Energy Conservation Standards Rulemaking Framework Document for Commercial Clothes Washers

Docket # EERE-2012-BT-STD-0020

U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Program

August 13, 2012

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AEO	Annual Energy Outlook
AHAM	Association of Home Appliance Manufacturers
ANOPR	advance notice of proposed rulemaking
AWWA	American Water Works Association
BLS	Bureau of Labor and Statistics
BT	Building Technologies Program
CAIR	Clean Air Interstate Rule
CCW	Commercial Clothes Washer
CEE	Consortium for Energy Efficiency
CFR	Code of Federal Regulations
CLA	Coin Laundry Association
CO_2	carbon dioxide
D.C.	District of Columbia
DOE	U.S. Department of Energy
DOJ	U.S. Department of Justice
EF	energy factor
EGU	electric generating units
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
EPACT	Energy Policy Act of 2005
EPCA	Energy Policy and Conservation Act
FFC	full-fuel-cycle
FR	Federal Register
GHG	greenhouse gas emissions
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
Hg	Mercury
I-O	Input-Output
IMEF	integrated modified energy factor
ImSET	Impact of Sector Energy Technologies
IWF	integrated water factor
kWh	kilowatt-hour
LCC	life-cycle cost
LVM	low-volume manufacturer
MEF	modified energy factor
MIA	manufacturer impact analysis
MLA	Multi-Housing Laundry Association
NAICS	North American Industry Classification System
NECPA	National Energy Conservation Policy Act of 1978
NEMS	National Energy Modeling System
NES	national energy savings
NESHAP	national emissions standards for hazardous air pollutants
NIA	national impact analysis
NOPR	notice of proposed rulemaking
NO_x	nitrogen oxides

NPV	net present value
OMB	Office of Management and Budget
PBP	payback period
PM	particulate matter
PNNL	Pacific Northwest National Laboratory
R&D	research and development
RCW	residential clothes washer
RMC	remaining moisture content
SCC	social cost of carbon
SEC	Securities and Exchange Commission
SG&A	selling, general, and administrative costs
SNOPR	supplemental notice of proposed rulemaking
SO_2	sulfur dioxide
SWEF	shipment-weighted efficiency
TSD	technical support document
TSL	trial standard level
U.S.	United States
U.S.C.	United States Code
WF	water factor

Rulemaking Framework Document for Commercial Clothes Washers

1. INTRODUCTION

This framework document describes the procedural and analytical approaches the U.S. Department of Energy (the Department, or DOE) anticipates using to evaluate amending the energy conservation standards for commercial clothes washers (CCW). It also informs interested parties of the standards rulemaking process, encourages input from these parties during the rulemaking, and serves as the starting point for developing standards. The framework document is not a definitive statement about any issue that DOE may determine in the rulemaking.

The DOE Appliances and Commercial Equipment Standards Program, within the Office of Energy Efficiency and Renewable Energy Building Technologies Program, develops and promulgates test procedures and energy conservation standards for consumer appliances and commercial equipment. The process for developing standards involves analysis, public notice, and the solicitation of comment from interested parties. Such parties include manufacturers, consumers, energy conservation and environmental advocates, State and Federal agencies, and any other groups or individuals with an interest in these standards and test procedures.

Section 1 of this framework document provides an overview of the rulemaking process. Sections 2 through 17 describe the analyses DOE intends to conduct to fulfill the statutory requirements for this standards rulemaking. DOE will conduct analyses to determine whether amended energy conservation standards are technologically feasible and economically justified and would result in significant conservation of energy.

Information regarding this rulemaking will be maintained on the DOE website at: http://www1.eere.energy.gov/buildings/appliance_standards/commercial/clothes_washers.html. In addition, materials submitted for public record will be available in the docket for this rulemaking, which is accessible through the *regulations.gov* website by searching for Docket No. EERE-2012-BT-STD-0020.

Throughout this document, comment boxes such as this one highlight particular issues on which DOE seeks comment and requests feedback from interested parties. Such requests for comment are numbered according to the section in which they appear. Although the comment boxes highlight particular issues that DOE has identified upfront, DOE invites comment from interested parties on all aspects of the material presented in this document.

1.1 The Appliances and Commercial Equipment Standards Program

The Energy Policy and Conservation Act of 1975 (EPCA) established an energy conservation program for consumer products. (42 U.S.C. 6291–6309) The National Energy Conservation Policy Act of 1978 (NECPA) amended EPCA to add Part C of Title III, which established an energy conservation program for certain industrial equipment. (42 U.S.C. 6311-6317) (Part C was re-designated as Part A-1 on codification in the U.S. Code, for editorial reasons). The Energy Policy Act of 2005 (EPACT 2005), P.L. 109-58, further amended EPCA to expand DOE's energy conservation program to include commercial clothes washers and other commercial equipment under Part C.

Table 1.1 provides a summary of prior key regulatory and legislative actions regarding energy conservation standards for commercial clothes washers, including relevant changes to the residential clothes washer test procedure, which is used by commercial clothes washers, as described further in Section 1.3.

Table 1.1 Summary of Relevant Regulatory and Legislative Actions for Commercial Clothes Washers

Name	Action	Citation and Date	Summary of Action
LEGISLATION			
EPCA	Legislation	Energy Policy and Conservation Act of 1975, Pub. L. 94-163	Established DOE authority to develop energy conservation standards and test procedures for consumer products.
NECPA	Legislation	National Energy Conservation Policy Act of 1978, Pub. L. 95-619	Amended EPCA to establish an energy conservation program for certain industrial equipment.
EPACT 2005	Legislation	Energy Policy Act of 2005, Pub. L. 109-58	Expanded DOE's energy conservation program to include commercial clothes washers; established initial energy and water conservation standards for commercial clothes washers.
ENERGY CONSERVATION STANDARDS			
March 2006 Framework Document	Framework Document	71 FR 15059 (March 27, 2006)	Developed to consider amended energy conservation standards.
November 2007 ANOPR	Advanced Notice of Proposed Rulemaking	72 FR 64432 (November 17, 2007)	Solicited comment on amended energy and water conservation standards for a single product class of commercial clothes washers.
October 2008 NOPR	Notice of Proposed Rulemaking	73 FR 62034 (October 17, 2008)	Proposed adoption of two separate energy and water conservation standards for top-loading and front-loading commercial clothes washers.
November 2009 SNOPR	Supplemental Notice of Proposed Rulemaking	74 FR 57738 (November 9, 2009)	Updated proposed energy conservation standards for top-loading and front-loading commercial clothes washers.
January 2010 Final Rule	Final Rule	75 FR 1122 (January 8, 2010)	Amended energy conservation standards for top-loading and front-loading commercial clothes washers manufactured on or after January 8, 2013.
August 2012 Framework Document	Framework Document	77 FR 48108 (August 13, 2012)	Developed to consider amended energy conservation standards.
TEST PROCEDURES			
August 1997 Final Rule	Final Rule	62 FR 45484 (August 27, 1997)	Established current test procedure at appendix J1.
March 2012 Final Rule	Final Rule	77 FR 13888 (March 7, 2012)	Established new test procedure at appendix J2; amended certain provisions in appendix J1; removed obsolete appendix J. Effective April 6, 2012.

EPACT 2005 defined commercial clothes washers as follows:

> The term "commercial clothes washer" means 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))

EPACT 2005 established the first energy conservation standards for commercial clothes washers, shown in Table 1.2.

Table 1.2. Energy Conservation Standards for Commercial Clothes Washers, Established by EPACT 2005

Metric	Standard
Modified Energy Factor (MEF), *ft^3/kwh/cycle*	1.26 (minimum)
Water Factor (WF), *gal/cycle/ft^3*	9.5 (maximum)

EPACT 2005 further directed DOE to conduct two rulemaking cycles to determine whether to amend these standards: the first final rule was required by January 1, 2010, and the second final rule is required by January 1, 2015. (42 U.S.C. 6313(e)) The January 2010 Final Rule (see section 1.2 for discussion) and the current rulemaking fulfill this requirement.

EPACT 2005 also mandated that the test procedures for commercial clothes washers be the same as the test procedures established by DOE for residential clothes washers. (42 U.S.C. 6314(a)(8)) Further discussion of the test procedure is provided in section 1.3 of this framework document.

1.2 Previous Commercial Clothes Washer Standards Rulemaking

DOE published a framework document for the first required rulemaking cycle on March 27, 2006. (71 FR 15059) DOE received comments from interested parties regarding the proposed analytical approach, including specific comments regarding product classes, market characterization, technology assessments, and life cycle costs.

On November 17, 2007, DOE published an advanced notice of proposed rulemaking ("November 2007 ANOPR"), in which DOE:

- Considered establishing a single product class for CCWs;
- Described in greater detail the analytical framework, models, and tools to be used throughout the rulemaking;
- Presented preliminary results of the engineering analysis, life cycle cost (LCC) analysis, payback period (PBP) analysis, national energy savings (NES) estimates, and national impact analysis (NIA); and
- Presented candidate energy conservation standard levels.

(72 FR 64432)

DOE received comments from interested parties on all aspects of the topics covered in the November 2007 ANOPR.

After further analysis, DOE issued a notice of proposed rulemaking on October 17, 2008 ("October 2008 NOPR"). (73 FR 62034) In the October 2008 NOPR, DOE stated that the method of loading clothes is a feature within the meaning of 42 U.S.C. 6295(o)(4), which prohibits DOE from adopting a standard that would result in the unavailability of product features substantially the same as those generally available in the United States at the time the standard is adopted. Because DOE's analysis showed that standards for a single product class based on the criteria set forth in EPCA would effectively eliminate top-loading CCWs from the market, DOE proposed establishing and setting separate energy and water conservation standards for two classes of CCWs based upon the axis of loading (*i.e.*, top-loading and front-loading).

DOE received additional comments from interested parties on all aspects of the proposals presented in the October 2008 NOPR. In particular, manufacturers expressed concern regarding the maximum technologically feasible (max-tech) efficiency level identified by DOE for top-loading CCWs. The manufacturer of the max-tech top-loading clothes washer stated that a transposition error had resulted in the incorrect reporting of the unit's modified energy factor. DOE conducted independent laboratory testing of the unit in question, which verified that the MEF rating had been reported incorrectly. Based on this information, DOE published a supplemental notice of proposed rulemaking on November 9, 2009 ("November 2009 SNOPR"), which revised the max-tech efficiency level downward for top-loading CCWs. (74 FR 57738) DOE also revised its engineering and economic analyses in the November 2009 SNOPR accordingly.

