level	1	2	3
Efficiency Level	FL: EL1 TL:EL1	FL: EL2 TL:EL1	FL: EL3 TL:EL2
Front Loading CCW Units	0.00	0.05	11.19
Top Loading CCW Units	0.00	0.00	2.73

2. Economic Impacts on Manufacturers

DOE performed an MIA to estimate the impact of new energy conservation standards on commercial clothes washer manufacturers. The following section describes the expected impacts on manufacturers at each TSL. Chapter 12 of the NOPR TSD explains the analysis in further detail.

a. Industry Cash-Flow Analysis Results

The following tables depict the financial impacts (represented by changes in INPV) of amended energy conservation standards on manufacturers of commercial clothes washers as well as the conversion costs that DOE estimates manufacturers would incur for each equipment class at each TSL. To evaluate the range of cash flow impacts on the commercial clothes washer manufacturing industry, DOE used two different markup assumptions to model scenarios that correspond to the range of anticipated market responses to amended energy conservation standards.

To assess the lower (less severe) end of the range of potential impacts, DOE modeled a preservation of gross margin percentage markup scenario, in which a uniform "gross margin percentage" markup is applied across all efficiency levels. In this scenario, DOE assumed that a manufacturer's absolute dollar markup would increase as production costs increase in the amended energy conservation standards case. Manufacturers have indicated that it is optimistic to assume that they would be able to maintain the same gross margin percentage markup as their production costs increase in response to a new or amended energy conservation standard, particularly at higher TSLs.

To assess the higher (more severe) end of the range of potential impacts, DOE modeled the preservation of operating profit (in absolute dollars) markup scenario, which assumes that manufacturers would not be able to preserve the same overall gross margin, but instead cut their markup for marginally compliant products to maintain a cost competitive product offering and keep the same overall level of operating profit as in the base case. The two tables below show the range of potential INPV impacts for manufacturers of commercial clothes washers. The first table reflects the lower bound of impacts (higher profitability) and the second represents the upper bound of impacts (lower profitability).

Each scenario results in a unique set of cash flows and corresponding industry values at each TSL. In the following discussion, the INPV results refer to the sum of discounted cash flows through 2047, the difference in INPV between the base case and each standards case, and the total industry conversion costs required for each standards case.

Table V.8. Manufacturer Impact Analysis under the Preservation of Gross Margin Percentage Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	2012$ Millions	$124.2	118.3	118.2	33.0
Change in INPV	2012$ Millions	-	(5.9)	(6.0)	(91.2)
	(%)	-	(4.7)	(4.9)	(73.4)
Product Conversion Costs	2012$ Millions	-	9.9	10.2	62.4
Capital Conversion Costs	2012$ Millions	-	-	-	63.1
Total Conversion Costs	2012$ Millions	-	9.9	10.2	126.6

* Values in parentheses are negative values.

Table V.9. Manufacturer Impact Analysis under the Preservation of Operating Profit in Absolute Dollars Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	2012$ Millions	$124.2	118.3	118.2	28.8
Change in INPV	2012$ Millions	-	(5.9)	(6.0)	(95.4)
	(%)	-	(4.7)	(4.9)	(76.8)
Product Conversion Costs	2012$ Millions	-	9.9	10.2	62.4
Capital Conversion Costs	2012$ Millions	-	-	-	63.1
Total Conversion Costs	2012$ Millions	-	9.9	10.2	126.6

* Values in parentheses are negative values.

Beyond impacts on INPV, DOE includes a comparison of free cash flow between the base case and the standards case at each TSL in the year before amended standards take effect to provide perspective on the short-run cash flow impacts in the discussion of the results below.

At TSL 1, DOE estimates the impact on INPV for manufacturers of commercial clothes washers to be $5.9 million, or a change in INPV of -4.7 percent under either

markup scenario. At this TSL, industry free cash flow is estimated to decrease by approximately 30.2 percent to $6.3 million, compared to the base-case value of $9.1 million in the year before the compliance date (2017).

TSL 1 represents an improvement in MEF_{J2} (as determined using appendix J2) from the baseline level of 1.65 to 1.80 (ft^3/kWh/cycle) for front-loading equipment and an improvement in MEF_{J2} from the baseline level of 1.15 to 1.35 (ft^3/kWh/cycle) for top-loading equipment. The identical results for the two markup scenarios at TSL 1 occur because for both equipment classes, the baseline MPCs and the MPCs at TSL 1 are the same. For front-loading equipment, this is because the 1.8 MEF_{J2} (as determined using appendix J2) products (on which the EL 1 standard is based) are the lowest efficiency front-loading equipment available on the market. As such, TSL 1 would have no impact on the front-loading market. Similarly, the design options associated with EL 1 for top-loading equipment relate to control changes and different cycle options, rather than material changes to the equipment itself. While there are product conversion costs associated with the research and development needed to make these changes, there are no changes in the per unit production costs. Given these conditions, the impacts on INPV at TSL 1 can be attributed solely to the $9.9 million in product conversion costs for top-loading equipment.

At TSL 2, DOE estimates the impact on INPV for manufacturers of commercial clothes washers to be $6.0 million, or a change in INPV of -4.9 percent under either markup scenario. At this TSL, industry free cash flow is estimated to decrease by

approximately 31.2 percent to $6.2 million, compared to the base-case value of $9.1 million in the year before the compliance date (2017).

TSL 2 represents an improvement in MEF_{J2} from the baseline level of 1.65 to 2.00 (ft^3/kWh/cycle) for front-loading equipment and an improvement in MEF_{J2} from the baseline level of 1.15 to 1.35 (ft^3/kWh/cycle) for top-loading equipment. Much like TSL 1, the identical results for the two markup scenarios at TSL 2 occur because the baseline MPCs and the MPCs at TSL 2 are very close for front-loading equipment, and the same for top-loading equipment. For front-loading equipment, this is because the 2.0 MEF_{J2} EL (as determined using appendix J2) requires only minor changes to baseline equipment needed to enable slightly faster spin speeds. The standard level for top-loading equipment at TSL 2 is the same at TSL 1, and again relates to control changes and different cycle options, rather than material changes to the equipment. Because there are no substantive changes to MPCs for either equipment class, much as in TSL 1, nearly all of the impacts on INPV at TSL 2 can be attributed to the $10.2 million in product conversion costs.

At TSL 3, DOE estimates impacts on INPV for manufacturers of commercial clothes washers to range from -$91.2 million to -$95.4 million, or a change in INPV of -73.4 percent to -76.8 percent. At this TSL, industry free cash flow is estimated to decrease by over 500 percent to -$36.8 million, compared to the base-case value of $9.1 million in the year before the compliance date (2017).

TSL 3 represents an improvement in MEF_{J2} from the baseline level of 1.65 to 2.20 (ft^3/kWh/cycle) for equipment class 1 and an improvement in MEF_{J2} from the baseline level of 1.15 to 1.55 (ft^3/kWh/cycle) for equipment class 2. Unlike TSL 1 and TSL 2, the efficiency levels specified at TSL 3 would require substantial redesigns of products in both equipment classes. The design options proposed at these efficiency levels include switching to direct-drive motors, hung suspension, non-traditional agitation, and increasing the tub capacity – all of which require major platform overhauls and significant changes to manufacturing capital. These design options do not contribute to substantially different MPCs, but the conversion costs associated with product development and testing, as well as the investments in manufacturing capital including retooling of tubs and agitators significantly impact the INPV.

b. Impacts on Direct Employment

DOE used the GRIM to estimate the domestic labor expenditures and number of domestic production workers in the base case and at each TSL from 2013 to 2047. DOE used statistical data from the most recent U.S Census Bureau's "Annual Survey of Manufactures," the results of the engineering analysis, and interviews with manufacturers to determine the inputs necessary to calculate industry-wide labor expenditures and domestic employment levels. Labor expenditures for the manufacture of a product are a function of the labor intensity of the product, the sales volume, and an assumption that wages in real terms remain constant.