After receiving and evaluating comments on the November 2009 SNOPR, DOE published a final rule on January 8, 2010 ("January 2010 final rule"), which established new energy and water conservation standards for top-loading and front-loading CCWs, shown in Table 1.3. (75 FR 1122) The revised standards apply to CCWs manufactured on or after January 8, 2013.

Table 1.3. Amended Energy Conservation Standards for Commercial Clothes Washers, Effective January 8, 2013

Product Class	**Modified Energy Factor** *$ft^3/kwh/cycle$* (minimum)	**Water Factor** *$gal/cycle/ft^3$* (maximum)
Top-Loading	1.60	8.5
Front-Loading	2.00	5.5

1.3 Test Procedures

EPCA requires that CCWs use the same test procedures as residential clothes washers. (42 U.S.C. 6314(a)(8))

On March 7, 2012, DOE published a final rule amending its test procedures for residential clothes washers ("March 2012 final rule"). (77 FR 13888) The March 2012 final rule amended certain provisions in the test procedure at 10 CFR 430, Subpart B, Appendix J1 and also established a new test procedure at Appendix J2. The amendments to Appendix J1 became effective April 6, 2012. Manufacturers of residential clothes washers will be required to use Appendix J2 to demonstrate compliance with standards beginning March 7, 2015.

Because CCWs are required by EPCA to use the same test procedures as residential clothes washers, manufacturers of CCWs will also be required to use Appendix J2 to demonstrate compliance with the MEF/WF standards shown in Table 1.3 beginning March 7, 2015.

Among other changes, the new Appendix J2 test procedure:

- Modifies the definition of the energy test cycle to improve clarity, repeatability, and reproducibility.
- Establishes a new energy efficiency metric, integrated modified energy factor (IMEF), which incorporates energy consumption in standby and off modes. (Because the current standards for CCWs do not include standby and off mode, CCW manufacturers will not be required to measure IMEF, as described below.)
- Establishes a new water efficiency metric, integrated water factor (IWF), which provides a more representative measure of water consumption by incorporating water consumption from all the temperature cycles included as part of the energy test cycle. The current WF metric is based on the water consumption of only the cold/cold wash/rinse temperature cycle.
- Modifies the capacity measurement method to improve clarity, repeatability, and reproducibility, and to more appropriately represent the usable volume of the clothes washer during operation.
- Modifies the dryer energy calculation to maintain consistency with the load size usage factors used throughout the test procedure.

Appendix J2 retains provisions for calculating MEF and WF; however, because of certain changes to the active mode provisions described above, MEF and WF calculated using Appendix J2 will differ from MEF and WF calculated for the same clothes washer using the current test procedure at Appendix J1.

DOE recognizes that the January 8, 2013 standard levels shown in Table 1.3 are based on MEF/WF as measured using Appendix J1. Until such time as DOE establishes amended energy and water conservation standards for commercial clothes washers, DOE is considering developing correction factors that would be used to determine compliance with the MEF/WF standards effective January 8, 2013 that would apply beginning March 7, 2015, at which time manufacturers will be required to use the Appendix J2 test procedure. To develop proposed correction factors, DOE would acquire a representative sample of CCWs that minimally comply with the 2013 standard levels and test them using the new Appendix J2 test procedure. The differences in the measured MEF/WF values between Appendix J1 and Appendix J2 would be used to develop proposed correction factors, on which DOE would seek comment prior to adopting any final correction factors.

Item 1-1 *DOE invites comment on developing correction factors for translating Appendix J1 MEF/WF values into Appendix J2 MEF/WF values that would apply beginning March 7, 2015, at which time manufacturers will be required to use the Appendix J2 test procedure. DOE also welcomes any data on the appropriate correction factors.*

For this rulemaking, DOE is considering whether to establish amended energy efficiency standards for CCWs based on the IMEF metric, which would incorporate standby and off mode power. DOE recognizes that some CCWs utilize display technologies and networking features that may consume significantly more standby mode power than traditional coin-operated CCWs, and that these technologies provide unique functionality within the markets they serve. In addition, the standby and off mode characteristics of CCWs may differ significantly from the characteristics of residential clothes washers, for which the Appendix J2 test procedure was developed. As part of the engineering analysis, DOE will evaluate the standby and off mode power characteristics of CCWs and will assess the applicability of the standby and off mode provisions in Appendix J2 to CCWs.

Item 1-2 *DOE invites comment on whether to establish new energy efficiency standards for commercial clothes washers based on the IMEF metric, which would incorporate standby and off mode power.*

DOE is also considering establishing new water efficiency standards based on the IWF metric, which would incorporate 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, which is based on the water consumption of only the cold/cold wash/rinse temperature cycle. DOE also believes that calculation of IWF is more consistent with the calculation of MEF and IMEF.

Item 1-3 *DOE invites comment on its whether to establish new water efficiency standards based on the IWF metric, which would incorporate water consumption from all the temperature cycles included as part of the energy test cycle in Appendix J2.*

1.4 General Rulemaking Process and Stakeholder Participation

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

(1) The economic impact of the standard on the manufacturers and consumers of the affected products;
(2) The savings in operating costs throughout the estimated average life of the product compared to any increases in the initial cost, or maintenance expense;
(3) The total projected amount of energy and water (if applicable) savings likely to result directly from the imposition of the standard;
(4) Any lessening of the utility or the performance of the products likely to result from the imposition of the standard;
(5) The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard;
(6) The need for national energy and water conservation; and
(7) Other factors the Secretary considers relevant.

(42 U.S.C. 6295 (o)(2)(B)(i) and 42 U.S.C. 6316(a))

DOE fulfills these and other applicable requirements by conducting a series of analyses throughout the rulemaking process. Table 1.4 shows the individual analyses that are performed to satisfy each of the requirements within EPCA.

Table 1.4 EPCA Requirements and Corresponding DOE Analyses

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

EPCA also requires DOE to solicit views and comments from interested parties regarding any proposed standards. (42 U.S.C. 6295 (o)(2)(B)(i) and 42 U.S.C. 6316(a)) DOE considers stakeholder participation to be an integral part of the process for establishing energy conservation standards. The Department actively encourages the participation and interaction of all interested parties during the comment period of each rulemaking stage. Interactions among all interested parties provide a balanced discussion of critical information required to conduct the standards rulemaking. DOE involves interested parties through a variety of means, including formal public notifications (*i.e.*, *Federal Register* notices) and public meetings.

Subsequent to issuance of this framework document, DOE intends to use the analyses performed during the previous CCW rulemaking in the development of a notice of proposed rulemaking

(NOPR) setting forth proposed energy and water conservation standards for CCWs. DOE believes that the current state of the CCW industry has not changed significantly from 2008, when the majority of the analysis for the prior rulemaking was conducted.

DOE plans to publish the following documents during the course of this rulemaking:

- *NOPR* (see section 1.4.1). The NOPR presents the proposed trial standard levels (TSLs), which span the range of efficiencies from baseline products to the most efficient technology; DOE's models and analytical tools used to determine the impact of standards on consumers, manufacturers, and the nation; DOE's weighting of the impacts; and the proposed new energy conservation standard levels.

- *Final rule* (see section 1.4.2). The final rule presents a discussion of comments received in response to the NOPR, any necessary revisions to the analysis of the impacts of standards, DOE's weighting of the impacts, and the standard levels DOE is adopting. The final rule also establishes the effective date of the standards.

DOE intends to follow the schedule shown in Table 1.5 for this rulemaking.

Table 1.5 Rulemaking Schedule

Rulemaking Notice	Publication Date
Framework Document	August 13, 2012
NOPR	January 31, 2014
Final Rule	December 31, 2014

Any amended standards for CCWs promulgated by the final rule would apply to products manufactured on or after January 1, 2018.

Item 1-4 *DOE invites comment on its proposed schedule for this rulemaking.*

1.4.1 Notice of Proposed Rulemaking (NOPR)

During the NOPR stage, DOE will perform each of the analyses outlined in Section 2 as described in greater detail in the subsequent sections of this framework document. DOE will present the results of these analyses in a technical support document (TSD) to be published concurrently with the NOPR. The NOPR will be published in the *Federal Register*, and the TSD will be available on the DOE website.

The NOPR will summarize the results of these analyses and will present DOE's preliminary determination of whether the current standards should be amended, and if so, the proposed new energy conservation standard levels. Publication of the NOPR will be followed by a public

comment period, including a public meeting. DOE will consider comments from all interested parties and may revise its analysis accordingly in preparation of the final rule.

In addition, DOE will provide the U.S. Department of Justice (DOJ) with a copy of the NOPR and TSD to solicit feedback on the impact of any proposed energy conservation standards on competition in the CCW industry. DOJ will review the proposed standard levels and the potential impacts of any lessening of competition that is likely to result from the imposition of standards. (42 U.S.C. 6295(o)(2)(B)(i)(V) and (B)(ii)) DOE will consider DOJ's determination on the impacts of the proposed standard on competition in preparation of the final rule.

1.4.2 Final Rule

After the publication of the NOPR, DOE will consider public comments received on the proposal and accompanying analyses. Based on its review of these comments, DOE may revise the individual analyses and/or the proposed standard levels. Before issuance of the final rule, DOE will also consider DOJ's comments on the NOPR relating to the impacts of the proposed standard levels on competition. DOJ's comments will be published as part of the final rule.

The standards rulemaking will conclude with publication of the final rule. DOE will select any final standard levels based on the complete record of the standards rulemaking. The final rule will publish any final standard levels and their compliance date, and DOE will explain the basis for their selection. The final rule will be accompanied by a final TSD.

2. OVERVIEW OF ANALYSES FOR RULEMAKING

The purpose of the analyses conducted in support of the standards rulemaking is to ensure that, consistent with the requirements of EPCA, DOE selects energy conservation standards that achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. In determining whether a standard is economically justified, DOE considers, to the maximum extent practicable, the seven factors set forth in section 1.4. This analysis includes consideration of the economic impacts on domestic manufacturers and consumers, national benefits, and issues of consumer utility.

The specific analyses include the following, which are explained in greater detail in subsequent sections of this framework document:

- Market and technology assessment (section 3)
- Screening analysis (section 4)
- Engineering analysis (section 5)
- Energy and water use determination (section 6)
- Markups for equipment price determination (section 7)
- Life-cycle cost and payback period analysis (section 8)
- Shipments analysis (section 9)
- National impact analysis (section 10)
- Consumer subgroup analysis (section 11)
- Manufacturer impact analysis (section 12)
- Utility impact analysis (section 13)
- Employment impact analysis (section 14)
- Emissions analysis (section 15)
- Monetization of Emission Reductions Benefits (section 16)
- Regulatory impact analysis (section 17)

3. MARKET AND TECHNOLOGY ASSESSMENT

The market and technology assessment will provide information about the CCW industry that DOE will use throughout the rulemaking. This assessment is used to identify potential design options or efficiency levels for each product class.

3.1 Market Assessment

DOE will qualitatively and quantitatively characterize the structure of the CCW industry and market. In the market assessment, DOE will identify and characterize the manufacturers of CCWs, estimate market shares and trends, address regulatory and non-regulatory initiatives intended to improve energy efficiency or reduce energy consumption, and explore the potential for technological improvements in the design and manufacturing of CCWs. DOE will also review product literature, industry publications, and company websites.

During the market assessment, DOE will gather shipments, market share and other relevant data to identify important issues such as potential small business impacts, competitive disruptions, and other factors that may arise from enacting standards. Market structure data will be particularly useful for assessing competitive impacts as part of the manufacturer impact analysis.

As noted previously, new energy efficiency standards for CCWs will become effective January 8, 2013. DOE expects this transition to impact its characterization of the CCW market, particularly for top-loading CCWs. As discussed further below, DOE is unaware of any top-loading CCWs currently on the market that exceed the amended standards beginning in January 2013. Manufacturers may introduce new top-loading models to the market shortly before or after the 2013 compliance date. DOE plans to analyze top-loading and front-loading CCW models currently on the market, as well as any new models that become available after the new standards become effective.

Item 3-1 *DOE requests 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).*

3.2 Product Classes

The general criteria for separation into different classes include (1) type of energy used; (2) capacity; or (3) other performance-related features that justify the establishment of a separate energy conservation standard, considering the utility of the feature to the consumer and other factors deemed appropriate by the Secretary. (42 U.S.C. 6295(q) and 6316(a))

During the previous energy conservation standards rulemaking for CCWs, DOE promulgated standards for two product classes: top-loading and front-loading. DOE stated that it had identified at least one consumer utility related to the method of loading clothes. Specifically, DOE determined that the longer cycle times of front-loading CCWs versus cycle times for top-

loaders are likely to significantly impact consumer utility. In commercial and multi-housing settings, it is beneficial to consumers with multiple, sequential laundry loads to approximately match CCW cycle times to those of the dryers to maximize throughput and minimize wait times, and wash times of 70–115 minutes would be longer than most drying cycles. Because the longer wash cycle times for front-loaders arise from the reduced mechanical action of agitation as compared to top-loaders, DOE stated such longer cycles may be required to achieve the necessary cleaning, and thereby constitute a performance-related utility of frontloading CCWs versus top-loading CCWs under the meaning of 42 U.S.C. 6295(q). 75 FR 1122, 1130-34.

For the reasons stated above and in the previous rulemaking, DOE is considering retaining these two product classes during this rulemaking.

Item 3-2 *DOE seeks comment on its proposal to retain two product classes for commercial clothes washers based on the location of access (i.e., top-loading and front-loading).*

3.3 Technology Assessment

The purpose of the technology assessment is to understand how the product uses energy and potential changes that could reduce energy consumption. DOE typically uses information about "technology options"—existing technologies and prototype designs and concepts—to identify technologies product manufacturers could use to attain higher energy efficiency levels. In consultation with interested parties, DOE will develop a list of technologies to consider in this analysis.

Initially, this list will include a subset of the design options considered during the most recent CCW standards rulemaking. Based on a preliminary review of the CCW market and information published in recent trade publications, technical reports, and manufacturer literature, DOE has observed that the results of the technology screening analysis performed during the previous rulemaking remain largely relevant for this rulemaking[1]. Based on further analysis of the CCW market, the residential clothes washer market, and discussions with manufacturers of both commercial and residential clothes washers, however, DOE believes that some of the technologies previously included in the analysis would provide negligible, if any, energy savings. DOE is considering eliminating those options from consideration in this rulemaking.

DOE believes that the technology options listed in Table 3.1 represent the most viable options for CCWs.

[1] Technical support document from the previous commercial clothes washer rulemaking available at http://www1.eere.energy.gov/buildings/appliance_standards/commercial/clothes_washers_ecs_final_rule_tsd.html or at the regulations.gov website by searching for Docket No. EERE-2006-STD-0127.

Table 3.1 Technology Options for Commercial Clothes Washers

1. Adaptive water fill
2. Advanced agitation concepts for top-loading machines
3. Capacity increase
4. Direct-drive motor
5. Motor efficiency improvements
6. Ozonated laundering
7. Polymer bead cleaning
8. Spray rinse or similar water-reducing rinse technology
9. Thermostatically controlled mixing valves
10. Water extraction improvements to reduce remaining moisture content
11. Water fill sensors with greater accuracy/precision
12. Water recirculation loop

DOE had not included capacity increase as a technology option in the previous CCW rulemaking. However, through its testing and reverse-engineering analysis performed for the residential clothes washer rulemaking, DOE believes that increasing the capacity of the wash basket represents an option for improving the energy efficiency of a clothes washer.

DOE had also not included polymer bead cleaning in the previous CCW rulemaking. However, DOE has become aware of polymer bead cleaning field trials conducted in the United Kingdom in industrial laundry facilities, with ongoing development of prototypes for commercial and residential settings. Therefore, DOE has added this technology option for consideration in its initial technology screening.

Item 3-3 *DOE seeks comment on whether any of the technologies listed in Table 3.1 should be removed from consideration, or whether any other technologies not listed in Table 3.1 should be considered as technology options.*

4. SCREENING ANALYSIS

The purpose of the screening analysis is to screen out technology options that DOE will not consider in the rulemaking.

DOE will assess each technology option identified in Table 3.1 according to the following four criteria:

1. *Technological feasibility.* DOE will not further consider technologies that are not incorporated in commercially available products or in working prototypes.

2. *Practicability to manufacture, install, and service.* If DOE determines that mass production of a product's technology and reliable installation and servicing of the

technology could not be achieved on the scale necessary to serve the market by the time of the effective date of the standard, then it will not consider that technology further.

3. *Adverse impacts on product utility or availability.* If DOE determines that a technology would have significant adverse impact on the utility of the product, including impacts to significant subgroups of consumers, or would result in the unavailability of any covered product type with performance characteristics (including reliability), features, size, capacities, and volumes that are substantially the same as products generally available in the United States at the current time, it will not consider that technology further.

4. *Adverse impacts on health or safety.* If DOE determines that a technology will have significant adverse impacts on health or safety, it will not consider that technology further.

DOE will designate the technology options that pass the screening criteria as "design options" and will consider these options in the development of cost-efficiency curves in the engineering analysis.

Item 4-1 *DOE seeks comment on whether any of the technologies listed in Table 3.1 should be removed from consideration based on any of the screening criteria listed above. If so, please provide details regarding the specific screening criteria that would preclude DOE from considering such technology options.*

5. ENGINEERING ANALYSIS

The purpose of the engineering analysis is to determine the relationship between manufacturer cost and energy efficiency for CCWs. In determining the cost-efficiency relationship, DOE will perform reverse-engineering "teardowns" to estimate the increase in manufacturer cost associated with technological changes that increase the efficiency of these products relative to the baseline models. To support the engineering analysis, DOE will measure the energy and water consumption of representative units at each of the TSLs under consideration using DOE's test procedure at Appendix J1.

The following sections describe the identification of baseline models (section 5.1), identification of higher efficiency levels (section 5.2), DOE's approach for determining the cost-efficiency relationship (section 5.3), consideration of proprietary designs (section 5.4), and consideration of impacts on consumer utility (section 5.5).

5.1 Baseline Models

For each established product classes, DOE will select a baseline model as a reference point against which any changes resulting from energy conservation standards can be measured. The baseline model in each product class represents the characteristics of common or typical

equipment in that class. Typically, a baseline model is one that minimally meets current energy conservation standards.

DOE intends to use the amended energy conservation standards applicable beginning January 8, 2013 to characterize the baseline models for top-loading and front-loading CCWs. These amended standards are indicated in Table 1.3. As stated previously, DOE is unaware of any top-loading CCWs currently on the market that exceed the amended MEF and WF standards beginning in January 2013. Manufacturers may introduce new top-loading models to the market that comply with the amended standards, and DOE will consider any newly-introduced models during the course of this rulemaking.

Item 5-1 *DOE seeks input from interested parties on whether the amended energy efficiency standard levels effective January 8, 2013 are appropriate for characterizing the baseline efficiency levels for this rulemaking.*

5.2 Higher Efficiency Levels

DOE will analyze the front-loading product class to determine the relevant TSLs and to develop incremental manufacturing cost data at each higher efficiency level. Table 5.1 presents the efficiency levels DOE will consider analyzing for front-loading CCWs, based on a preliminary review of the current market. Because DOE is unaware of any top-loading CCWs that exceed the January 8, 2013 baseline efficiency level (1.60 MEF/8.5 WF), DOE is not specifying more efficient standard levels for top-loading machines at this time. Should manufacturers develop models above the baseline efficiency level, or should working prototypes above the baseline efficiency level become available, DOE will consider incorporating additional efficiency levels in its analysis.

Table 5.1 Efficiency Levels Under Consideration for Front-Loading Commercial Clothes Washer Analysis

Level	Efficiency Level Source	Efficiency Level	
		MEF	WF
Baseline	DOE Standard	2.00	5.5
1	CEE Tier 2	2.20	4.5
2	CEE Tier 3	2.40	4.0
3	Maximum Available	2.60	3.7

For front-loaders, DOE will consider defining higher efficiency levels based on the Consortium for Energy Efficiency (CEE) Tier levels for CCWs. DOE notes that CEE Tier 1 for CCWs specifies a rating of 2.00 MEF/6.0 WF, which does not meet the water factor requirement of the revised energy efficiency standard effective January 8, 2013. DOE seeks input from interested parties on the higher efficiency levels identified for front-loading CCWs.