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

The estimates of production workers in this section cover only those up to and including the line-supervisor level directly involved in fabricating and assembling a product within the original equipment manufacturer (OEM) facility. In addition, workers that perform services closely associated with production operations are included. Employees above the working-supervisor level are excluded from the count of production workers. Thus, the labor associated with non-production functions (e.g., factory supervision, advertisement, sales) is explicitly not covered.[38] In addition, DOE's estimates account for production workers that manufacture only the specific products covered by this rulemaking. For example, a worker on a clothes dryer production line would not be included in the estimate of the number of commercial clothes washer production workers. Finally, this analysis also does not factor in the dependence by some manufacturers on production volume to make their operations viable. For example, should a major line of business cease or move, a production facility may no longer have

[38] The 2010 ASM provides the following definition: "The 'production workers' number includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item."

the manufacturing scale to obtain volume discounts on its purchases nor be able to justify maintaining major capital equipment. Thus, the impact on a manufacturing facility due to a line closure may affect more employees than just the production workers, but as stated previously, this analysis focuses on the production workers impacted directly. The aforementioned scenarios, however, are considered relative to employment impacts specific to the LVM at the end of this section.

In the GRIM, DOE used the labor content of each product and the manufacturing production costs from the engineering analysis to estimate the annual labor expenditures in the commercial clothes washer manufacturing industry. DOE used information gained through interviews with manufacturers to estimate the portion of the total labor expenditures that is attributable to domestic labor.

The employment impacts shown in Table V.10 represent the potential production employment that could result following amended energy conservation standards. These are independent of the employment impacts from the broader U.S. economy, which are documented in chapter 16 of the NOPR TSD.

DOE estimates that in the absence of amended energy conservation standards, there would be 334 domestic production workers involved in manufacturing commercial clothes washers in 2018.. Table V.10 shows the range of the impacts of potential amended energy conservation standards on U.S. production workers in the commercial

clothes washer manufacturing industry. The upper end of the results in this table estimates the total potential increase in the number of production workers after amended energy conservation standards. To calculate the total potential increase, DOE assumed that manufacturers continue to produce the same scope of covered products in domestic production facilities and domestic production is not shifted to lower-labor-cost countries. Because there is a risk of manufacturers evaluating sourcing decisions in response to amended energy conservation standards, the lower end of the range of employment results in Table V.10 includes the estimated total number of U.S. production workers in the industry who could lose their jobs if all existing production were moved outside of the United States.

Table V.10. Change in Total Number of Domestic Production Employees in 2018 in the CCW Industry

	Base Case	**TSL 1**	**TSL 2**	**TSL 3**
Total Number of Domestic Production Workers in 2018	334	334	334	364
Potential Changes in Domestic Production Workers in 2018*	-	0 - (334)	0 - (334)	30 - (364)

Because production employment expenditures are assumed to be a fixed percentage of Cost of Goods Sold (COGS) and the MPCs typically increase with more efficient products, labor tracks the increased prices in the GRIM. As efficiency of washers increases, so does the complexity of the machines, generally requiring more labor to produce. As previously discussed, for TSL 1, there is no change in MPCs from the base case, and, for TSL 2, there is a small increase in MPCs for front-loaders that would be offset by a shift in shipments from front-loaders to top-loaders. As a result,

DOE expects that there would be no employment impacts among domestic commercial clothes washer manufacturers for TSL 1 and TSL 2. For TSL 3, the GRIM predicts an increase in domestic employment following amended standards based on the increase in complexity and relative price of the equipment.

Using the U.S. Census Bureau's 2010 Annual Survey of Manufactures[39] and interviews with manufacturers, DOE estimates that approximately 83 percent of commercial clothes washers are currently produced domestically. In the commercial clothes washer industry, 100 percent of top-loaders are manufactured domestically, while a much larger share of front-loaders are produced abroad. As illustrated in Table V.10, the actual impacts on domestic employment after standards would be different than estimated if any U.S. manufacturer decided to shift remaining U.S. production to lower-cost countries. The proposed standard could result in losing all 334 production workers if all U.S. manufacturers source standards-compliant washers or shift U.S. production abroad. However, feedback from manufacturers during NOPR interviews supports the notion that top-loading commercial clothes washers will continue to be produced domestically following amended energy conservation standards, unless the max-tech level is chosen.

c. Impacts on Manufacturing Capacity

According to the majority of commercial clothes washer manufacturers, new energy conservation standards could potentially impact manufacturers' production

[39] The 2010 Annual Survey of Manufacturers is available at: http://www.census.gov/mcd/asmhome.html.

capacity depending on the efficiency level required. For TSL 1 and TSL 2, the most significant conversion costs are the research and development, testing, and certification of products with more-efficient components, which does not affect production line capacity. Available information indicates that manufacturers will be able to maintain manufacturing capacity levels and continue to meet market demand under new energy conservation standards as long as manufacturers continue to offer top-loading and front-loading washers.

However, a very high efficiency standard for top-loading clothes washers could cause certain manufacturers to abandon further domestic production of top-loading clothes washers after the effective date, and choose instead to relocate manufacturing abroad or to source from a foreign manufacturer, which could lead to a permanently lower production capacity within the commercial clothes washer industry.

d. Impacts on Subgroups of Manufacturers

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

As outlined earlier, one LVM of commercial clothes washers would be disproportionately affected by any energy efficiency regulation in the commercial clothes washer industry. This business is focused on one specific market segment and is at least ten times smaller than its diversified competitors. Due to this combination of market concentration and size, this LVM is at risk of material harm to its business, depending on the TSL chosen.

The commercial clothes washer LVM indicated that it could not manufacture top-loading or front-loading washers at the proposed max-tech level (MEF_{J2} of 1.55 and 2.20, respectively, as determined using appendix J2) with its existing manufacturing capital and platform constraints. If DOE were to set the standard at the max-tech level, the LVM believes that a "green field" design for front-loaders would likely be required. For top-loaders, the LVM asserts that it does not have the technology to reach the max-tech level, and it would be forced to develop an entirely new business model, possibly ceasing commercial clothes washer production altogether, sourcing from abroad, shifting production abroad, or some combination thereof, which could cause employment impacts in the commercial clothes washer industry. If the LVM no longer offers top-loading washers, it would likely cease commercial clothes washer production altogether, resulting in significant impacts to the industry. Currently, the LVM's top-loading washers account for more than half of the company's commercial clothes washer revenues and three-quarters of its commercial clothes washer shipments. To shift all top-loading commercial clothes washers to front-loading washers at current production volumes would require substantial investments that the company may not be able to justify. In addition, the

LVM derives an estimated 88 percent of its clothes washer revenue from commercial clothes washers, so its sales in the residential clothes washer market would be too low to justify continuing any top-loading clothes washer manufacturing. Further detail and separate analysis of impacts on the LVM are found in chapter 12 of the NOPR TSD.

e. Cumulative Regulatory Burden

One aspect of assessing manufacturer burden is the cumulative impact of multiple DOE standards and the regulatory actions of other Federal agencies and states that affect the manufacturers of a covered product or equipment. While any one regulation may not impose a significant burden on manufacturers, the combined effects of several existing or impending regulations may have serious consequences for some manufacturers, groups of manufacturers, or an entire industry.

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

In addition to DOE's energy conservation regulations for commercial clothes washers, several other existing regulations apply to these products and other equipment produced by the same manufacturers. The most significant of these additional

regulations include several additional existing or proposed Federal and State energy conservation and environmental standards, consumer product safety standards, the Green Chemistry law in California, and standards impacting commercial clothes washer suppliers such as the Conflict Minerals directive contained within the Dodd-Frank Act of 2010.

Most manufacturers interviewed also sell products to other countries with energy conservation and standby standards. Manufacturers may incur a substantial cost to the extent that there are overlapping testing and certification requirements in other markets besides the United States. Because DOE has authority to set standards on products sold in the United States, DOE accounts only for domestic compliance costs in its analysis of cumulative regulatory burdens impacting commercial clothes washer manufacturers. For more details, see chapter 12 of the NOPR TSD.

3. National Impact Analysis

Projections of shipments are an important part of the NIA. As discussed in section IV.G, The market shares of the equipment classes are somewhat sensitive to the installed cost of new equipment. DOE applied a cross-price elasticity to estimate how the market would shift between front-loading and top-loading units in response to a change in price of the unit.

Table V.11presents the estimated cumulative shipments in 2018–2047 in the base case and under each TSL. Because DOE found CCW units to be relatively price inelastic, DOE estimated that the potential standards would not affect total shipments.