The "maximum available" efficiency level for front-loaders and the baseline efficiency level for top-loaders correspond to models with the maximum efficiency currently available in the market, but may not necessarily correspond to the max-tech 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); 6316(a)) Models with maximum available efficiency may not incorporate all possible design options for increasing efficiency and, therefore, may not achieve an efficiency level as high as the max-tech level. Also, some of the design options that have passed the screening analysis may not yet be commercially available (*e.g.*, are only in working prototypes) and, therefore, would not be found in products with maximum available efficiency. DOE seeks input from interested parties to determine appropriate max-tech efficiency levels.

Item 5-2 *DOE seeks input on whether any higher efficiency levels should be considered for top-loading commercial clothes washers, and if so, the basis for such consideration.*

Item 5-3 *DOE seeks input on the appropriateness of the higher efficiency levels identified for front-loading commercial clothes washers.*

Item 5-4 *DOE seeks input on appropriate maximum technologically feasible efficiency levels and the basis for why those levels should be selected.*

5.3 Approach for Determining the Cost-Efficiency Relationship

DOE will use an efficiency-level approach to determine the relationship between manufacturer cost and energy efficiency. Using this approach, DOE will examine the aggregated incremental increases in manufacturer selling price at a specified efficiency. DOE will solicit information regarding the technology design options and incremental manufacturing costs required for achieving each higher efficiency level.

DOE will also conduct a reverse-engineering analysis to identify the incremental cost and efficiency improvement associated with each design option or design option combination—in effect, supplementing the efficiency-level approach with a design-option approach as needed. DOE will conduct reverse engineering through physical testing and teardowns of CCW models at key efficiency levels to determine baseline manufacturing cost as well as incremental manufacturing costs above the baseline. Reverse engineering entails a detailed product disassembly process, whereby:

(1) Representative units are torn down;
(2) All components, processes, assembly, and manufacturing steps are noted in an activities-based cost model; and
(3) All manufacturing costs are calculated.

Representative units are chosen based on the range of efficiencies, design options, and capacities. DOE proposes to perform reverse engineering on units rated at baseline and at each identified higher efficiency level for each analyzed product class.

DOE will estimate the contribution of the depreciation of conversion capital expenditures to the incremental overhead. During manufacturer interviews, DOE will gather information about the capital expenditures necessitated by increasing the efficiency of the baseline models to various efficiency levels (*i.e.*, conversion capital expenditures by efficiency or energy-use level). DOE will also request information about the depreciation method used to expense the conversion capital.

DOE may supplement the reverse-engineering data with information from catalogs, websites, and trade publications to create a wider set of units for its cost-efficiency analysis.

DOE will also supplement these cost data with information obtained through manufacturer interviews. These confidential interviews will provide a deeper understanding of the various combinations of technologies used to increase product efficiency and their associated manufacturing costs. DOE will maintain confidentiality of proprietary data while allowing the public to examine the cost and design assumptions that underlie the cost-efficiency estimates.

Item 5-5 *DOE requests feedback on the use of an efficiency-level approach to determine the relationship between manufacturer cost and energy efficiency for commercial clothes washers, supplemented, as needed, by a design-option approach.*

5.4 Proprietary Designs

DOE will consider in its engineering and economic analyses all design options that are commercially available or present in a working prototype, including proprietary designs and technologies. However, DOE will consider a proprietary design in the subsequent analyses only if the achieved efficiency level can also be reached using other non-proprietary design options. If the proprietary design is the only approach available to achieve a given efficiency level, then DOE will reject that efficiency level because the analytical results appear to favor one manufacturer over others.

DOE is sensitive to manufacturer concerns about proprietary designs and will maintain the confidentiality of any proprietary data submitted by manufacturers or discussed during manufacturer interviews. DOE prepares aggregated results for DOE's analysis that do not divulge sensitive raw data, but that enable other interested parties to review and comment on the aggregated dataset. To prevent public disclosure of the data due to actions taken by a third party, interested parties providing confidential information to DOE must submit that data according to 10 CFR 1004.11 indicating in writing which data should remain confidential. This information will provide input to the manufacturer impact analysis and other economic analyses.

Item 5-6 *Are there proprietary designs or technologies for commercial clothes washers of which DOE should be aware in this rulemaking? If so, what are these designs or technologies and how should DOE acquire the cost data necessary for evaluating them?*

5.5 Impacts on Consumer Utility

EPCA requires DOE to consider any lessening of the utility or the performance of a covered product likely to result from the imposition of a new standard. (42 USC 6295(o)(2)(B)(i)(IV), 42 USC 6316(a)) As part of its analysis of higher efficiency levels, DOE will consider whether new standards may impact the utility of commercial clothes washers.

Item 5-7 *DOE seeks comment on whether any new standards may impact the utility of commercial clothes washers. If such impacts exist, can the effects be quantified? If so, how?*

6. ENERGY AND WATER USE ANALYSIS

The energy and water use analysis establishes the annual energy and water consumption of the equipment and assesses the energy- and water-savings potential of various equipment efficiencies. DOE uses the annual energy consumption and energy- and water-savings potential in the LCC and PBP analyses to establish the customer operating cost savings at various equipment efficiency levels.

The annual energy and water use of a CCW depends on the energy and water use per cycle and the number of cycles per year.

To calculate the energy and water use per cycle, DOE plans to use the new Appendix J2 test procedure, as described in the paragraphs that follow. (77 FR 13888, Mar. 7, 2012). Based on the known MEF, WF, and remaining moisture content (RMC) of the washer, the test procedure provides algorithms to derive energy and water use per cycle.

The test procedure uses a single value for number of cycles, which is based on residential use. DOE will need to establish an appropriate range of usage specific to CCW in the field. Because the predominant applications of CCWs are in multi-family buildings and laundromats, DOE plans to focus on these two building applications to determine the appropriate number of CCW cycles per year. Other applications include lodging establishments (e.g., hotels and motels), inpatient health care facilities, and nursing homes. Relative to multi-family buildings and laundromats, these other applications are a small segment of the market. In addition, these other applications typically use larger-size clothes washers that exceed the capacity limits defined for DOE-covered products, as described in section 1.1.

For the analysis conducted for the previous rulemaking, DOE relied on several research studies to arrive at average annual use cycles of 1,241 and 2,190 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), CEE, and Southern California Edison. DOE also used data from an "Assessment of High-Performance, Family-Sized Commercial Clothes Washers" published in May 2000[2]. For the current rulemaking, DOE will rely on this data, as well as research sponsored by the MLA and the CLA, trade associations that represent the commercial laundry industry, to establish use (cycles per year). DOE does not intend to rely on the Commercial Building Energy Consumption Survey (CBECS) conducted by DOE's Energy Information Administration (EIA) because neither energy nor water consumption is specified for buildings identified with laundry facilities in the CBECS dataset. DOE will also review other information, such as research sponsored by the American Water Works Association (AWWA), San Diego County Water Authority, CEE, and the California Energy Commission, for its relevance.

For the previous rulemaking, given the significant variability in the usage values gathered from the various sources, DOE determined the variability in annual energy and water consumption using the average usage data. For multifamily application, DOE utilized the eight average usage values, for multi-family buildings, each from a specific study, ranging from a low of 1.5 cycles per day to a high of 6.4 cycles per day. For laundromats, the low and high values were 3 and 8 cycles per day, respectively. DOE utilized the range to conduct a sensitivity analysis to determine how high and low estimates of usage affect the economic feasibility of amended energy conservation standards. DOE will follow a similar approach for this analysis.

Item 6-1 *DOE seeks stakeholder input on the approaches considered for specifying the typical annual energy and water consumption. Most importantly, DOE is interested in new sources of data that can assist in characterizing the cycles per year for commercial clothes washers. Drafts of the data request sheets are contained in Appendix A.*

7. MARKUPS ANALYSIS

DOE uses customer prices for equipment at the baseline efficiency level and all other efficiency levels under consideration in the LCC and PBP analyses and the national impact analysis. DOE uses manufacturer-to-customer markups to convert the manufacturer selling price estimates from the engineering analysis to customer prices. The manufacturer-to- customer markups are in addition to the markups on production costs that DOE uses to estimate manufacturer selling price in the engineering analysis. To validate these markups, DOE will collect data on current prices in the market, i.e., by purchasing data sets or downloading data from distributor Internet sites.

Before it can develop markup information, however, DOE must identify distribution channels (*i.e.*, how the equipment is distributed from the manufacturer to the customer).

[2] Available online at http://digitalcorpora.org/corp/nps/files/govdocs1/384/384154.pdf.

For the previous rulemaking, DOE based the distribution channels on data developed by the CEE (see Figure 7.1). The CEE states that the relevant portions of the commercial, family-sized clothes washer market can be divided into three areas: laundromats; private multi-family housing; and large institutions.[3] For these three market areas, the CEE data indicated that an overwhelming majority of commercial clothes washers are sold through distributors or to route operators. Laundromats generally purchase their equipment through distributors while multi-family housing and large institutions generally lease their equipment from route operators. For purposes of developing the markups, DOE based its calculations on the distribution channel that involved only distributors. DOE assumed that the markups and the resulting equipment prices determined for the distribution channel involving distributors would be representative of the prices paid by owners leasing their equipment from route operators. DOE seeks input to determine if this is a reasonable assumption for the distribution of commercial clothes washers.