Table V.11. Projected Cumulative Shipments of Front- and Top-loading Commercial Clothes Washer Units in 2018–2047 (million units)

	Base Case	TSL1	TSL2	TSL3 Max Tech
		FL: EL1 TL:EL1	FL: EL2 TL:EL1	FL: EL3 TL:EL2
Front Loading	2.813	2.813	2.812	2.900
Top Loading	3.465	3.465	3.466	3.379
TOTAL	6.278	6.278	6.278	6.278

a. Significance of Energy Savings

For each TSL, DOE projected energy savings for front-loading and top-loading commercial clothes washer unit purchased in the 30-year period that begins in the year of anticipated compliance with amended standards (2018–2047). The savings are measured over the entire lifetime of equipment purchased in the 30-year period. DOE quantified the energy savings attributable to each TSL as the difference in energy consumption between each standards case and the base case. Table V.12 presents the estimated primary energy savings for each considered TSL, and Table V.13 presents the estimated FFC energy savings for each TSL. The approach for estimating national energy savings is further described in section IV.H.

Table V.12. Cumulative Primary Energy Savings for Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels for Units Sold in 2018 –2047

Equipment Class	Trial Standard Level		
	1	2	3
	quads		
Front Loading CCW Units	0.007	0.023	0.005
Top Loading CCW Units	0.086	0.085	0.163
Total All Classes	0.092	0.109	0.168

Table V.13. Cumulative Full-Fuel-Cycle Energy Savings for Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels for Units Sold in 2018 –2047

Equipment Class	Trial Standard Level		
	1	2	3
	quads		
Front Loading CCW Units	0.007	0.025	0.005
Top Loading CCW Units	0.090	0.090	0.170
Total All Classes	0.097	0.114	0.175

For this rulemaking, DOE undertook a sensitivity analysis using nine instead of 30 years of equipment shipments. The choice of a nine-year period is a proxy for the timeline in EPCA for the review of certain energy conservation standards and potential revision of and compliance with such revised standards.[40] This timeframe may not be statistically relevant with regard to the equipment lifetime, equipment manufacturing

[40] EPCA requires DOE to review its standards at least once every 6 years, and requires, for certain products, a 3-year period after any new standard is promulgated before compliance is required, except that in no case may any new standards be required within 6 years of the compliance date of the previous standards. While adding a 6-year review to the 3-year compliance period adds up to 9 years, DOE notes that it may undertake reviews at any time within the 6 year period and that the 3-year compliance date may yield to the 6-year backstop. A 9-year analysis period may not be appropriate given the variability that occurs in the timing of standards reviews and the fact that for some consumer products, the compliance period is 5 years rather than 3 years.

cycles or other factors specific to front-loading and top-loading commercial clothes washer equipment. Thus, this information is presented for informational purposes only and is not indicative of any change in DOE's analytical methodology. The NES results based on a 9-year analytical period are presented in Table V.14. The impacts are counted over the lifetime of commercial clothes washers purchased in 2018–2026.

Table V.14. Cumulative Primary Energy Savings for Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels for Units Sold in 2018–2026

Equipment Class	Trial Standard Level		
	1	2	3
	quads		
Front Loading CCW Units	0.002	0.006	0.001
Top Loading CCW Units	0.024	0.024	0.046
Total All Classes	0.026	0.030	0.047

b. Net Present Value of Customer Costs and Benefits

DOE estimated the cumulative NPV of the total costs and savings for customers that would result from the TSLs considered for CCWs. In accordance with OMB's guidelines on regulatory analysis,[41] DOE calculated the NPV using both a 7-percent and a 3-percent real discount rate. The 7-percent rate is an estimate of the average before-tax rate of return on private capital in the U.S. economy, and reflects the returns on real estate and small business capital as well as corporate capital. This discount rate approximates the opportunity cost of capital in the private sector. The 3-percent rate

[41] OMB Circular A-4, section E (Sept. 17, 2003). Available at: http://www.whitehouse.gov/omb/circulars_a004_a-4.

reflects the potential effects of standards on private consumption (e.g., through higher prices for equipment and reduced purchases of energy). This rate represents the rate at which society discounts future consumption flows to their present value. It can be approximated by the real rate of return on long-term government debt (i.e., yield on United States Treasury notes), which has averaged about 3 percent for the past 30 years.

Table V.15 shows the customer NPV results for each TSL considered for CCWs. In each case, the impacts cover the lifetime of equipment purchased in 2018–2047.

Table V.15. Net Present Value of Customer Benefits for Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels for Units Sold in 2018 –2047

Equipment Class	Discount Rate %	Trial Standard Level		
		1	2	3
		billion 2012$		
Front Loading CCW Units	3%	0.120	0.344	-0.132
Top Loading CCW Units		0.596	0.594	2.131
Total All Classes		0.716	0.938	1.999
Front Loading CCW Units	7%	0.051	0.145	-0.060
Top Loading CCW Units		0.261	0.260	0.910
Total All Classes		0.311	0.405	0.850

The NPV results based on the nine-year analytical period discussed in section V.B.3.a are presented in Table V.16. The impacts are counted over the lifetime of equipment purchased in 2018–2026. As mentioned previously, this information is

presented for informational purposes only and is not indicative of any change in DOE's analytical methodology or decision criteria.

Table V.16. Net Present Value of Customer Benefits for Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels for Units Sold in 2018–2026[†]

Equipment Class	Discount Rate %	Trial Standard Level		
		1	2	3
		billion 2012$		
Front Loading CCW Units	3%	0.04	0.11	(0.04)
Top Loading CCW Units		0.21	0.21	0.71
Total All Classes		0.24	0.31	0.67
Front Loading CCW Units	7%	0.02	0.06	(0.03)
Top Loading CCW Units		0.13	0.12	0.42
Total All Classes		0.15	0.19	0.40

[†] Values in parentheses are negative values.

c. Indirect Impacts on Employment

DOE expects energy conservation standards for front-loading and top-loading commercial clothes washers to reduce energy costs for equipment owners, and the resulting net savings to be redirected to other forms of economic activity. Those shifts in spending and economic activity could affect the demand for labor. As described in section IV.N, DOE used an input/output model of the U.S. economy to estimate indirect employment impacts of the TSLs that DOE considered in this rulemaking. DOE understands that there are uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis. Therefore, DOE generated results for near-term time frames, where these uncertainties are reduced.

The results suggest that the proposed standards are likely to have negligible impact on the net demand for labor in the economy. The net change in jobs is so small that it would be imperceptible in national labor statistics and might be offset by other, unanticipated effects on employment. Chapter 16 of the NOPR TSD presents detailed results.

4. Impact on Utility

As discussed in section IV.C, DOE has determined that the standards it is proposing today will not lessen the utility of front-loading and top-loading commercial clothes washers.

5. Impact of Any Lessening of Competition

DOE considers any lessening of competition likely to result from amended standards. The Attorney General determines the impact, if any, of any lessening of competition likely to result from a proposed standard, and transmits such determination to the Secretary, together with an analysis of the nature and extent of such impact.

To assist the Attorney General in making such determination, DOE will provide DOJ with copies of this NOPR and the TSD for review. DOE will consider DOJ's comments on the proposed rule in preparing the final rule, and DOE will publish and respond to DOJ's comments in that document.

6. Need of the Nation to Conserve Energy

Enhanced energy efficiency, where economically justified, improves the nation's energy security, strengthens the economy, and reduces the environmental impacts or costs of energy production. Reduced electricity demand due to energy conservation standards is also likely to reduce the cost of maintaining the reliability of the electricity system, particularly during peak-load periods. As a measure of this reduced demand, chapter 15 in the NOPR TSD presents the estimated reduction in generating capacity for the TSLs that DOE considered in this rulemaking.

Energy savings from standards for front-loading and top-loading commercial clothes washers could also produce environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases. Table V.17 provides DOE's estimate of cumulative emissions reductions projected to result from the TSLs considered in this rulemaking. DOE reports annual emissions reductions for each TSL in chapter 13 of the NOPR TSD.

Table V.17. Cumulative Emissions Reduction Estimated for Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels

	Trial Standard Level		
	1	2	3
Power Sector and Site Emissions*			
CO_2 (million metric tons)	4.5	5.4	8.2
SO_2 (thousand tons)	4.0	4.3	8.6
NO_X (thousand tons)	1.2	1.7	1.2
Hg (tons)	0.00	0.01	0.01
N_2O (thousand tons)	0.07	0.07	0.14
CH_4 (thousand tons)	0.40	0.44	0.83
Upstream Emissions			
CO_2 (million metric tons)	0.4	0.5	0.7
SO_2 (thousand tons)	0.04	0.04	0.08
NO_X (thousand tons)	6.0	7.4	10.0
Hg (tons)	0.00	0.00	0.00
N_2O (thousand tons)	0.002	0.002	0.004
CH_4 (thousand tons)	40.4	49.7	65.3
Total Emissions			
CO_2 (million metric tons)	5.0	5.9	8.8
SO_2 (thousand tons)	4.0	4.4	8.7
NO_X (thousand tons)	7.3	9.1	11.1
Hg (tons)	0.00	0.01	0.01
N_2O (thousand tons)	0.07	0.08	0.15
N_2O (thousand tons CO_2eq)**	20.4	22.6	43.2
CH_4 (thousand tons)	40.8	50.1	66.2
CH_4 (thousand tons CO_2eq)**	1019.1	1253.4	1654.1

* Includes site emissions from gas water heaters.

** CO_2eq is the quantity of CO_2 that would have the same global warming potential (GWP).

As part of the analysis for this rule, DOE estimated monetary benefits likely to result from the reduced emissions of CO_2 and NO_X that DOE estimated for each of the TSLs considered. As discussed in section IV.L, DOE used the most recent values for the

SCC developed by an interagency process. The four sets of SCC values resulting from that process (expressed in 2012$) are represented by $11.8/metric ton (the average value from a distribution that uses a 5-percent discount rate), $39.7/metric ton (the average value from a distribution that uses a 3-percent discount rate), $61.2/metric ton (the average value from a distribution that uses a 2.5-percent discount rate), and $117/metric ton (the 95th-percentile value from a distribution that uses a 3-percent discount rate). These values correspond to the value of emission reductions in 2015; the values for later years are higher due to increasing damages as the projected magnitude of climate change increases.

Table V.18 presents the global value of CO_2 emissions reductions at each TSL. For each of the four cases, DOE calculated a present value of the stream of annual values using the same discount rate as was used in the studies upon which the dollar-per-ton values are based. DOE calculated domestic values as a range from 7 percent to 23 percent of the global values, and these results are presented in chapter 14 of the NOPR TSD.

Table V.18. Estimates of Present Value of CO_2 Emissions Reduction under Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels

TSL	SCC Case*			
	5% discount rate, average*	3% discount rate, average*	2.5% discount rate, average*	3% discount rate, 95th percentile*
	Million 2012$			
Power Sector and Site Emissions				
1	30.06	139.38	221.96	430.59
2	35.45	164.70	262.39	508.93
3	54.38	251.50	400.32	776.76
Upstream Emissions				
1	2.652	12.450	19.876	38.514
2	3.219	15.136	24.170	46.828
3	4.434	20.818	33.234	64.399
Total Emissions				
1	32.71	151.83	241.83	469.10
2	38.67	179.84	286.56	555.76
3	58.81	272.31	433.55	841.16

* For each of the four cases, the corresponding global SCC value for emissions in 2015 is $11.8, $39.7, $61.2, and $117 per metric ton (2012$).

DOE is well aware that scientific and economic knowledge about the contribution of CO_2 and other greenhouse gas (GHG) emissions to changes in the future global climate and the potential resulting damages to the world economy continues to evolve rapidly. Thus, any value placed on reducing CO_2 emissions in this rulemaking is subject to change. DOE, together with other Federal agencies, will continue to review various methodologies for estimating the monetary value of reductions in CO_2 and other GHG emissions. This ongoing review will consider the comments on this subject that are part of the public record for this and other rulemakings, as well as other methodological assumptions and issues. However, consistent with DOE's legal obligations, and taking

into account the uncertainty involved with this particular issue, DOE has included in this proposed rule the most recent values and analyses resulting from the interagency process.

DOE also estimated the cumulative monetary value of the economic benefits associated with NO_X emissions reductions anticipated to result from amended standards for Front-loading and Top-loading CCWs. The dollar-per-ton values that DOE used are discussed in section IV.L. Table V.19 presents the cumulative present values for each TSL calculated using seven-percent and three-percent discount rates.

Table V.19. Estimates of Present Value of NO_X Emissions Reduction under Front-loading and Top-loading Commercial Clothes Washers Trial Standard Levels

TSL	3% discount rate	7% discount rate
	Million 2012$	
Power Sector and Site Emissions		
1	1.18	0.26
2	1.77	0.50
3	0.63	-0.30
Upstream Emissions		
1	7.93	3.60
2	9.66	4.36
3	13.07	5.93
Total Emissions		
1	9.10	3.85
2	11.43	4.86
3	13.71	5.63

7. Summary of National Economic Impacts

The NPV of the monetized benefits associated with emissions reductions can be viewed as a complement to the NPV of the customer savings calculated for each TSL

considered in this rulemaking. Table V.20 presents the NPV values that result from adding the estimates of the potential economic benefits resulting from reduced CO_2 and NO_X emissions in each of four valuation scenarios to the NPV of customer savings calculated for each TSL considered in this rulemaking, at both a seven-percent and three-percent discount rate. The CO_2 values used in the columns of each table correspond to the four sets of SCC values discussed above.

Table V.20. Net Present Value of Customer Savings Combined with Present Value of Monetized Benefits from CO_2 and NO_X Emissions Reductions

TSL	Customer NPV at 3% Discount Rate added with:			
	SCC Case $11.8/metric ton CO_2*	**SCC Case $39.7/metric ton CO_2***	**SCC Case $61.2/metric ton CO_2***	**SCC Case $117/metric ton CO_2***
	Billion 2012$			
1	0.8	0.9	1.0	1.2
2	1.0	1.1	1.2	1.5
3	2.1	2.3	2.4	2.9
TSL	**Customer NPV at 7% Discount Rate added with:**			
	SCC Case $11.8/metric ton CO_2*	**SCC Case $39.7/metric ton CO_2***	**SCC Case $61.2/metric ton CO_2***	**SCC Case $117/metric ton CO_2***
	Billion 2012$			
1	0.3	0.5	0.6	0.8
2	0.4	0.6	0.7	1.0
3	0.9	1.1	1.3	1.7

* These label values represent the global SCC in 2015, in 2012$. For NO_X emissions, each case uses the medium value, which corresponds to $2,639 per ton.

Although adding the value of customer savings to the values of emission reductions provides a valuable perspective, two issues should be considered. First, the national operating cost savings are domestic U.S. customer monetary savings that occur as a result of market transactions, while the value of CO_2 reductions is based on a global

value. Second, the assessments of operating cost savings and the SCC are performed with different methods that use different time frames for analysis. The national operating cost savings is measured for the lifetime of equipment shipped in 2018–2047. The SCC values, on the other hand, reflect the present value of future climate-related impacts resulting from the emission of one metric ton of CO_2 in each year. These impacts continue well beyond 2100.

8. Other Factors

The Secretary of Energy, in determining whether a standard is economically justified, may consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6313(a)(6)(B)(ii)(VII)) No other factors were considered in this analysis.

C. Proposed Standards

When considering proposed standards, the new or amended energy conservation standard that DOE adopts for any type (or class) of covered equipment shall be designed to achieve the maximum improvement in energy efficiency that the Secretary of Energy determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and 6316(a)) In determining whether a standard is economically justified, the Secretary must determine whether the benefits of the standard exceed its burdens to the greatest extent practicable, considering the seven statutory factors discussed previously. (42 U.S.C. 6295(o)(2)(B)(i) and 6316(a)) The new or amended standard must also "result in significant conservation of energy." (42 U.S.C. 6295(o)(3)(B) and 6316(a))

For today's NOPR, DOE considered the impacts of standards at each TSL, beginning with the maximum technologically feasible level, to determine whether that level was economically justified. Where the max-tech level was not justified, DOE then considered the next most efficient level and undertook the same evaluation until it reached the highest efficiency level that is technologically feasible, economically justified and saves a significant amount of energy.