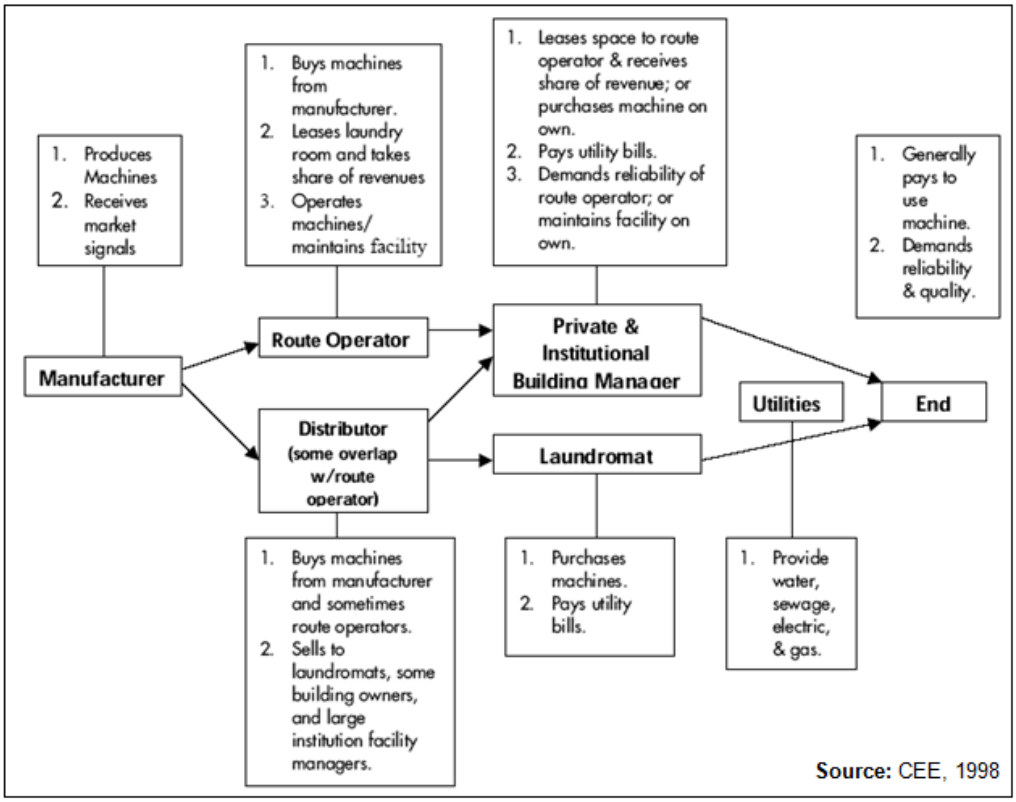

Figure 7.1 Distribution Channel for Commercial Clothes Washers

Once it establishes proper distribution channels for the equipment, DOE will rely on Economic Census data from the U.S. Census Bureau as well as input from the industry and any other interested parties to define how equipment is marked up from the manufacturer to the customer.

[3] As noted in section 6, DOE is analyzing the laundromat and private multi-family housing applications; the large institution application is significantly smaller than these two main applications. In addition, large institutions typically use larger-size clothes washers that exceed the capacity limits defined for DOE-covered products.

To the extent possible, DOE also will use collected price data to help validate overall manufacturer-to-customer markups.

DOE plans to determine an average manufacturer markup by examining the annual Securities and Exchange Commission (SEC) 10-K reports filed by publicly traded manufacturers whose equipment range includes clothes washers. DOE will determine an average markup for distributors by analyzing both Economic Census data from the U.S. Census Bureau and the annual SEC 10-K reports filed by publicly traded distribution channel participants.

In addition to developing the manufacturer and distributor markups, DOE will develop and include sales taxes to calculate final equipment prices. The Sales Tax Clearinghouse[4] is an Internet source that DOE intends to use to calculate applicable sales taxes.

To the extent possible, DOE also will use collected distributor price data to validate the overall manufacturer-to-customer markup. While DOE often relies on point of sale data from NPD Group, Inc., this data set is not available for commercial clothes washers. As an alternative, DOE may rely on distributors' Internet sites or conversations with distributors and route operators, although the representativeness of any given price data point or industry contact is unknown.

Item 7-1 *DOE welcomes comments on whether the distribution channels described above are the same.*

Item 7-2 *DOE seeks input on data sources for establishing the mark-ups.*

8. LIFE-CYCLE COST AND PAYBACK PERIOD ANALYSES

8.1 Overview

DOE analyzes the effect of amended standards on consumers by evaluating changes in the LCC of owning and operating the product, as well as the PBP of higher-efficiency products. The LCC of a product is the cost a product incurs over its lifetime, taking into account both purchase price and operating expenses. The PBP represents the time it takes to recover the additional installed cost of the more-efficient device through annual operating cost savings.

DOE analyzes the net effect on consumers by calculating the LCC and PBP using the engineering performance data (section 5), the energy-use and end-use load characterization data (section 6), and the markups for product price determination (section 7). Inputs to the LCC calculation include the installed cost to the consumer (purchase price plus installation cost), operating expenses (energy expenses, and, if applicable, repair costs and maintenance costs), the lifetime of the product or other defined period of analysis, and a discount rate. Inputs to the

[4] Sales Tax Clearinghouse, Inc., *State sales tax rates along with combined average city and county rates*. Available at http://thestc.com/STrates.stm.

payback period calculation include the installed cost to the consumer and first-year operating costs.

DOE considers both LCC and PBP to determine the impacts of potential energy conservation standards on consumers of the covered products. Calculation of LCC uses a discount rate (that depends on consumers' cost of financing) and takes into account changing energy prices over time.

DOE will perform the LCC and PBP analyses using a spreadsheet model combined with Crystal Ball (a commercially-available software add-on program to Microsoft Excel used to conduct stochastic analysis using Monte Carlo simulation and probability distributions) to account for uncertainty and variability among the input variables. Each Monte Carlo simulation will consist of 10,000 LCC and PBP calculations. The models will perform each calculation using input values sampled from probability distributions or characterized with single point values depending on available data and variability therein. The analytical results will be a distribution of 10,000 data points showing the range of LCC savings and PBPs for a given efficiency level relative to the base-case efficiency projection. For any sensitivity analyses it conducts, DOE will account for correlations that may exist between inputs.

The following sections discuss the methodologies DOE plans to use to develop several of the inputs to the LCC and PBP analysis, including: (1) energy prices; (2) discount rates; (3) maintenance, repair, and installation costs; and (4) product lifetime. The other inputs to the LCC and PBP analysis—namely, manufacturer costs, annual energy consumption, and markups for the determination of consumer retail prices—have been discussed previously.

DOE intends to conduct the LCC and PBP analysis for two commercial clothes washer product classes, top-loading and front-loading.

The LCC and PBP analysis implicitly assumes that the purchaser of the equipment also pays the operating costs for the equipment. In the case of CCWs in multi-family buildings, those who own CCWs (usually route operators) often do not incur the operating costs as do, generally, owners of multi-family dwellings. This is an example of a "split incentive" situation. As it did in the previous rulemaking, DOE plans to assume that the purchasers are able to either pass on the higher purchase costs of more efficient CCWs, or otherwise recover those costs. To the extent possible, DOE will attempt to evaluate the validity of this assumption.

Item 8-1 *DOE seeks input on the extent to which purchasers of CCWs are able to either pass on the higher purchase costs of more efficient CCWs, or otherwise recover those costs.*

8.2 Energy, Water, and Wastewater Prices

Energy and water prices are used to calculate the annual cost savings at different efficiency levels. DOE will derive average energy prices using recent EIA data[5] for each of the nine Census Divisions and four large states to establish appropriate energy prices. DOE is separating out those four large states to analyze the impact of standards on 32% of the U.S. general population and to develop energy prices at the smallest geographic area as the data permit. Looking at smaller geographic areas enables DOE to examine additional regional differences in the variability of energy prices. For those Census divisions containing one of the large states, DOE intends to leave out the data for those states to avoid double-counting when calculating regional average values. The Pacific region average, for example, will not include California, and the West South Central region average will not include Texas.

To calculate natural gas and oil prices for commercial consumers DOE will use data from the EIA publications *Natural Gas Monthly*[6] and *Petroleum Navigator*.[7] DOE will use water and wastewater rate survey data from the AWWA and Raftelis Financial Consultants, Inc. (a water and wastewater financial consulting firm) to determine water and wastewater prices.

If the EIA and AWWA/Raftelis data demonstrate a large variability in energy, water, and wastewater prices, DOE will conduct sensitivity analyses to determine how high and low energy, water, and wastewater price estimates affect the economic feasibility of amended energy conservation standards.

DOE will use projections of national average energy prices to commercial consumers to estimate future energy prices in its LCC analysis. DOE will use the most recent available edition of EIA's *Annual Energy Outlook* (*AEO*) as the default source of projections for future energy prices. DOE will base projections of future water and wastewater prices on an examination of trends in historical prices.

Item 8-2 *DOE seeks stakeholder input on the planned approach for estimating current and forecasted energy, water, and wastewater prices.*

8.3 Maintenance, Repair, and Installation Costs

DOE will consider any expected changes to maintenance, repair, and installation costs for the equipment covered in this rulemaking. Typically, small incremental changes in equipment efficiency incur little or no changes in repair and maintenance costs over baseline equipment. There is a greater probability that equipment having efficiencies that are significantly higher than the baseline will incur increased repair and maintenance costs, because such equipment is more likely to incorporate technologies that are not widely available. DOE will rely on input from

[5] EIA's 2010 Form 861 data and EIA's 2011 Form 826. Available at: http://205.254.135.24/cneaf/electricity/page/eia861.html and http://205.254.135.7/cneaf/electricity/page/eia826.html.
[6] Available at www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.htm.
[7] Available at http://tonto.eia.doe.gov/dnav/pet/pet_pri_dist_dcu_nus_a.htm.

manufacturers and other stakeholders in developing appropriate repair and maintenance cost estimates, as necessary.

Regarding installation costs, unless the efficiency increases considered for this rulemaking result in significantly larger or heavier equipment, DOE expects that more efficient clothes washers will not incur increased installation costs.

Item 8-3 *DOE seeks stakeholder input on whether it is correct to assume that changes in maintenance, repair, and installation costs will be negligible for more efficient commercial clothes washers. If it is incorrect, DOE is interested in the reasons why this is so and specific ways to correct this assumption.*

8.4 Equipment Lifetimes

Product lifetime is the age at which a product is retired from service. In the previous CCW rulemaking, DOE used an average lifetime of 11.25 years for multifamily applications and 7.13 years for Laundromats. DOE tentatively plans to use the same averages for the analyses. In addition, DOE plans to use various literature sources and industry experts and input from manufacturers and other interested parties to determine a range for the lifetime of commercial clothes washers.