To aid the reader in understanding the benefits and/or burdens of each TSL, tables in this section summarize the quantitative analytical results for each TSL, based on the assumptions and methodology discussed herein. The efficiency levels contained in each TSL are described in section V.A. In addition to the quantitative results presented in the tables, DOE also considers other burdens and benefits that affect economic justification. These include the impacts on identifiable subgroups of customers who may be disproportionately affected by a national standard (see section V.B.1.b), and impacts on employment. DOE discusses the impacts on employment in front-loading and top-loading commercial clothes washer equipment manufacturing in section V.B.2, and discusses the indirect employment impacts in section V.B.3.c.

1. Benefits and Burdens of Trial Standard Levels Considered for Front-loading and Top-loading Commercial Clothes Washers

Table V.21 and Table V.22 summarize the quantitative impacts estimated for each TSL for front-loading and top-loading commercial clothes washers.

Table V.21. Summary of Analytical Results for Front-loading and Top-loading Commercial Clothes Washers: National Impacts

Category	TSL 1	TSL 2	TSL 3
National FFC Energy Savings quads			
	0.097	0.114	0.175
NPV of Customer Benefits 2012$ billion			
3% discount rate	0.72	0.94	2.00
7% discount rate	0.31	0.40	0.85
Cumulative Emissions Reduction (Total FFC Emissions)			
CO_2 million metric tons	4.94	5.87	8.84
NO_X thousand tons	7.26	9.10	11.14
Hg tons	0.00	0.01	0.01
N_2O thousand tons	0.07	0.08	0.15
N_2O thousand tons CO_2eq*	20.37	22.57	43.25
CH_4 thousand tons	40.77	50.14	66.16
CH_4 thousand tons CO_2eq*	1,019	1,253	1,654
SO_2 thousand tons	3.99	4.36	8.69
Value of Emissions Reduction (Total FFC Emissions)			
CO_2 2012$ million**	32.7 to 469.1	38.7 to 555.8	58.8 to 841.2
NO_X – 3% discount rate 2012$ million	9.1	11.43	13.71
NO_X – 7% discount rate 2012$ million	3.85	4.86	5.63

* CO_2eq is the quantity of CO_2 that would have the same global warming potential (GWP).

** Range of the economic value of CO_2 reductions is based on estimates of the global benefit of reduced CO_2 emissions.

Table V.22. Summary of Analytical Results for Front-loading and Top-loading Commercial Clothes Washers: Manufacturer and Consumer Impacts

Category	TSL 1	TSL 2	TSL 3
Manufacturer Impacts			
Change in Industry NPV (2012$ million)†	(5.9)	(6.0)	(91.2) to (95.4)
Change in Industry NPV (%)†	(4.7)	(4.90)	(73.4) to (76.8)
Customer Mean LCC Savings 2012$			
Front-Loading, Multi-family	229	285	8
Front-Loading, Laundromat†	198	235	(19)

Category	TSL 1	TSL 2	TSL 3
Top-Loading, Multi-family	259	259	813
Top-Loading, Laundromat	145	145	654
Weighted Average*	235	257	464
Customer Median PBP years			
Front-Loading, Multi-family	0.0	0.0	3.8
Front-Loading, Laundromat	0.0	0.0	8.0
Top-Loading, Multi-family	0.0	0.0	0.6
Top-Loading, Laundromat	0.0	0.0	0.6
Weighted Average*	0.0	0.0	2.2
Front-Loading, Multi-Family			
Customers with Net Cost %	0	0	46
Customers with Net Benefit %	27	61	53
Customers with No Impact %	73	39	0
Front-Loading, Laundromat			
Customers with Net Cost %	0	0	72
Customers with Net Benefit %	27	61	28
Customers with No Impact %	73	39	0
Top-Loading, Multi-Family			
Customers with Net Cost %	0	0	0
Customers with Net Benefit %	99	99	100
Customers with No Impact %	1	1	0
Top-Loading, Laundromat			
Customers with Net Cost %	0	0	0
Customers with Net Benefit %	99	99	100
Customers with No Impact %	1	1	0

* Weighted by shares of each equipment class in total projected shipments in 2018.
† Values in parentheses are negative values.

First, DOE considered TSL 3, the most efficient level (max tech), which would save an estimated total of 0.17 quads of energy, an amount DOE considers significant. TSL 3 has an estimated NPV of customer benefit of $0.85 billion using a 7 percent discount rate, and $1.99 billion using a 3 percent discount rate.

The cumulative emissions reductions at TSL 3 are 8.8 million metric tons of CO_2, 11.1 thousand tons of NO_X, 8.7 thousand tons of SO_2, and 0.01 tons of Hg. The estimated monetary value of the CO_2 emissions reductions at TSL 3 ranges from $59 million to $841 million.

At TSL 3, the average LCC savings is $8 and -$19 for multi-family and laundromat applications for front-loading CCW units, and $813 and $654 for multi-family and laundromat applications for top-loading CCW units. The median PBP is 4 and 8 years for multi-family and laundromat applications for front-loading CCW units, and 0.6 years for both applications for top-loading CCW units. The share of customers experiencing a net LCC benefit is 53 percent and 28 percent for multi-family and laundromat applications for front-loading CCW units, and 99.8 percent for both applications for top-loading CCW units.

At TSL 3, the projected change in INPV ranges from a decrease of $91.2 million to a decrease of $95.4 million, equivalent to 73.4 percent and 76.8 percent, respectively. Products that meet the efficiency standards specified by this TSL are forecast to represent only 12 percent of shipments in the year leading up to amended standards. As such, manufacturers would have to redesign nearly all products by the 2018 compliance date to meet demand. Redesigning all units to meet the current max-tech efficiency levels would require considerable capital and equipment conversion expenditures. At TSL 3, the capital conversion costs total $63.1 million, 13.1 times the industry annual capital expenditure in the year leading up to amended standards. DOE estimates that complete

platform redesigns would cost the industry $62.4 million in equipment conversion costs. These conversion costs largely relate to the research programs required to develop new products that meet the efficiency standards set forth by TSL 3. These costs are equivalent to 14.3 times the industry annual budget for research and development. Total capital and equipment conversion costs associated with the changes in products and manufacturing facilities required at TSL 3 would require significant use of manufacturers' financial reserves (manufacturer capital pools), impacting other areas of business that compete for these resources, and significantly reducing INPV. In addition, manufacturers could face a substantial impact on profitability at TSL 3. Because manufacturers are more likely to reduce their margins to maintain a price-competitive product at higher TSLs, DOE expects that TSL 3 would yield impacts closer to the high end of the range of INPV impacts. If the high end of the range of impacts is reached, as DOE expects, TSL 3 could result in a net loss of 76.8 percent in INPV to commercial clothes washer manufacturers. As a result, at TSL 3, DOE expects that some companies would be forced to exit the commercial clothes washer market or shift production abroad, both which would negatively impact domestic manufacturing capacity and employment.

In view of the foregoing, DOE concludes that, at TSL 3 for front-loading and top-loading CCW equipment, the benefits of energy savings, positive NPV of total customer benefits, customer LCC savings for three of the four applications, emission reductions and the estimated monetary value of the emissions reductions would be outweighed by the negative customer impacts for front-loadings CCWs in laundromats, the large reduction in industry value at TSL 3, as well as the potential for loss of domestic

manufacturing. Consequently, DOE has concluded that TSL 3 is not economically justified.

Next, DOE considered TSL 2, which would save an estimated total of 0.11 quads of energy, an amount DOE considers significant. TSL 2 has an estimated NPV of customer benefit of $0.40 billion using a 7 percent discount rate, and $0.94 billion using a 3 percent discount rate.

The cumulative emissions reductions at TSL 2 are 5.9 million metric tons of CO_2, 9.1 thousand tons of NO_X, 4.4 thousand tons of SO_2, and 0.01 tons of Hg. The estimated monetary value of the CO_2 emissions reductions at TSL 2 ranges from $39 million to $556 million.

At TSL 2, the average LCC savings is $285 and $235 for front-loading CCW units for multi-family application, and laundromat application, respectively. For top-loading CCW units, the average LCC savings are $259 and $145 for multi-family and laundromat applications. The median PBP is 0.02 and 0.01 years for multi-family and laundromat applications for front-loading CCW units, zero years for top-loading CCW units. The share of customers experiencing a net LCC benefit is 61 percent for front-loading CCW units, and 99 percent for top-loading CCW units.