Item 8-4 *DOE seeks stakeholder input on appropriate lifetimes for the commercial clothes washer classes covered in this rulemaking.*

8.5 Customer Discount Rates

DOE uses the discount rate to determine the present value of lifetime operating expenses. The discount rate used in the LCC analysis represents the rate from an individual customer's perspective.[8]

For owners of commercial clothes washers, DOE plans to derive the discount rates from estimates of the finance cost to purchase commercial equipment. This approach incorporates the cost of capital for companies that purchase commercial clothes washers. The cost of capital commonly is 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 plans to estimate the weighted-average cost of capital for firms in those sectors that purchase CCWs.

Item 8-5 *DOE seeks stakeholder input on the planned approach for estimating discount rates for commercial customers.*

[8] The consumer discount rate is in contrast to the discount rates used in the national impact analysis, which are intended to represent the rate of return of capital in the U.S. economy, as well as the societal rate of return on private consumption. See section 10.3 for additional information.

8.6 Energy Efficiency in the Base Case

To estimate the share of consumers that would be affected by a standard at a particular efficiency level, DOE's LCC and PBP analysis will consider the projected distribution (*i.e.*, market shares) of product efficiencies that consumers will purchase in the first compliance year under the base case (*i.e.*, the case without amended energy conservation standards). DOE requests market-share efficiency data (*i.e.*, data on the distribution of shipments by efficiency) for the two product classes of commercial clothes washers. Data on efficiency distributions may encompass market share information for front-loading and top-loading units by efficiency levels (i.e. MEF and WF). In the prior rulemaking, DOE based its base case market share data for commercial clothes washers on data that the Association of Home Appliance Manufacturers (AHAM) provided. AHAM provided shipment-weighted efficiency data rather than market share data by efficiency level. For the year 2005, the shipment-weighted efficiencies of commercial clothes washers as provided by AHAM were 1.41 MEF and 10.91 WF. For this rulemaking, DOE is requesting market-share efficiency data from recent years (*i.e.*, 2008–2010), realizing that this information may be difficult to collect. In cases where market-share efficiency data are not available, DOE will use efficiency distributions based on available models as a proxy.

The projection will use available data on recent market trends in clothes washer efficiency and will take into account the potential impacts of the ENERGY STAR program and other programs or policies that may affect the demand for more-efficient commercial clothes washers (such as consumer rebate programs or State tax credits to consumers that encourage the purchase of more-efficient products, and manufacturer tax credits that encourage the production of more-efficient products).

> ***Item 8-6*** *DOE requests data from stakeholders to characterize the current mix of commercial clothes washer efficiencies in the market, as well as expected trends in the next five years.*

8.7 Rebuttable Presumption Analysis

In addition to the LCC and PBP calculations discussed above, DOE also conducts a rebuttable presumption analysis for covered products. EPCA establishes a rebuttable presumption that a standard is economically justified if DOE 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)) DOE also routinely conducts a full economic analysis that considers the full range of impacts, including those to the consumer, manufacturer, nation, and environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this 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 preliminary determination of economic justification).

9. SHIPMENTS ANALYSIS

DOE develops shipment forecasts of products to calculate the national impacts of potential energy conservation standards on energy consumption, net present value (NPV), and future manufacturer cash flows. DOE plans to develop shipments forecasts (from the assumed compliance date of a new standard to 30 years after compliance is required) based on an analysis of key market drivers for commercial clothes washers.

9.1 Base-Case Forecast

For commercial clothes washers, DOE intends to develop a base-case shipments projection for two product classes, top-loading and front-loading. DOE plans to determine annual shipments in the base case by accounting for: (1) replacements due to failure; (2) commercial clothes washer installations in new multi-family housing and new laundromats; and (3) retirements and/or installations due to condominium conversions.

DOE plans to use multi-family housing construction forecasts from the latest available edition of EIA's *AEO* to determine shipments to new construction. To determine replacement shipments, DOE will use the same equipment lifetimes and retirement functions that it generates for the LCC and PBP analyses.

In the previous rulemaking, DOE found a significant drop in shipments after 1998 extending up to 2005. To account for this drop and to reconcile the historical shipments with the accounting model, DOE assumed every retired unit is not replaced immediately. The market share of retired units not replaced was relatively large due to the significant drop in shipments after 1998. The share of retired units not replaced during 1999 – 2005 fluctuated between nine and 31 percent. To determine the share of these units after the year 2005, DOE reviewed data from the Census Bureau's American Housing Survey on the saturation of in-unit washers (i.e., residential washers used in multi-family units) in the multi-family stock and new multi-family construction. DOE found that the saturation of in-unit washers in new construction had stayed relatively constant while the saturation in the multi-family building stock has increased by approximately 16 percent. DOE estimated that the growth in in-unit washer saturations in the multi-family stock over the last ten years was caused by conversions of rental property to condominiums, resulting in the gradual phase out or non-replacement of failed commercial clothes washers in common-area laundry facilities. For the current rulemaking, DOE will apply a similar approach to determine the non-replacement percentage due to condominium conversions. DOE also will take into consideration any other input provided by stakeholders.

DOE plans to calibrate its forecasts against historical shipments.

Item 9-1 *DOE seeks historical shipments data broken down by product class.*

Item 9-2 *DOE seeks input on whether conversions from apartments to condos/townhouses are still occurring.*

9.2 Impacts of Standards on Equipment Shipments

DOE will also develop shipments forecasts for commercial clothes washers for each set of efficiency levels (standards) analyzed. Because the standards-case forecasts consider the increase in purchase price and the decrease in operating costs caused by standards, forecasted shipments typically deviate from the base case. Because the purchase price tends to have a larger impact than operating cost on equipment purchase decisions, standards-case forecasts typically show a drop in equipment shipments relative to the base case.

DOE's past standards analyses have attempted to quantify the sensitivity of shipments to increased purchase prices and operating cost savings. DOE has conducted literature reviews and analyses of historical appliance price and efficiency data to develop estimates of the price elasticity of demand for appliances. DOE will attempt to develop price elasticities specifically for commercial clothes washers and will also evaluate the sensitivity of shipments of one clothes washer type (*e.g.*, top-loading) to changes in the price of another type (*e.g.*, front-loading). DOE developed similar cross-price elasticity for the residential clothes washer (RCW) direct final rule announced on May 11, 2012.[9] The analysis for the residential units indicated that front loader market share is positively correlated with top loader price and size and negatively correlated with front loader price. These regression results were used to derive the cross price impact of a change in the front loading washer price on the top loading market share (and vice versa). For example, a 10% increase in the mean price of front loader washers in the data resulted in a 10.7 % increase in the top-loading market share. Thus, the cross-price elasticity on top-loading market share (percent change in top-loading market share over percent change in front-loading price) is 1.07.

DOE will attempt to obtain data relevant to the commercial clothes washer market. In the alternative, DOE may rely on estimates of price elasticity from the RCW analysis. DOE will also consider modeling standards-case shipments forecasts with scenarios (*i.e.*, specified impacts to equipment shipments).

Item 9-3 *DOE requests input from manufacturers and other stakeholders on historical shipments by efficiency, historical prices of CCW for specific product categories.*

Item 9-4 *DOE seeks input from manufacturers and other stakeholders on the potential impact of amended CCW energy conservation standards on equipment shipments, and whether the elasticities developed for RCW would be appropriate for CCW.*

10. NATIONAL IMPACT ANALYSIS

This section discusses DOE's assessment of the aggregate impacts of potential energy conservation standards at the national level. Measures of impact that DOE will report include the future national energy savings (NES) from candidate standards and the net present value (NPV) of total customer costs and benefits.

[9] http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/rcw_direct_final_rule_5_14_2012.pdf

Analyzing impacts of energy conservation standards for commercial clothes washers requires a comparison of projected energy consumption with and without new or amended standards. The forecasts contain projections of annual equipment shipments in both the base and standards cases (section 9), the annual energy and water consumption of new equipment (section 6), and the purchase price of new equipment (section 7).

10.1 Projected Efficiency Trends

A key component of the NIA is the projected energy efficiency trends for the base case (without new standards) and for each standards case. For commercial clothes washers, the forecasted efficiencies represent the annual shipment-weighted energy and water consumption and wastewater production during the shipments projection period (that is, from the assumed compliance date of a new standard to 30 years after compliance with the standard is required).

DOE will also consider the mix of efficiencies sold in the absence of new standards and how that mix might change over time. DOE will collect data on historical equipment shipments and market shares of the various efficiency levels offered for each product class for the years 2000 - 2011. DOE will also attempt to collect shipment-weighted average efficiency data dating back to 1995. Based on detectable trends in the collected efficiency data, DOE will project base-case shipment-weighted efficiencies (SWEF) by product class. DOE intends to rely on input from AHAM, appliance manufacturers, and other stakeholders to develop base-case historical shipment-weighted average efficiencies. For the previous rulemaking, AHAM provided shipment weighted average efficiency data (MEF and WF) for commercial clothes washers. DOE seeks the same type of data for both clothes washer product classes.

DOE may also consider developing its own estimates based on the aggregated historical SWEF data, past and current energy conservation standards, and historical shipments data disaggregated by product class. To project base-case efficiencies, in addition to determining detectable trends in any historical SWEF data provided, DOE intends to review data from the ENERGY STAR program to determine the program's effect on increasing equipment efficiency. Based on the trends in the historical SWEF data and the ENERGY STAR program's success at transforming the commercial clothes washer market, as well its potential for future impacts on equipment efficiency, DOE will forecast base-case efficiency trends for each product class.

To estimate the impact that standards may have in the year compliance becomes required, DOE has used "roll-up" and/or "shift" scenarios in its standards rulemakings. Under the "roll-up" scenario, DOE assumes: (1) product efficiencies in the base case that do not meet the standard level under consideration would "roll-up" to meet the new standard level; and (2) product efficiencies above the standard level under consideration would not be affected. Under the "shift" scenario, DOE uses the pattern of the base-case efficiency distribution at and above the new minimum energy conservation standard. DOE will evaluate whether one of these approaches is more reasonable for commercial clothes washers, or whether it would be preferable to use both scenarios in its calculation of national impacts.

Once DOE establishes the shipment-weighted efficiencies for the assumed compliance date of the standard, it will estimate future shipment-weighted efficiencies for each standards case.

Item 10-1 *DOE seeks historical SWEF data by product class. DOE also seeks historical market share data showing the percentage of equipment shipments by efficiency level for as many product classes as possible.*

10.2 National Energy Savings

DOE will calculate national energy consumption for each year in the forecast period. DOE will calculate national energy consumption by fuel type for the base case and each standards case analyzed. For each considered efficiency level, DOE will project 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. The savings are measured over the entire lifetime of products purchased in the 30-year period.

DOE plans to perform this calculation through the use of a spreadsheet model that multiplies the stock of products (determined by the shipments projections) by unit energy savings, accounting for the stock of products affected by the energy conservation standards. In response to comments by stakeholders in prior rulemakings who asked for a simple, transparent model, DOE has developed NIA spreadsheet models to forecast energy savings from standards at different efficiency levels.

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

10.3 Net Present Value

The inputs for determining NPV of the total costs and benefits experienced by consumers of the considered appliances are: (1) total annual installed cost; (2) total annual savings in operating costs; (3) a discount factor; (4) present value of costs; and (5) present value of savings. DOE calculates net savings each year as the difference between the base case and each standards case in terms of the total savings in operating costs and total increases in installed costs. DOE calculates savings over the life of each product. DOE calculates NPV as the difference between the present value of operating cost savings and the present value of total installed costs.

DOE calculates increases in total installed costs as the product of the difference in total installed cost between the base case and a standards case. DOE expresses savings in operating costs as decreases associated with the lower energy consumption of products bought in the standards case

compared to the base case. Total savings in operating costs are the product of savings per unit and the number of units of each vintage that survive in a given year.

According to U.S. Office of Management and Budget (OMB) guidelines for Federal agencies, DOE will conduct two NPV calculations, one using a real discount rate of 3 percent and another using a real discount rate of 7 percent (OMB, Circular A-4: Regulatory Analysis (2003)). 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 "societal rate of time preference," which is the rate at which society discounts future consumption flows to their present value.

11. CONSUMER SUBGROUP ANALYSIS

A customer subgroup comprises a subset of the population that is likely to be affected disproportionately by new or revised energy conservation standards. The purpose of a subgroup analysis is to determine the extent of this disproportionate impact. DOE will work with stakeholders early in the rulemaking process to identify any subgroups for consideration. DOE may consider analyzing the impacts of any standards on the following subgroups: (1) laundromats, (2) landlord-owned apartment buildings, and (3) other related businesses, such as lodging establishments, that have on-site laundry facilities.

In comparing potential impacts on the different customer subgroups, DOE will evaluate variations in energy prices and energy use profiles that might affect the LCC of an energy conservation standard to certain customer subgroups.

Item 11-1 *DOE requests input on any customer subgroups it should consider when analyzing standards for commercial clothes washers.*

12. MANUFACTURER IMPACT ANALYSIS

The manufacturer impact analysis (MIA) provides an assessment of the potential impacts of energy conservation standards on manufacturers of commercial clothes washers. Quantitative results of this analysis include estimates of the industry net present value and domestic manufacturing employment both absent and following amended energy conservation standards. In addition to quantitative estimates, the MIA serves to identify and describe impacts to the industry qualitatively. Qualitative analyses include assessments of key issues facing the commercial clothes washer industry, the cumulative regulatory burden felt by manufacturers, the impact on competition, and a determination of disproportionate impacts on sub-groups of manufacturers operating in this industry.[10]

[10] For additional information, see, "Energy Conservation Standards Activities" (Standards Activities), which is available on the DOE website at: http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/congressional_report_013106.pdf.

12.1 Sources of Information for the Manufacturer Impact Analysis

Many of the analyses described earlier in this framework document provide important information that DOE uses as inputs for the MIA. Such information includes the manufacturing costs as taken from the engineering analysis (section 5), as well as price forecasts (section 7), and shipments forecasts (section 9). DOE supplements this and other information taken from publicly available sources with information gathered during confidential interviews with manufacturers.

DOE conducts detailed interviews with manufacturers to gain insight into the range of potential impacts of efficiency standards. The interview process plays a critical role in the MIA, since it provides an opportunity for directly affected parties to express their views on important issues and comment on preliminary findings. During the interviews, DOE solicits information on a variety of topics including the anticipated impact of standards on manufacturing costs, sales, direct employment, capital expenditure, and industry competitiveness. DOE prefers an interactive interview because it helps to clarify responses and provides the opportunity to identify additional issues. DOE asks that interview participants identify all confidential information consistent with DOE regulations at 10 CFR 1004.11.

12.2 Industry Cash Flow and Direct Employment Analyses

To estimate the impact of amended efficiency standards to commercial clothes washer manufactures, DOE uses a discounted cash flow model to arrive at the industry net present value. The industry cash flow model uses a number of inputs including industry weighted average financial parameters, estimated upfront compliance costs, manufacturer production costs, and manufacturer markups, as well as shipments and pricing forecasts to determine a series of annual cash flows. These cash flows begin at the announcement of the new standard and continue for several years after its implementation. For inputs that carry particular uncertainly, DOE models multiple scenarios to determine the full range of likely impacts to industry. DOE compares the results against base-case projections that involve no new standards. The financial impact of new standards is the difference between the two sets of discounted annual cash flows.

The direct employment analysis builds off the industry cash flow model and is used to determine the likely impact to domestic manufacturing employment for the commercial clothes washer industry. This analysis uses the projected industry labor costs as calculated in the cash flow model in conjunction with labor statistics from the Annual Survey of Manufacturers and confidential information provided by manufacturers to estimate domestic manufacturing employment levels both with and without amended efficiency standards.

12.3 Manufacturer Subgroup Analysis

It is possible that an industry aggregate analysis may not adequately portray the different degree to which impacts are felt by different subgroups of manufacturers. DOE recognizes that smaller manufacturers, niche players, and manufacturers whose operations differ significantly from those typical of the industry may be affected differently by standards. Ideally, DOE would consider the impact on every firm individually. In highly concentrated industries, this may be possible.

In industries having numerous participants, however, DOE uses the results of the market and technology assessment to group manufacturers into subgroups, as appropriate.

For this rulemaking, DOE will consider small businesses as one manufacturer subgroup. Small business size standards are listed by North American Industry Classification System (NAICS) code and industry description. Commercial laundry, dry-cleaning and pressing machine manufacturing is classified under NAICS 333312, and manufacturers must have 500 employees or fewer to qualify as a small business according to the Small Business Administration size limitations. A search of companies operating under this NAICS code indicates that there is one small business that manufactures commercial clothes washers that may be covered by this rulemaking.

In addition to the small business manufacturer subgroup, following the precedent set by the CCW final rule published in 2010, DOE will consider "low-volume manufacturers" (LVM) as an additional subgroup. DOE has identified one manufacturer of commercial clothes washers as a LVM due to its sole focus on the laundry business, lower total shipment volume, and lower revenues as compared to its competitors. DOE will incorporate this subgroup into its analysis.

DOE examines publicly available data and contacts manufacturers, when needed, to determine if they meet the criteria set forth for the subgroup analysis and if their manufacturing facilities are located within the United States. DOE will then interview qualifying businesses affected by the rulemaking to determine if there are significant impacts that may result from new energy conservation standards and how those impacts may differ from the rest of the industry.

Item 12-1 *DOE seeks comment on appropriate manufacturer subgroups for commercial clothes washers that DOE should consider in a manufacturer subgroup analysis.*

12.4 Competitive Impacts Assessment

EPCA directs DOE to consider any lessening of competition that is likely to result from an imposition of standards. (42 U.S.C. 6295(o)(2)(B)(i)(V) and 6316(a)) It further directs the Attorney General to determine in writing the impacts, if any, of any lessening of competition. (42 U.S.C. 6295(o)(2)(B)(ii) and 6316(a))

DOE makes a determined effort to gather firm-specific financial information and impacts, and reports the aggregated impact of the standard on the commercial clothes washer industry at large. The competitive impacts analysis focuses on determining any significant disproportionate impacts on specific manufacturers. DOE bases the assessment on manufacturing cost data and information collected from interviews with manufacturers. DOE provides the Attorney General with a copy of the NOPR for consideration in his/her evaluation of the impact of standards on the lessening of competition.

12.5 Cumulative Regulatory Burden

DOE is aware that efficiency standards exist for other products produced by manufacturers of commercial clothes washers. Additionally, DOE is aware that other regulations outside of the

scope of energy efficiency standards may apply to equipment covered under this rulemaking. Multiple regulations may result in a significant, cumulative regulatory burden for these manufacturers. Accordingly, DOE will analyze and seek to mitigate the overlapping effects of amended DOE standards and other regulatory actions on manufacturers of commercial clothes washers.

Item 12-2 *What regulations or pending regulations should DOE consider in its examination of cumulative regulatory burden?*

13. UTILITY IMPACT ANALYSIS

To estimate the effects of energy conservation standards for commercial clothes washers on the electric and gas utility industries, DOE plans to use EIA's NEMS-BT model. NEMS is a large, multi-sectoral, partial-equilibrium model of the U.S. energy sector that EIA has developed throughout several years, primarily for the purpose of preparing the *AEO*. NEMS, which is available in the public domain, produces a widely recognized reference case forecast for the United States through 2035.[11]

The utility impact analysis is a comparison between the NEMS-BT model results for the base case and standards cases. Typical outputs include forecasts of electricity and gas sales and avoided capacity. DOE plans to conduct the utility impact analysis as a scenario departing from the latest *AEO* reference case. In other words, DOE will model the energy savings impacts from amended energy conservation standards using NEMS-BT to generate forecasts that deviate from the *AEO* reference case.