At TSL 2, the projected change in INPV is a decrease of $6.0 million, or a decrease of 4.9 percent. Although products that meet the efficiency standards specified by

this TSL are forecast to represent only 15 percent of shipments in the year leading up to amended standards, DOE's testing and reverse-engineering analyses indicate that manufacturers can achieve TSL 2 at little or no additional capital cost compared to models at the current baseline levels. Through its analyses, DOE observed that manufacturers generally employ control strategies to achieve the TSL 2 efficiency levels (e.g., changes in water levels, water temperatures, and cycle settings available to the end user). Accordingly, this level corresponds more to incremental equipment conversions rather than platform redesigns. Thus, DOE estimates that compliance with TSL 2 would not require any up front capital investments, while the industry budget for capital expenditure in the year leading up to amended standards is $4.8 million. TSL 2 will require an estimated $10.2 million in equipment conversion costs primarily relating to the research and development programs needed to improve upon existing platforms to meet the specified efficiency levels. This represents 2.3 times the industry budget for research and development in the year leading up to amended standards. The substantial reduction in conversion costs corresponding to compliance with TSL 2 greatly mitigates the operational risk and impact on INPV.

After considering the analysis and weighing the benefits and the burdens, DOE has tentatively concluded that at TSL 2 for front-loading and top-loading commercial clothes washer equipment, the benefits of energy savings, positive NPV of customer benefit, positive impacts on consumers (as indicated by positive average LCC savings, favorable PBPs, and the large percentage of customers who would experience LCC benefits), emission reductions, and the estimated monetary value of the emissions

reductions would outweigh the potential reductions in INPV for manufacturers. The Secretary of Energy has concluded that TSL 2 would save a significant amount of energy and is technologically feasible and economically justified.

Based on the above considerations, DOE today proposes to adopt the energy conservation standards for front-loading and top-loading commercial clothes washers at TSL 2.

Table V.23 presents the proposed energy conservation standards for commercial clothes washer equipment.

Table V.23. Proposed Energy Conservation Standards for Commercial Clothes Washers

Product Class	Minimum MEF_{J2}*	Maximum IWF†
Top-Loading	1.35	8.8
Front-Loading	2.00	4.1

*MEF_{J2} (appendix J2 modified energy factor) is calculated as the clothes container capacity in cubic feet divided by the sum, expressed in kilowatt-hours (kWh), of: (1) the total weighted per-cycle hot water energy consumption; (2) the total weighted per-cycle machine electrical energy consumption; and (3) the per-cycle energy consumption for removing moisture from a test load.
†IWF (integrated water factor) is calculated as the sum, expressed in gallons per cycle, of the total weighted per-cycle water consumption for all wash cycles divided by the clothes container capacity in cubic feet.

2. Summary of Benefits and Costs (Annualized) of the Proposed Standards

The benefits and costs of today's proposed standards, for equipment sold in 2018-2047, can also be expressed in terms of annualized values. The annualized monetary values are the sum of (1) the annualized national economic value of the benefits from consumer operation of equipment that meet the proposed standards (consisting primarily

of operating cost savings from using less energy, minus increases in equipment purchase and installation costs, which is another way of representing consumer NPV), and (2) the annualized monetary value of the benefits of emission reductions, including CO_2 emission reductions.[42]

Although combining the values of operating savings and CO_2 emission reductions provides a useful perspective, two issues should be considered. First, the national operating savings are domestic U.S. customer monetary savings that occur as a result of market transactions while the value of CO_2 reductions is based on a global value. Second, the assessments of operating cost savings and CO_2 savings are performed with different methods that use different time frames for analysis. The national operating cost savings is measured for the lifetime of front-loading and top-loading commercial clothes washers shipped in 2018 –2047. The SCC values, on the other hand, reflect the present value of some future climate-related impacts resulting from the emission of one ton of carbon dioxide in each year. These impacts continue well beyond 2100.

Estimates of annualized benefits and costs of the proposed standards for front-loading and top-loading commercial clothes washers are shown in Table V.24. The results under the primary estimate are as follows. Using a 7-percent discount rate for

[42] DOE used a two-step calculation process to convert the time-series of costs and benefits into annualized values. First, DOE calculated a present value in 2013, the year used for discounting the NPV of total customer costs and savings, for the time-series of costs and benefits using discount rates of three and seven percent for all costs and benefits except for the value of CO_2 reductions. For the latter, DOE used a range of discount rates. From the present value, DOE then calculated the fixed annual payment over a 30-year period (2019 through 2048) that yields the same present value. The fixed annual payment is the annualized value. Although DOE calculated annualized values, this does not imply that the time-series of cost and benefits from which the annualized values were determined is a steady stream of payments.

benefits and costs other than CO_2 reduction, for which DOE used a 3-percent discount rate along with the average SCC series that uses a 3-percent discount rate, the cost of the standards proposed in today's rule is $0.02 million per year in increased equipment costs; while the estimated benefits are $31 million per year in reduced equipment operating costs, $9 million in CO_2 reductions, and $0.37 million in reduced NO_X emissions. In this case, the net benefit would amount to $40 million per year. Using a 3-percent discount rate for all benefits and costs and the average SCC series, the estimated cost of the standards proposed in today's rule is $0.02 million per year in increased equipment costs; while the estimated benefits are $46 million per year in reduced operating costs, $9 million in CO_2 reductions, and $0.57 million in reduced NO_X emissions. In this case, the net benefit would amount to approximately $56 million per year.

Table V.24. Annualized Benefits and Costs of Proposed Standards for Front-loading and Top-loading Commercial Clothes Washers (TSL 2)

	Discount Rate	Primary Estimate*	Low Net Benefits Estimate*	High Net Benefits Estimate*
		million 2012$/year		
Benefits				
Operating Cost Savings	7%	31	27	38
	3%	46	40	60
CO_2 Reduction Monetized Value ($11.8/t case)*	5%	2	2	3
CO_2 Reduction Monetized Value ($39.7/t case)*	3%	9	8	11
CO_2 Reduction Monetized Value ($61.2/t case)*	2.5%	13	12	17
CO_2 Reduction Monetized Value ($117/t case)*	3%	28	25	34
NO_X Reduction Monetized Value (at $2,639/ton)**	7%	0.37	0.33	0.45
	3%	0.57	0.51	0.70
Total Benefits†	7% plus CO_2 range	33 to 58	29 to 52	42 to 73
	7%	40	35	50
	3% plus CO_2 range	49 to 75	43 to 66	64 to 95
	3%	56	49	72
Costs				
Incremental Product Costs	7%	0.02	0.02	0.02
	3%	0.02	0.03	0.02
Net Benefits				
Total†	7% plus CO_2 range	33 to 58	29 to 52	42 to 73
	7%	40	35	50
	3% plus CO_2 range	49 to 75	43 to 66	64 to 95
	3%	56	49	72

* This table presents the annualized costs and benefits associated with front-loading and top-loading CCW units shipped in 2018−2047. These results include benefits to customers which accrue after 2047 from the products purchased in 2018−2047. The results account for the incremental variable and fixed costs incurred by manufacturers due to the standard, some of which may be incurred in preparation for the rule. The Primary, Low Benefits, and High Benefits Estimates utilize projections of energy prices from the AEO2013 Reference case, Low Economic Growth case, and High Economic Growth case, respectively. In addition, incremental product costs reflect no change for projected product price trends in the Primary Estimate, an increasing trend for projected product prices in the Low Benefits Estimate, and a decreasing trend for projected product prices in the High Benefits Estimate. The methods used to derive projected price trends are explained in section IV.F.

** The interagency group selected four sets of SCC values for use in regulatory analyses. Three sets of values are based on the average SCC from the three integrated assessment models, at discount rates of 2.5, 3, and 5 percent. The fourth set, which represents the 95th percentile SCC estimate across all three models at a 3-percent discount rate, is included to represent higher-than-expected impacts from temperature change further out in the tails of the SCC distribution. The values in parentheses represent the SCC in 2015. The SCC time series incorporate an escalation factor. The value for NO_X is the average of the low and high values used in DOE's analysis.

† Total Benefits for both the 3-percent and 7-percent cases are derived using the series corresponding to average SCC with 3-percent discount rate. In the rows labeled "7% plus CO_2 range" and "3% plus CO_2 range," the operating cost and NO_X benefits are calculated using the labeled discount rate, and those values are added to the full range of CO_2 values.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866 and 13563

Section 1(b)(1) of Executive Order 12866, "Regulatory Planning and Review," 58 FR 51735 (Oct. 4, 1993), requires each agency to identify the problem that it intends to address, including, where applicable, the failures of private markets or public institutions that warrant new agency action, as well as to assess the significance of that problem. The problems that today's standards address are as follows:

(1) There is a lack of consumer information and/or information processing capability about energy efficiency opportunities in the commercial appliance market.

(2) There is asymmetric information (one party to a transaction has more and better information than the other) and/or high transactions costs (costs of gathering information and effecting exchanges of goods and services).

(3) There are external benefits resulting from improved energy efficiency of commercial clothes washers that are not captured by the users of such equipment. These benefits include externalities related to environmental protection and energy security that are not reflected in energy prices, such as reduced emissions of greenhouse gases.

In addition, DOE has determined that today's regulatory action is a "significant regulatory action" under Executive Order 12866. DOE presented for review to the Office of Information and Regulatory Affairs (OIRA) in the OMB the draft rule and other documents prepared for this rulemaking, including a regulatory impact analysis (RIA), and has included these documents in the rulemaking record. The assessments prepared pursuant to Executive Order 12866 can be found in the technical support document for this rulemaking.

DOE has also reviewed this regulation pursuant to Executive Order 13563, issued on January 18, 2011 (76 FR 3281, Jan. 21, 2011). EO 13563 is supplemental to and explicitly reaffirms the principles, structures, and definitions governing regulatory review established in Executive Order 12866. To the extent permitted by law, agencies are required by Executive Order 13563 to: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits

and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

DOE emphasizes as well that Executive Order 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, DOE believes that today's NOPR is consistent with these principles, including the requirement that, to the extent permitted by law, benefits justify costs and that net benefits are maximized.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act ("RFA", 5 U.S.C. 601 et seq.) requires preparation of an initial regulatory flexibility analysis (IRFA) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking," 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website (http://energy.gov/gc/office-general-counsel).

DOE reviewed today's NOPR pursuant to the RFA and the policies and procedures discussed above. DOE certifies that the standards established in today's NOPR, published elsewhere in today's Federal Register, will not have a significant impact on a substantial number of small entities. The factual basis for this certification is set forth below. DOE will consider any comments on the certification or economic impacts of the rule in determining whether to proceed with the NOPR.

For manufacturers of commercial clothes washers, the Small Business Administration (SBA) has set a size threshold, which defines those entities classified as ''small businesses'' for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the

requirements of the rule. 65 FR 30836, 30848 (May 15, 2000), as amended at 65 FR 53533, 53544 (Sept. 5, 2000) and codified at 13 CFR part 121.The size standards are listed by North American Industry Classification System (NAICS) code and industry description and are available at: *www.sba.gov/sites/default/files/Size_Standards_Table.pdf* . Commercial clothes washer manufacturing is classified under NAICS 333318, ‘‘Other commercial and service industry machinery manufacturing.’’ The SBA sets a threshold of 1,000 employees or less for an entity to be considered as a small business for this category.

To estimate the number of small businesses which could be impacted by the amended energy conservation standards, DOE conducted a market survey using available public information to identify potential small manufacturers. DOE’s research included the AHAM membership directory, product databases (CEE, CEC, and ENERGY STAR databases) and individual company Web sites to find potential small business manufacturers. DOE also asked interested parties and industry representatives if they were aware of any other small business manufacturers during manufacturer interviews and at previous DOE public meetings. DOE reviewed all publicly available data and contacted various companies, as necessary, to determine whether they met the SBA’s definition of a small business manufacturer of covered commercial clothes washers. DOE screened out companies that did not offer products covered by this rulemaking, did not meet the definition of a ‘‘small business,’’ or are foreign owned and operated.

All top-loading commercial clothes washers and approximately 40 percent of front-loading commercial clothes washers are currently manufactured in the United States, accounting for 78 percent of overall domestic commercial clothes washer shipments. Three U.S.-based companies are responsible for this 78 percent domestic production and over 95 percent of commercial clothes washer industry market share. Although one of these manufacturers has been identified and analyzed separately as a LVM, none of these manufacturers meet the definition of a small business manufacturer, as they all have more than 1,000 employees. The small portion of the remaining commercial clothes washer market (approximately 5,800 shipments) is supplied by a combination of 3 international companies, all of which have small market shares. These companies are all foreign owned and operated, and exceed the SBA's employment threshold for consideration as a small business under the appropriate NAICS code. Therefore, DOE did not identify any small business manufacturers of commercial clothes washers.

Based on the discussion above, DOE certifies that the standards for commercial clothes washers set forth in today's rule would not have a significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared a regulatory flexibility analysis for this rulemaking. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act

Manufacturers of commercial clothes washers must certify to DOE that their products comply with any applicable energy conservation standards. In certifying compliance, manufacturers must test their products according to the DOE test procedures for commercial clothes washers, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including commercial clothes washers. 76 FR 12422 (March 7, 2011). The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 20 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

Pursuant to the National Environmental Policy Act (NEPA) of 1969, DOE has determined that the proposed rule fits within the category of actions included in Categorical Exclusion (CX) B5.1 and otherwise meets the requirements for application of a CX. See 10 CFR Part 1021, App. B, B5.1(b); 1021.410(b) and Appendix B, B(1)-(5). The proposed rule fits within the category of actions because it is a rulemaking that establishes energy conservation standards for consumer products or industrial equipment, and for which none of the exceptions identified in CX B5.1(b) apply. Therefore, DOE has made a CX determination for this rulemaking, and DOE does not need to prepare an Environmental Assessment or Environmental Impact Statement for this proposed rule. DOE's CX determination for this proposed rule is available at http://cxnepa.energy.gov/.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism." 64 FR 43255 (Aug. 10, 1999) imposes certain requirements on Federal agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the states and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by state and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735.

EPCA governs and prescribes Federal preemption of state regulations as to energy conservation for the products that are the subject of today's proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, "Civil Justice Reform," imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. 61 FR 4729 (Feb. 7, 1996). Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that,

to the extent permitted by law, this proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on state, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by state, local, and tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of state, local, and tribal governments on a proposed "significant intergovernmental mandate," and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820. DOE's policy statement is also available at http://energy.gov/gc/office-general-counsel.

DOE examined today's proposed rule according to UMRA and its statement of policy. Today's proposed rule does not contain a Federal intergovernmental mandate,

and DOE expects it will not require expenditures of $100 million or more by the private sector. Such expenditures may include: (1) investment in research and development and in capital expenditures by commercial clothes washer manufacturers in the years between the final rule and the compliance date for the new standards, and (2) incremental additional expenditures by consumers to purchase higher-efficiency commercial clothes washers, starting at the compliance date for the applicable standard. Therefore, the analytical requirements of UMRA do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, "Governmental Actions and Interference with Constitutionally Protected Property Rights" 53 FR 8859 (Mar. 18, 1988), that this regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under the Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516, note) provides for Federal agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed today's NOPR under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use" 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OIRA at OMB, a Statement of Energy Effects for any proposed significant energy action. A "significant energy action" is defined as any action by an agency that promulgates or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy, or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

DOE has tentatively concluded that today's regulatory action, which sets forth energy conservation standards for commercial clothes washers, is not a significant energy action because the proposed standards are not likely to have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as such by the Administrator at OIRA. Accordingly, DOE has not prepared a Statement of Energy Effects on the proposed rule.

L. Review Under the Information Quality Bulletin for Peer Review

On December 16, 2004, OMB, in consultation with the Office of Science and Technology Policy (OSTP), issued its Final Information Quality Bulletin for Peer Review (the Bulletin). 70 FR 2664 (Jan. 14, 2005). The Bulletin establishes that certain scientific information shall be peer reviewed by qualified specialists before it is disseminated by the Federal Government, including influential scientific information related to agency regulatory actions. The purpose of the bulletin is to enhance the quality and credibility of the Government's scientific information. Under the Bulletin, the energy conservation standards rulemaking analyses are "influential scientific information," which the Bulletin defines as scientific information the agency reasonably can determine will have, or does have, a clear and substantial impact on important public policies or private sector decisions. 70 FR 2667.

In response to OMB's Bulletin, DOE conducted formal in-progress peer reviews of the energy conservation standards development process and analyses and has prepared a Peer Review Report pertaining to the energy conservation standards rulemaking

analyses. Generation of this report involved a rigorous, formal, and documented evaluation using objective criteria and qualified and independent reviewers to make a judgment as to the technical/scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of programs and/or projects. The "Energy Conservation Standards Rulemaking Peer Review Report" dated February 2007 has been disseminated and is available at the following Web site: www1.eere.energy.gov/buildings/appliance_standards/peer_review.html.

VII. Public Participation

A. Attendance at the Public Meeting

The time, date, and location of the public meeting are listed in the DATES and ADDRESSES sections at the beginning of this notice. If you plan to attend the public meeting, please notify Ms. Brenda Edwards at (202) 586-2945 or Brenda.Edwards@ee.doe.gov. As explained in the ADDRESSES section, foreign nationals visiting DOE Headquarters are subject to advance security screening procedures.

In addition, you can attend the public meeting via webinar. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's rulemaking website at: http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/56.

Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements For Distribution

Any person who has plans to present a prepared general statement may request that copies of his or her statement be made available at the public meeting. Such persons may submit requests, along with an advance electronic copy of their statement in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format, to the appropriate address shown in the ADDRESSES section at the beginning of this notice. The request and advance copy of statements must be received at least one week before the public meeting and may be emailed, hand-delivered, or sent by mail. DOE prefers to receive requests and advance copies via email. Please include a telephone number to enable DOE staff to make follow-up contact, if needed.

C. Conduct of the Public Meeting

DOE will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. After the public meeting, interested parties may submit further comments on the proceedings as well as on any aspect of the rulemaking until the end of the comment period.

The public meeting will be conducted in an informal, conference style. DOE will present summaries of comments received before the public meeting, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will allow, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the public meeting.

A transcript of the public meeting will be included in the docket, which can be viewed as described in the Docket section at the beginning of this notice. In addition, any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

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

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

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

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

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

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

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery/courier, please

provide all items on a CD, if feasible. It is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

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

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. 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 via email, postal mail, or hand delivery/courier two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

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

E. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1. Information on historical product shipments and market share efficiency data, disaggregated by product class, for 2012 and 2013 as those data become available.

2. Comments, information and data on characterizing the CCW usage for establishing energy consumption of CCW. Specifically, whether there are any data on on-premise laundry usage that could improve the usage characterization.

3. Comments, information and data on the equipment lifetimes developed for multi-family and laundromat applications for both front-loading and top-loading CCW. DOE defines lifetime as the age at which CCW equipment is retired from service. DOE welcomes further input on the multi-family, commercial clothes washer lifetimes of 11.25 years on average, a 15.5 year maximum, and a 7.0 year minimum. DOE also welcomes further input on the laundromat average lifetime assumption of 7.125 years on average, a 9.3 year maximum, and a 5.0 year minimum. In the technical support document, these equipment lifetime assumptions applied to the LCC and PBP are discussed further in Chapter 8.2.3 and the Weibull distributions used for the lifetimes are discussed in Appendix 8C.

4. Comments, information and data on the base case efficiency distributions of CCW. Given that market share efficiency data for 2010-2011 were used to develop estimated base case efficiency distributions in the compliance year (2018), DOE seeks more historical market share efficiency data which would be useful for projecting the base case and standards case efficiency distributions for the analysis period.

5. Comments, information, and data on the repair and maintenance costs for front-loading and top-loading CCW equipment classes. Whether repair costs for CCW equipment would increase at the efficiency levels indicated in today's proposed

rule due to any changes in the design and materials and components used in order to comply with the new efficiency standards.

6. Impacts that the energy and water conservation standards may have on any lessening of the utility or performance of the covered products. These impacts may include increased cycle times to wash clothes, ability to achieve good wash performance (e.g., cleaning and rinsing), increased longevity of clothing, improved ergonomics of washer use, increased noise, and other potential impacts.

7. The reasonableness of the values that DOE used to characterize the rebound effect with the more efficient CCW equipment.

8. Whether there would be any anticipated changes in the consumption of complementary goods (e.g., laundry detergent, stain removers, fabric softeners) that may result from the proposed standards.

9. On the assumptions applied in the engineering analysis in Chapter 5 of the technical support document, for top-loading and front-loading product classes for the baseline efficiency levels and technology cost assessment. For the top-loading product class, DOE used the baseline level on the 1.60 MEF and the 8.5 WF requirements specified by current Federal energy conservation standards, which became effective for commercial clothes washers manufactured on or after January 8, 2013. For the front-loading product class, DOE established the baseline level based on the 2.00 MEF and 5.5 WF requirements specified by current Federal energy conservation standards.

10. To estimate the impact on shipments of the price increase for the considered efficiency levels, DOE used a cross price elasticity approach to measure

the change in the market share of top-loaders caused by a change in the price of front loaders. At the efficiency levels proposed in this rule, front-loader CCW equipment would increase their market share by 48 percent from the current 40 percent in the analysis period. DOE welcomes stakeholder input and estimates on the effect of amended standards on future CCW equipment shipments. DOE also welcomes input and data on the cross elasticity estimates used in the analysis.

11. DOE requests comment on whether there are features or attributes of the more energy-efficient CCW equipment that manufacturers would produce to meet the standards in this proposed rule that might affect how they would be used by consumers. DOE requests comment specifically on how any such effects on CCW product features or attributes should be weighed in the choice of standards for the CCW final rule.

12. For this rulemaking, DOE analyzed the effects of this proposal assuming that the CCW equipment would be available to purchase for 30 years, and it undertook a sensitivity analysis using 9 years rather than 30 years of product shipments. The choice of a 30-year period of shipments is consistent with the DOE analysis for other products and commercial equipment. The choice of a 9-year period is a proxy for the timeline in EPCA for the review of certain energy conservation standards and potential revision of and compliance with such revised standards. We are seeking input, information and data on whether there are ways to refine the analytic timeline further.

13. DOE solicits comment on the application of the new SCC values used to determine the social benefits of CO2 emissions reductions over the rulemaking

analysis period. The rulemaking analysis period covers from 2018 to 2047 plus an additional 50 years to account for the lifetime operation of the equipment purchased in that period. In particular, the agency solicits comment on its derivation of SCC values after 2050, where the agency applied the average annual growth rate of the SCC estimates in 2040−2050 associated with each of the four sets of values.

14. The agency also seeks input on the cumulative regulatory burden that may be imposed on industry either from recently implemented rulemakings for these products or other rulemakings that affect the same industry.

15. Whether DOE should incorporate the cost of risers or storage drawers (also referred to as pedestals) into the baseline installation costs for front-loading machines.

VIII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of today's proposed rule.

List of Subjects in 10 CFR Part 431

Administrative practice and procedure, Energy conservation, Household appliances, and Small businesses.

Issued in Washington, DC, on February 21, 2014.

David T. Danielson
Assistant Secretary
Energy Efficiency and Renewable Energy

For the reasons set forth in the preamble, DOE proposes to amend part 431 of chapter II, subchapter D, of title 10 of the Code of Federal Regulations, to read as set forth below:

PART 431 - ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

1. The authority citation for Part 431 continues to read as follows:

Authority: 42 U.S.C. 6291-6317.

2. Section 431.156 to Subpart I is amended by revising paragraph (b) and adding paragraph (c) as follows:

§431.156 Energy and water conservation standards and their effective dates.

* * * * *

(b) Each commercial clothes washer manufactured on or after January 8, 2013, and before January 1, 2015, shall have a modified energy factor no less than and a water factor no greater than:

Equipment Class	**Modified energy factor (MEF), <u>cu. ft./kWh/cycle</u>**	**Water factor (WF), <u>gal./cu. ft./cycle</u>**
Top-Loading	1.60	8.5
Front-Loading	2.00	5.5

(c) Each commercial clothes washer manufactured on or after January 1, 2015 shall have a modified energy factor no less than and an integrated water factor no greater than:

Equipment Class	**Modified energy factor (MEF_{J2}), cu. ft./kWh/cycle**	**Integrated water factor (IWF), gal./cu. ft./cycle**
Top-Loading	1.35	8.8
Front-Loading	2.00	4.1