Item 13-1 *DOE seeks input from stakeholders regarding its plan to use NEMS-BT to conduct the utility impact analysis. Is the NEMS-BT model appropriate for assessing utility impacts of energy conservation standards? If not, why? What would be a more appropriate model for DOE to use?*

14. EMPLOYMENT IMPACT ANALYSIS

Employment impacts include direct and indirect impacts. Direct employment impacts are any changes in the number of employees of manufacturers of the equipment subject to standards, their suppliers, and related service firms. The MIA addresses those impacts. Indirect employment impacts from standards consist of the net jobs created or eliminated in the national economy,

[11] For more information on NEMS, please refer to the U.S. Department of Energy, Energy Information Administration documentation. A useful summary is The National Energy Modeling System: An Overview 2000, DOE/EIA-0581(March 2000), available at http://tonto.eia.doe.gov/ftproot/forecasting/05812000.pdf. 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 EIA assumptions, DOE refers to the model by the name NEMS-BT.

other than in the manufacturing sector being regulated, caused by: (1) reduced spending by end users on energy; (2) reduced spending on new energy supply by the utility industry; (3) increased spending on new equipment to which the new standards apply; 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). The BLS regularly publishes its estimates of the number of jobs per million dollars of economic activity in different sectors of the economy, as well as the jobs created elsewhere in the economy by this same economic activity. Data from BLS indicate that expenditures in the utility sector generally create fewer jobs (both directly and indirectly) than expenditures in other sectors of the economy.[12] 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).

DOE plans to estimate 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).[13] 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 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. DOE may consider the use of other modeling approaches for examining long run employment impacts.

Item 14-1 *DOE welcomes feedback on its approach to assessing national employment impacts.*

15. EMISSIONS ANALYSIS

In the emissions analysis, which is conducted in the NOPR phase, DOE will estimate the reduction in power sector emissions of carbon dioxide (CO_2), nitrogen oxides (NO_X), and

[12] See Bureau of Economic Analysis, Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II). Washington, DC. U.S. Department of Commerce, 1992.
[13] J. M. Roop, M. J. Scott, and R. W. Schultz, ImSET 3.1: Impact of Sector Energy Technologies, PNNL-18412, Pacific Northwest National Laboratory, 2009. Available at: www.pnl.gov/main/publications/external/technical_reports/PNNL-18412.pdf

mercury (Hg) using NEMS-BT. In the emissions analysis, NEMS-BT is run similarly to the *AEO* NEMS, except that energy use is reduced by the amount of energy saved (by fuel type) due to each considered standard level. The inputs of national energy savings come from the NIA spreadsheet model, while the output is the projected physical emissions. The net benefit of each considered standard level is the difference between the projected emissions estimated by NEMS-BT at that level and the latest *AEO* Reference Case.

In addition to estimating impacts of standards on power sector emissions, DOE will estimate emissions impacts in production activities that provide the energy inputs to power plants. (These are referred to as "upstream" emissions.) This FFC analysis includes impacts on emissions of methane and nitrous oxide, both of which are recognized as greenhouse gases.

15.1 Carbon Dioxide

In the absence of any Federal emissions control regulation of power plant emissions of CO_2, a DOE standard is likely to result in reductions of these emissions. The CO_2 emission reductions likely to result from a standard will be estimated using NEMS-BT and national energy savings estimates drawn from the NIA spreadsheet model. The net benefit of the standard is the difference between emissions estimated by NEMS-BT at each standard level considered and the *AEO* Reference Case. NEMS-BT tracks CO_2 emissions using a detailed module that provides results with broad coverage of all sectors and inclusion of interactive effects.

15.2 Sulfur Dioxide

Sulfur dioxide (SO_2) emissions from affected electric generating units (EGUs) are subject to nationwide and regional emissions cap and trading programs, and DOE has preliminarily determined that these programs create uncertainty about the potential standards' impact on SO_2 emissions. 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. SO_2 emissions from 28 eastern states and D.C. are also limited under the Clean Air Interstate Rule (CAIR), (70 Fed. Reg. 25162, May 12, 2005), which created an allowance-based trading program. In 2008, CAIR was remanded to the U.S. Environmental Protection Agency (EPA) by the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit), see *North Carolina v. EPA*, 550 F.3d 1176 (D.C. Cir. 2008), but it remained in effect temporarily, consistent with the D.C. Circuit's earlier opinion in *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. 76 FR 48208 (August 8, 2011). On December 30, 2011, however, the D.C. Circuit stayed the new rules while a panel of judges reviews them, and directed EPA to continue enforcing CAIR (see *EME Homer City Generation v. EPA*, No. 11-1302, Order at *2 (D.C. Cir. Dec. 30, 2011)).

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 imposition of an efficiency standard could be used to permit offsetting increases in SO_2 emissions by any regulated EGU. However, if the standard resulted in a permanent increase in the quantity of unused emissions allowances, there would be an overall reduction in SO_2 emissions from the

standards. While there remains some uncertainty about the ultimate effects of efficiency standards on SO_2 emissions covered by the existing cap and trade system, the NEMS-BT modeling system that DOE uses to forecast emissions reductions currently indicates that no physical reductions in power sector emissions would occur for SO_2.

15.3 Nitrogen Oxides

Under CAIR, there is a cap on NOx emissions in 28 eastern states and the District of Columbia. All these States and D.C. have elected to reduce their NOx emissions by participating in cap-and-trade programs for EGUs. Therefore, energy conservation standards for commercial clothes washers may have little or no physical effect on these emissions in the 28 eastern states and the D.C. for the same reasons that they may have little or no physical effect on SO_2 emissions. DOE uses NEMS-BT to estimate NOx emissions reductions from possible standards in the States where emissions are not capped.

15.4 Mercury

On December 21, 2011, EPA announced national emissions standards for hazardous air pollutants (NESHAPs) for mercury and certain other pollutants emitted from coal and oil-fired EGUs. 76 FR 24976. The NESHAPs do not include emissions caps and, as such, DOE's energy conservation standards would likely reduce Hg emissions. For the emissions analysis for this rulemaking, DOE plans to estimate mercury emissions reductions using the most recent NEMS-BT, which may incorporate projected impacts of the NESHAPs.

15.5 Particulate Matter

DOE acknowledges that particulate matter (PM) exposure can impact human health. Power plant emissions can have either direct or indirect impacts on PM. A portion of the pollutants emitted by a power plant are in the form of particulates as they leave the smoke stack. These are direct, or primary, PM emissions. However, the great majority of PM emissions associated with power plants are in the form of secondary sulfates, which are produced at a significant distance from power plants by complex atmospheric chemical reactions that often involve the gaseous (non-particulate) emissions of power plants, mainly SO_2 and NO_X. The quantity of the secondary sulfates produced is determined by a very complex set of factors including the atmospheric quantities of SO_2 and NO_X, and other atmospheric constituents and conditions. Because these highly complex chemical reactions produce PM comprised of different constituents from different sources, EPA does not distinguish direct PM emissions from power plants from the secondary sulfate particulates in its ambient air quality requirements, PM monitoring of ambient air quality, or PM emissions inventories. For these reasons, it is not currently possible to determine how the amended standard impacts either direct or indirect PM emissions. Therefore, DOE is not planning to assess the impact of these standards on PM emissions. Further, as described previously, it is uncertain whether efficiency standards will result in a net decrease in power plant emissions of SO_2, which are now largely regulated by cap and trade systems.

Item 15-1 *DOE seeks input on its plans to use NEMS-BT to analyze emissions impacts of potential standards on commercial clothes washers.*

16. MONETIZING CARBON DIOXIDE AND OTHER EMISSIONS REDUCTIONS

DOE plans to consider the estimated monetary benefits likely to result from the reduced emissions of CO_2 and NO_X that are expected to result from each of the standard levels considered.

In order to estimate the monetary value of benefits resulting from reduced emissions of CO_2, DOE plans to use the most current social cost of carbon (SCC) values developed and/or agreed to by an interagency process. The SCC is intended to be a monetary measure of the incremental damage resulting from greenhouse gas (GHG) emissions, including, but not limited to, net agricultural productivity loss, human health effects, property damage from sea level rise, and changes in ecosystem services. Any effort to quantify and to monetize the harms associated with climate change will raise serious questions of science, economics, and ethics. But with full regard for the limits of both quantification and monetization, the SCC can be used to provide estimates of the social benefits of reductions in GHG emissions.

At the time of this notice, the most recent interagency estimates of the potential global benefits resulting from reduced CO_2 emissions in 2010, expressed in 2010$, were $4.9, $22.3, $36.5, and $67.6 per metric ton avoided. For emissions reductions that occur in later years, these 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 DOE will give preference to consideration of the global benefits of reducing CO_2 emissions. To calculate a present value of the stream of monetary values, DOE will discount the values in each of the four cases using the discount rates that had been used to obtain the SCC values in each case.

DOE recognizes that scientific and economic knowledge continues to evolve rapidly as to the contribution of CO_2 and other GHG to changes in the future global climate and the potential resulting damages to the world economy. Thus, these values are subject to change.

DOE also intends to estimate the potential monetary benefit of reduced NO_X emissions resulting from the standard levels it considers. For NO_X emissions, available estimates suggest a very wide range of monetary values for NO_X emissions, ranging from $450 to $4,623 per ton in 2010$.[14] In accordance with OMB guidance, DOE will conduct two calculations of the monetary benefits derived using each of the economic values used for NO_X, one using a real discount rate of 3 percent and another using a real discount rate of 7 percent.[15]

DOE does not plan to monetize estimates of Hg in this rulemaking. DOE is aware of multiple agency efforts to determine the appropriate range of values used in evaluating the potential economic benefits of reduced Hg emissions. DOE has decided to await further guidance regarding consistent valuation and reporting of Hg emissions before it monetizes Hg in its rulemakings.

[14] For additional information, refer to 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.

[15] OMB, Circular A-4: Regulatory Analysis (Sept. 17, 2003).

17. REGULATORY IMPACT ANALYSIS

As part of the NOPR stage of this rulemaking, DOE will prepare a regulatory impact analysis that addresses the potential for non-regulatory approaches to supplant or augment energy conservation standards to improve the efficiency of commercial clothes washers. DOE recognizes that voluntary or other non-regulatory efforts by manufacturers, utilities, and other interested parties can result in substantial efficiency improvements. DOE intends to analyze the likely effects of non-regulatory initiatives on equipment energy use, consumer utility, and LCCs. DOE will attempt to base its assessment on the actual impacts of any such initiatives to date, but also will consider information on the impacts that an existing initiative might have in the future.

If DOE proposes energy conservation standards for commercial clothes washers and the NOPR constitutes a significant regulatory action, DOE would submit to OMB's Office of Information and Regulatory Affairs the assessment of costs and benefits required under section 6(a)(3) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (October 4, 1993).

APPENDIX A – SUMMARY OF ITEMS FOR COMMENT FROM INTERESTED PARTIES

DOE requests comments from interested parties on the following issues: