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DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE–2008–BT–STD–0005]

RIN 1904–AB57

Energy Conservation Program: Energy Conservation Standards for External Power Supplies

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

ACTION: Final rule.

SUMMARY: Pursuant to the Energy Policy and Conservation Act of 1975 (EPCA), as amended, today's final rule amends the energy conservation standards that currently apply to certain external power supplies and establishes new energy conservation standards for other external power supplies that are currently not required to meet such standards. Through its analysis, DOE has determined that these changes satisfy EPCA's requirements that any new and amended energy conservation standards for these products result in the significant conservation of energy and be both technologically feasible and economically justified.

DATES: The effective date of this rule is April 11, 2014. Compliance with the new and amended standards established for EPSs in today's final rule is February 10, 2016.

The incorporation by reference of a certain publication listed in this rule is approved by the Director of the Federal Register on April 11, 2014.

ADDRESSES: The docket, which includes **Federal Register** notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at regulations.gov. All documents in the docket are listed in the regulations.gov index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket can be accessed from the regulations.gov homepage by searching for Docket ID EERE–2008–BT–STD–0005. The regulations.gov Web page contains simple instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket, contact Ms. Brenda Edwards at (202) 586–2945 or by email: *Brenda.Edwards@ee.doe.gov.*

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SUPPLEMENTARY INFORMATION: This final rule incorporates by reference into part 430 the following industry standard:

International Efficiency Marking Protocol for External Power Supplies, Version 3.0

The above referenced document has been added to the docket for this rulemaking and can be downloaded from Docket EERE–2008–BT–STD–0005 on *Regulations.gov.*

The document is discussed in section IV.O of this notice.

Table of Contents

I. Summary of the Final Rule and Its Benefits

Today's notice announces the Department of Energy's (DOE's) amended and new energy conservation standards for certain classes of external power supplies (EPSs). These standards, which are based on a series of mathematical equations that vary based on output power, will affect a wide variety of EPSs used in a wide variety of consumer applications.

Title III, Part B [1] of the Energy Policy and Conservation Act of 1975 (EPCA or the Act), Public Law 94–163 (42 U.S.C. 6291–6309, as codified), established the Energy Conservation Program for Consumer Products Other Than Automobiles.[2] Pursuant to EPCA, any new and amended energy conservation standard that DOE prescribes for certain products, such as EPSs, shall be designed to achieve the maximum improvement in energy efficiency that DOE determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) Furthermore, the new and amended standard must result in significant conservation of energy. (42 U.S.C. 6295(o)(3)(B)) In accordance with these provisions, DOE is amending the standards for certain EPSs—those devices that are already regulated by standards enacted by Congress in 2007—and establishing new standards for EPSs that have not yet been regulated by DOE. These standards, which prescribe a minimum average efficiency during active mode (i.e. when an EPS is plugged into the main electricity supply and is supplying power in response to a load demand from another connected device) and a maximum power consumption level during no-load mode (i.e. when an EPS is plugged into the main electricity supply but is not supplying any power in response to a demand load from another connected device), are expressed as a function of the nameplate output power (i.e. the power output of the EPS). These standards are shown in Table I–1. and will apply to all products listed in Table I.1 and manufactured in, or imported into, the United States starting on February 10, 2016.

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[1] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

[2] All references to EPCA in this document refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Public Law 112–210 (Dec. 18, 2012).

Table I-1. Energy Conservation Standards for Direct Operation EPSs* (Compliance Starting **February 10, 2016.**)

Single-Voltage External AC-DC Power Supply, Basic-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** (expressed as a decimal)	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.100
1 W $< P_{out} \leq$ 49 W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.100
49 W $< P_{out} \leq$ 250 W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-DC Power Supply, Low-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** (expressed as a decimal)	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.100
1 W $< P_{out} \leq$ 49 W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.100
49 W $< P_{out} \leq$ 250 W	≥ 0.870	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-AC Power Supply, Basic-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** (expressed as a decimal)	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.210
1 W $< P_{out} \leq$ 49 W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.210
49 W $< P_{out} \leq$ 250 W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-AC Power Supply, Low-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** (expressed as a decimal)	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.210
1 W $< P_{out} \leq$ 49 W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.210

49 W < $P_{out} \leq$ 250 W	$\geq$ 0.870	$\leq$ 0.210
P_{out} > 250 W	$\geq$ 0.875	$\leq$ 0.500
Multiple-Voltage External Power Supply		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** (expressed as a decimal)	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq$ 1 W	$\geq 0.497 \times P_{out} + 0.067$	$\leq$ 0.300
1 W < $P_{out} \leq$ 49 W	$\geq 0.075 \times \ln(P_{out}) + 0.561$	$\leq$ 0.300
P_{out} > 49 W	$\geq$ 0.860	$\leq$ 0.300

* Excludes any device that requires Federal Food and Drug Administration (FDA) listing and approval as a medical device in accordance with section 513 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360(c)) and any AC-DC EPS with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charges the battery of a product that is fully or primarily motor operated. Additionally, consistent with EPCA, certain EPSs used for certain life safety and security equipment do not need to meet the no-load mode requirements.

The new and amended standards being adopted today apply to all direct operation EPSs, both Class A and non-Class A, with the exceptions noted in the footnote to Table I–1. These exemptions are discussed in more detail in Section IV.A.2.d and Section B.5. Note that the standards established by Congress for Class A EPSs will continue in force for all Class A EPSs, including indirect operation EPSs. Therefore, all indirect operation Class A EPSs must continue to meet the standards established by Congress at efficiency level IV (discussed in Section II.B.1), while direct operation Class A EPSs will be required to meet the more stringent standards being adopted today.

A. Benefits and Costs to Consumers

Table I–2 presents DOE's evaluation of the economic impacts of today's standards on EPS consumers, as measured by the average life-cycle cost (LCC) savings, the median payback period, and the average lifetime. The average LCC savings are positive and the median payback periods are less than the average lifetimes for all product classes for which consumers are impacted by the standards.

Table I-2 Impacts of Today's Standards on Consumers of EPSs

Representative Unit	Average LCC Savings (2012$)	Median Payback Period (years)	Average Lifetime (years)
2.5W AC-DC, Basic Voltage	0.17	3.7	4.8
18W AC-DC, Basic Voltage	0.81	2.9	4.5
60W AC-DC, Basic Voltage	0.90	1.3	4.1
120W AC-DC, Basic Voltage	0.79	1.7	3.7
203W Multiple-Voltage	2.38	4.0	5.0
345W High-Power	142.18	0.0	10.0

B. Impact on Manufacturers

The industry net present value (INPV) is the sum of the discounted cash flows to the industry from the base year through the end of the analysis period (2013 to 2044). Using a real discount rate of 7.1 percent, DOE estimates that the industry net present value (INPV) for manufacturers of EPSs is $274.0 million in 2012$. Under today's standards, DOE expects that manufacturers may lose up to 18.7 percent of their INPV, which is approximately $51.2 million. Additionally, based on DOE's interviews with the manufacturers of EPSs no domestic OEM EPS manufacturers were identified and therefore, DOE does not expect any plant closings or significant loss of employment.

C. National Benefits [3]

DOE's analyses indicate that today's standards would save a significant amount of energy. The lifetime savings for EPSs purchased in the 30-year period that begins in the year of compliance with new and amended standards (2015–2044) amount to 0.94 quads. The annual energy savings in 2030 amount to 0.15 percent of total residential energy use in 2012.[4]

The estimated cumulative net present value (NPV) of total consumer costs and savings of today's standards for EPSs ranges from $1.9 billion (at a 7-percent discount rate) to $3.8 billion (at a 3-percent discount rate). This NPV expresses the estimated total value of future operating-cost savings minus the estimated increased product costs for products purchased in 2015–2044.

In addition, today's standards are projected to yield significant environmental benefits. The energy savings would result in cumulative greenhouse gas emission reductions of approximately 47.0 million metric tons (Mt) [5] of carbon dioxide (CO_2), 81.7 thousand tons of sulfur dioxide (SO_2), 15.0 thousand tons of nitrogen oxides (NO_X) and 0.1 tons of mercury (Hg).[6] Through 2030, the estimated energy savings would result in cumulative emissions reductions of 23.6 Mt of CO_2.

The value of the CO_2 reductions is calculated using a range of values per metric ton of CO_2 (otherwise known as the Social Cost of Carbon, or SCC) developed and recently updated by an interagency process.[7] The derivation of the SCC values is discussed in section IV.L. DOE estimates that the net present monetary value of the CO_2 emissions reductions is between $0.4 billion and $4.7 billion. DOE also estimates that the net present monetary value of the NO_X emissions reductions is $0.014 billion at a 7-percent discount rate and $0.024 billion at a 3-percent discount rate.[8]

Table I–3 summarizes the national economic costs and benefits expected to result from today's standards for EPSs.

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[3] All monetary values in this section are expressed in 2012 dollars and are discounted to 2013.

[4] Total residential energy use in 2012 was 20.195 quads. See: *http://www.eia.gov/totalenergy/data/monthly/?src=Total-f3# consumption*

[5] A metric ton is equivalent to 1.1 short tons. Results for NO_X and Hg are presented in short tons.

[6] DOE calculated emissions reductions relative to the *Annual Energy Outlook 2013* (*AEO 2013*) Reference case, which generally represents current legislation and environmental regulations for which implementing regulations were available as of December 31, 2012.

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

[8] DOE is currently investigating valuation of avoided Hg and SO_2 emissions.

Table I-3. Summary of National Economic Benefits and Costs of EPS Energy Conservation Standards, Present Value for EPS Shipped in 2015-2044 in Billion 2012$

Category	Present Value (Billion 2012$)	Discount Rate
Benefits		
Operating Cost Savings	3.9	7%
	7.1	3%
CO_2 Reduction Monetized Value ($11.8/t case)*	0.4	5%
CO_2 Reduction Monetized Value ($39.7/t case)*	1.5	3%
CO_2 Reduction Monetized Value ($61.2/t case)*	2.4	2.5%
CO_2 Reduction Monetized Value ($117/t case)*	4.7	3%
NO_X Reduction Monetized Value (at $2,639/ton)**	0.014	7%
	0.024	3%
Total Benefits†	5.5	7%
	8.6	3%
Costs		
Incremental Installed Costs	2.0	7%
	3.3	3%
Net Benefits		
Including CO_2 and NO_X Reduction Monetized Value†	3.5	7%
	5.4	3%

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

** The value represents the average of the low and high NO_X values used in DOE's analysis.

† Total Benefits for both the 3% and 7% cases are derived using the series corresponding to average SCC with 3-percent discount rate.

The benefits and costs of today's standards, for products sold in 2015–2044, can also be expressed in terms of annualized values. The annualized monetary values are the sum of (1) the annualized national economic value of the benefits from operating the product (consisting primarily of operating cost savings from using less energy, minus increases in equipment purchase and installation costs, which is another way of representing consumer NPV), plus (2) the annualized monetary value of the benefits of emission reductions, including CO_2 emission reductions.[9]

Although adding the value of consumer savings to the value of emission reductions provides a valuable perspective, two issues should be considered. First, the national operating cost savings are domestic U.S. consumer monetary savings that occur as a result of market transactions, while the value of CO_2 reductions is based on a global value. Second, the assessments of operating cost savings and CO_2 savings are performed with different methods that use different time frames for analysis. The national operating cost savings is measured for the lifetime of EPSs shipped in 2015–2044. The SCC values, on the other hand, reflect the present value of all future climate-related impacts resulting from the emission of one metric ton of carbon dioxide in each year. These impacts continue well beyond 2100.

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[9] DOE used a two-step calculation process to convert the time-series of costs and benefits into annualized values. First, DOE calculated a present value in 2013, the year used for discounting the NPV of total consumer costs and savings, for the time-series of costs and benefits using discount rates of three and seven percent for all costs and benefits except for the value of CO_2 reductions. For the latter, DOE used a range of discount rates, as shown in Table I.3. From the present value, DOE then calculated the fixed annual payment over a 30-year period (2013 through 2042) that yields the same present value. The fixed annual payment is the annualized value. Although DOE calculated annualized values, this does not imply that the time-series of cost and benefits from which the annualized values were determined is a steady stream of payments.

Estimates of annualized benefits and costs of today's standards are shown in Table I–4. The results under the primary estimate are as follows. Using a 7-percent discount rate for benefits and costs other than CO_2 reduction, for which DOE used a 3-percent discount rate along with the average SCC series that uses a 3-percent discount rate, the cost of the standards in today's rule is $147 million per year in increased equipment costs to consumers, while the benefits are $293 million per year in reduced equipment operating costs to consumers, $77 million in CO_2 reductions, and $1.1 million in reduced NO_X emissions. In this case, the net benefit amounts to $223 million per year. Using a 3-percent discount rate for all benefits and costs and the average SCC series, the cost of the standards in today's rule is $162 million per year in increased equipment costs, while the benefits are $350 million per year in reduced operating costs, $77 million in CO_2 reductions, and $1.2 million in reduced NO_X emissions. In this case, the net benefit amounts to $266 million per year.

Table I-4 Annualized Benefits and Costs of New and Amended Standards for EPSs, in Million 2012$

	Discount Rate	Primary Estimate*	Low Net Benefits Estimate*	High Net Benefits Estimate*
		million 2012$/year		
Benefits				
Consumer Operating Cost Savings	7%	293	292	298
	3%	350	347	356
CO_2 Reduction ($11.8/t case)**	5%	22	22	22
CO_2 Reduction ($39.7/t case)**	3%	77	77	77
CO_2 Reduction ($61.2/t case)**	2.5%	114	114	114
CO_2 Reduction ($117/t case)**	3%	235	235	235
NO_X Reduction at $2,639/ton**	7%	1.06	1.06	1.06
	3%	1.20	1.20	1.20
Total Benefits†	7% plus CO_2 range	316 to 529	315 to 528	321 to 534
	7%	371	369	375
	3% plus CO_2 range	373 to 586	370 to 583	379 to 592
	3%	428	425	434
Costs				
Consumer Incremental Product Costs	7%	147	147	94
	3%	162	162	96
Net Benefits				
Total†	7% plus CO_2 range	169 to 382	168 to 381	227 to 440
	7%	223	222	281
	3% plus CO_2 range	211 to 424	209 to 422	284 to 497
	3%	266	263	338

* This table presents the annualized costs and benefits associated with EPSs shipped in 2015 - 2044. These results include benefits to consumers which accrue after 2044 from EPSs purchased from 2015 - 2044. Costs incurred by manufacturers, some of which may be incurred prior to 2015 in preparation for the rule, are not directly included, but are indirectly included as part of incremental equipment costs. The Primary, Low Benefits, and High Benefits Estimates utilize projections of energy prices from the AEO 2013 Reference case, Low Estimate, and High Estimate, respectively. In addition, incremental product costs reflect a constant rate for projected product price trends in the Primary Estimate, a constant rate for projected product price trends in the Low Benefits Estimate, and a declining rate for projected product price trends in the High Benefits Estimate. The methods used to derive projected price trends are explained in section IV.F.1.

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

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

D. Conclusion

Based on the analyses culminating in this final rule, DOE found the benefits to the Nation of the standards (energy savings, consumer LCC savings, positive NPV of consumer benefit, and emission reductions) outweigh the burdens (loss of INPV and LCC increases for some users of these products). DOE has concluded that the standards in today's final rule represent the maximum improvement in energy efficiency that is technologically feasible and economically justified, and would result in significant conservation of energy.

II. Introduction

The following section briefly discusses the statutory authority underlying today's final rule, as well as some of the relevant historical background related to the establishment of standards for EPSs.

A. Authority

Title III, Part B[10] of the Energy Policy and Conservation Act of 1975 (EPCA or the Act), Public Law 94–163 (42 U.S.C. 6291–6309, as codified) established the Energy Conservation Program for Consumer Products Other Than Automobiles, a program covering most major household appliances (collectively referred to as ''covered products''),[11] which includes the types of EPSs that are the subject of this rulemaking. (42 U.S.C. 6295(u)) (DOE notes that under 42 U.S.C. 6295(m), the agency must periodically review its already established energy conservation standards for a covered product. Under this requirement, the next review that DOE would need to conduct must occur no later than six years from the issuance of a final rule establishing or amending a standard for a covered product.)

Pursuant to EPCA, DOE's energy conservation program for covered products consists essentially of four parts: (1) Testing; (2) labeling; (3) the establishment of Federal energy conservation standards; and (4) certification and enforcement procedures. The Federal Trade Commission (FTC) is primarily responsible for labeling, and DOE implements the remainder of the program. The labeling of EPSs, however, is one of the few exceptions for which either agency may establish requirements as needed. See 42 U.S.C. 6294(a)(5)(A). Subject to certain criteria and conditions, DOE is required to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of each covered product. (42 U.S.C. 6293) Manufacturers of covered products must use the prescribed DOE test procedure as the basis for certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA and when making representations to the public regarding the energy use or efficiency of those products. (42 U.S.C. 6293(c) and 6295(s)) Similarly, DOE must use these test procedures to determine whether the products comply with standards adopted pursuant to EPCA. *Id.* The DOE test procedures for EPSs currently appear at title 10 of the Code of Federal Regulations (CFR) part 430, subpart B, appendix Z. See also 76 FR 31750 (June 1, 2011) (finalizing the most recent amendment to the test procedures for EPSs).

DOE must follow specific statutory criteria for prescribing new and amended standards for covered products. As indicated above, any new and amended standard for a covered product must be designed to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6295(o)(3)) Moreover, DOE may not prescribe a standard: (1) For certain products, including EPSs, if no test procedure has been established for the product, or (2) if DOE determines by rule that the new and amended standard is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)(A)–(B)) In deciding whether a new and amended standard is economically justified, DOE must determine whether the benefits of the standard exceed its burdens. (42 U.S.C. 6295(o)(2)(B)(i)) DOE must make this determination after receiving comments on the proposed standard and by considering, to the greatest extent practicable, the following seven factors:

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

(42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII))

EPCA, as codified, also contains what is known as an ''anti-backsliding'' provision, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C.

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[10] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

[11] All references to EPCA in this document refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Public Law 112–210 (Dec. 18, 2012).

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

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

Additionally, 42 U.S.C. 6295(q)(1) specifies requirements when promulgating a standard for a type or class of covered product that has two or more subcategories. DOE must specify a different standard level than that which applies generally to such type or class of product for any group of covered products that have the same function or intended use if DOE determines that products within such group (A) consume a different kind of energy from that consumed by other covered products within such type (or class); or (B) have a capacity or other performance-related feature which other products within such type (or class) do not have and such feature justifies a higher or lower standard. (42 U.S.C. 6295(q)(1)) In determining whether a performance-related feature justifies a different standard for a group of products, DOE must consider such factors as the utility to the consumer of such a feature and other factors DOE deems appropriate. *Id.* Any rule prescribing such a standard must include an explanation of the basis on which such higher or lower level was established. (42 U.S.C. 6295(q)(2))

Federal energy conservation requirements generally preempt State laws or regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6297(a)–(c)) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions set forth under 42 U.S.C. 6297(d). The energy conservation standards established in this rule will preempt relevant State laws or regulations on February 10, 2016.

Also, pursuant to the amendments contained in section 310(3) of EISA 2007, any final rule for new and amended energy conservation standards promulgated after July 1, 2010, are required to address standby mode and off mode energy use. (42 U.S.C. 6295(gg)(3)) Specifically, when DOE adopts a standard for a covered product after that date, it must, if justified by the criteria for adoption of standards under EPCA (42 U.S.C. 6295(o)), incorporate standby mode and off mode energy use into the standard, or, if that is not feasible, adopt a separate standard for such energy use for that product. (42 U.S.C. 6295(gg)(3)(A)–(B)) DOE's current test procedures and standards for EPSs address standby mode and off mode energy use, as do the standards adopted in this final rule.

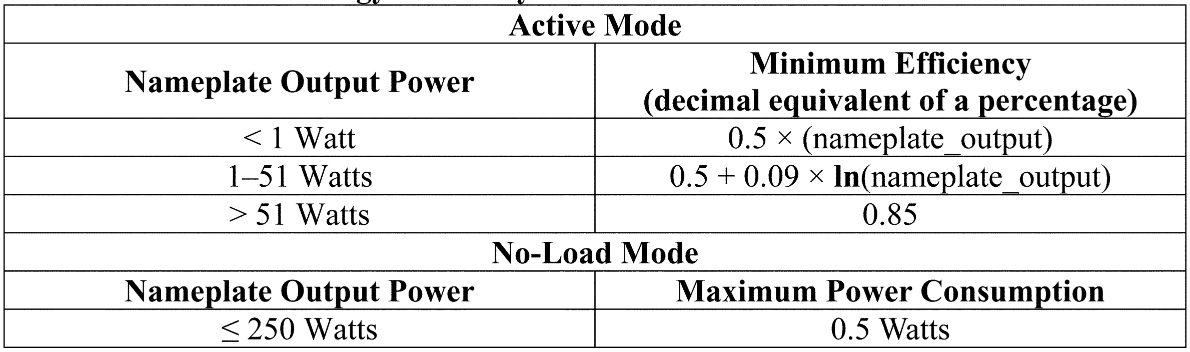
Finally, Congress created a series of energy conservation requirements for certain types of EPSs—those EPSs that meet the ''Class A'' criteria. See 42 U.S.C. 6295(u)(3) (establishing standards for Class A EPSs) and 6291(36)(C) (defining what a Class A EPS is). Congress clarified the application of these standards in a subsequent revision to EPCA by creating an exclusion for certain types of Class A EPSs. In particular, EPSs that are designed to be used with security or life safety alarm or surveillance system that are manufactured prior to 2017 are not required to meet the no-load mode requirements. See 42 U.S.C. 6295(u)(3)(E) (detailing criteria for satisfying the exclusion requirements). The standards in today's final rule are consistent with these Congressionally-enacted provisions.

B. Background

1. Current Standards

Section 301 of EISA 2007 established minimum energy conservation standards for Class A EPSs, which became effective on July 1, 2008. (42 U.S.C. 6295(u)(3)(A)). Class A EPSs are types of EPSs defined by Congress that meet certain design criteria and that are not devices regulated by the Food and Drug Administration as medical devices or that power the charger of a detachable battery pack or the battery of a product that is fully or primarily motor operated. See 42 U.S.C. 6291(36)(C)(i)–(ii). The current standards for Class A EPSs are set forth in Table II.1.

Table II-1: Federal Energy Efficiency Standards for Class A EPSs



Active Mode	
Nameplate Output Power	**Minimum Efficiency (decimal equivalent of a percentage)**
< 1 Watt	$0.5 \times (\text{nameplate\_output})$
1–51 Watts	$0.5 + 0.09 \times \ln(\text{nameplate\_output})$
> 51 Watts	0.85
No-Load Mode	
Nameplate Output Power	**Maximum Power Consumption**
≤ 250 Watts	0.5 Watts

Currently, there are no Federal energy conservation standards for EPSs falling outside of Class A.

2. History of Standards Rulemaking for EPSs

Section 135 of the Energy Policy Act of 2005 (EPACT 2005), Public Law 109–58 (Aug. 8, 2005), amended sections 321 and 325 of EPCA by defining the term ''external power supply.'' That provision also directed DOE to prescribe test procedures related to the energy consumption of EPSs and to issue a final rule that determines whether energy conservation standards shall be issued for EPSs or classes of EPSs. (42 U.S.C. 6295(u)(1)(A) and (E))

On December 8, 2006, DOE complied with the first of these requirements by publishing a final rule that prescribed test procedures for a variety of products, including EPSs. 71 FR 71340. See also 10 CFR part 430, Subpart B, Appendix Z (''Uniform Test Method for Measuring the Energy Consumption of External Power Supplies'') (codifying the EPS test procedure).

On December 19, 2007, Congress enacted EISA 2007, which, among other things, amended sections 321, 323, and 325 of EPCA (42 U.S.C. 6291, 6293, and 6295). As part of these amendments, EISA 2007 supplemented the EPS definition, which the statute defines as an external power supply circuit ''used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product.'' (42 U.S.C. 6291(36)(A)) In particular, Section 301 of EISA 2007 created a subset of EPSs called ''Class A External Power Supplies,'' which consists of, among other elements, those EPSs that can convert to only 1 AC or DC output voltage at a time and have a nameplate output power of no more than 250 watts (W). The Class A definition, as noted earlier, excludes any device requiring Federal Food and Drug Administration (FDA) listing and approval as a medical device in accordance with section 513 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360(c)) along with devices that power the charger of a detachable battery pack or that charge the battery of a product that is fully or primarily motor operated. (42 U.S.C. 6291(36)(C)) Section 301 of EISA 2007 also established energy conservation standards for Class A EPSs that became effective on July 1, 2008, and directed DOE to conduct an energy conservation standards rulemaking to review those standards.

Additionally, section 309 of EISA 2007 amended section 325(u)(1)(E) of EPCA (42 U.S.C. 6295(u)(1)(E)) by directing DOE to issue a final rule prescribing energy conservation standards for battery chargers or classes of battery chargers or to determine that no energy conservation standard is technologically feasible and economically justified. To satisfy these requirements, along with those for EPSs, as noted later, DOE chose to bundle the rulemakings for these separate products together into a single rulemaking effort. The rulemaking requirements contained in sections 301 and 309 of EISA 2007 also effectively superseded the prior determination analysis that EPACT 2005 required DOE to conduct.

Section 309 of EISA 2007 also instructed DOE to issue a final rule to determine whether DOE should issue energy conservation standards for EPSs or classes of EPSs by no later than two years after EISA 2007's enactment. (42 U.S.C. 6295(u)(1)(E)(i)(I)) Because Congress had already set standards for Class A devices, DOE interpreted this determination requirement as applying solely to assessing whether energy conservation standards would be warranted for EPSs that fall outside of the Class A definition, *i.e.,* non-Class A EPSs. Non-Class A EPSs include those devices that (1) have a nameplate output power greater than 250 watts, (2) are able to convert to more than one AC or DC output voltage simultaneously, and (3) are specifically excluded from coverage under the Class A EPS definition in EISA 2007 by virtue of their application (i.e. EPSs used with medical devices or that power chargers of detachable battery packs or batteries of products that are motor-operated).[12]

Finally, section 310 of EISA 2007 established definitions for active, standby, and off modes, and directed DOE to amend its existing test procedures for EPSs to measure the energy consumed in standby mode and off mode. (42 U.S.C. 6295(gg)(2)(B)(i)) Consequently, DOE published a final rule incorporating standby- and off-mode measurements into the DOE test procedure. See 74 FR 13318 (March 27, 2009) DOE later amended its test procedure for EPSs by including a measurement method for multiple-voltage EPSs and clarified certain definitions within the single voltage EPS test procedure. See 76 FR 31750 (June 1, 2011)

DOE initiated its current rulemaking effort for these products by issuing the Energy Conservation Standards Rulemaking Framework Document for Battery Chargers and External Power Supplies (the framework document), which explained, among other things, the issues, analyses, and process DOE would follow in developing potential standards for non-Class A EPSs and amended standards for Class A EPSs. See *http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0005.* 74 FR 26816 (June 4, 2009). DOE also published a notice of proposed determination regarding the setting of standards for non-Class A EPSs. 74 FR 56928 (November 3, 2009). These notices were followed by a final determination published on May 14, 2010, 75 FR 27170, which concluded that energy conservation standards for non-Class A EPSs appeared to be technologically feasible and economically justified, and would be likely to result in significant energy savings. Consequently, DOE decided to include non-Class A EPSs in the present energy conservation standards rulemaking for battery chargers and EPSs.[13]

On September 15, 2010, having considered comments from interested parties, gathered additional information, and performed preliminary analyses for the purpose of developing potential amended energy conservation standards for Class A EPSs and new energy conservation standards for battery chargers and non-Class A EPSs, DOE announced a public meeting and the availability on its Web site of a preliminary technical support document (preliminary TSD). 75 FR 56021. The preliminary TSD discussed the comments DOE had received in response to the framework document and described the actions DOE had taken up to this point, the analytical framework DOE was using, and the content and results of DOE's preliminary analyses. *Id.* at 56023, 56024. DOE convened the public meeting to discuss and receive comments on: (1) The product classes DOE analyzed, (2) the analytical framework, models, and tools that DOE was using to evaluate potential standards, (3) the results of the preliminary analyses performed by DOE, (4) potential standard levels that DOE might consider, and (5) other issues participants believed were relevant to the rulemaking. *Id.* at 56021, 56024. DOE also invited written comments on these matters. The public meeting took place on October 13, 2010. Many interested parties participated by submitting written comments.

DOE published a notice of proposed rulemaking (NOPR) on March 27, 2012. 77 FR 18478. Shortly after, DOE also published on its Web site the complete TSD for the proposed rule, which incorporated the complete analyses DOE conducted and technical documentation for each analysis. The NOPR TSD included the LCC spreadsheet, the national impact analysis spreadsheet, and the manufacturer impact analysis (MIA) spreadsheet—all of which are available in the docket for this rulemaking. In the March 2012 NOPR, in addition to proposing potential standards for battery chargers, DOE

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[12] To help ensure that the standards Congress set were not applied in an overly broad fashion, DOE applied the statutory exclusion not only to those EPSs that require FDA listing and approval but also to any EPS that provides power to a medical device.

[13] See *http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/23.*

proposed amended energy conservation standards for EPSs as follows:

Table II-2 Proposed Energy Conservation Standards for Direct Operation External Power Supplies

AC-DC, Basic-Voltage External Power Supply		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 * P_{out} + 0.16$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.071 * \ln(P_{out}) - 0.0014 * P_{out} + 0.67$	≤ 0.100
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500
AC-DC, Low-Voltage External Power Supply		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 * P_{out} + 0.087$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 * \ln(P_{out}) - 0.0014 * P_{out} + 0.609$	≤ 0.100
49 W $< P_{out} \leq 250$ W	≥ 0.870	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500
AC-AC, Basic-Voltage External Power Supply		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 * P_{out} + 0.16$	≤ 0.210
1 W $< P_{out} \leq 49$ W	$\geq 0.071 * \ln(P_{out}) - 0.0014 * P_{out} + 0.67$	≤ 0.210
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500
AC-AC, Low-voltage External Power Supply		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 * P_{out} + 0.087$	≤ 0.210
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 * \ln(P_{out}) - 0.0014 * P_{out} + 0.609$	≤ 0.210

49 W < $P_{out} \leq$ 250 W	≥ 0.870	≤ 0.210
P_{out} > 250 W	≥ 0.875	≤ 0.500
Multiple-Voltage External Power Supply		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq$ 1 W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.300
1 W < $P_{out} \leq$ 49 W	$\geq 0.075 \times \ln(P_{out}) + 0.561$	≤ 0.300
P_{out} > 49 W	≥ 0.860	≤ 0.300

In the March 2012 NOPR, DOE identified 36 specific issues related to battery chargers and EPSs on which it was particularly interested in receiving comments. *Id.* at 18642–18644. DOE also sought comments and data that would allow DOE to further bring clarity to the issues surrounding battery chargers and EPSs, and determine how the issues discussed in the March 2012 NOPR could be adequately addressed. DOE also held a public meeting in Washington, DC, on May 2, 2012, to solicit comment and information from the public relevant to the proposed rule. Finally, DOE received many written comments on these and other issues in response to the March 2012 NOPR. All commenters, along with their corresponding abbreviations and organization type, are listed in Table II–3. In today's notice, DOE summarizes and addresses the issues these commenters raised that relate to EPSs. The March 2012 NOPR included additional, detailed background information on the history of this rulemaking. *See id.* at 18493– 18495.

TABLE II–3—LIST OF COMMENTERS

Organization	Abbreviation	Organization type
ARRIS Group, Inc.	ARRIS Group	Manufacturer.
ASAP, ASE, ACEEE, CFA, NEEP, and NEEA	ASAP, *et al.*	Energy Efficiency Advocates.
Association of Home Appliance Manufacturers	AHAM	Industry Trade Association.
Brother International Corporation	Brother International	Manufacturer.
California Energy Commission	California Energy Commission	State Entity.
California Investor-Owned Utilities	CA IOUs	Utilities.
Cobra Electronics Corporation	Cobra Electronics	Manufacturer.
Consumer Electronics Association	CEA	Industry Trade Association.
Delta-Q Technologies Corp.	Delta-Q Technologies	Manufacturer.
Dual-Lite, a Division of Hubbell Lighting, Inc.	Dual-Lite	Manufacturer.
Duracell	Duracell	Manufacturer.
Eastman Kodak Company	Eastman Kodak	Manufacturer.
Flextronics Power	Flextronics	Manufacturer.
GE Healthcare	GE Healthcare	Manufacturer.
Information Technology Industry Council	ITI	Industry Trade Association.
Jerome Industries, a subsidiary of Astrodyne	Jerome Industries	Manufacturer.
Korean Agency for Technology and Standards	Republic of Korea	Foreign Government.
Logitech Inc.	Logitech	Manufacturer.
Microsoft Corporation	Microsoft	Manufacturer.
Motorola Mobility, Inc.	Motorola Mobility	Manufacturer.
National Electrical Manufacturers Association	NEMA	Industry Trade Association.
Natural Resources Defense Council	NRDC	Energy Efficiency Advocate.
Nintendo of America Inc.	Nintendo of America	Manufacturer.
Nokia Inc.	Nokia	Manufacturer.
Northeast Energy Efficiency Partnerships	NEEP	Energy Efficiency Advocate.
Northwest Energy Efficiency Alliance and the Northwest Power and Conservation Council.	NEEA and NPCC	Energy Efficiency Advocates.
NRDC, ACEEE, ASAP, CFA, Earthjustice, MEEA, NCLC, NEEA, NEEP, NPCC, Sierra Club, SEEA, SWEEP.	NRDC, *et al.*	Energy Efficiency Advocates.
Panasonic Corporation of North America	Panasonic	Manufacturer.
PG&E and SDG&E	PG&E and SDG&E	Utilities.
Philips Electronics	Philips	Manufacturer.
Plantronics	Plantronics	Manufacturer.
Power Sources Manufacturers Association	PSMA	Industry Trade Association.
Power Tool Institute, Inc.	PTI	Industry Trade Association.
Salcomp Plc	Salcomp	Manufacturer.
Schneider Electric	Schneider Electric	Manufacturer.
Security Industry Association	SIA	Industry Trade Association.
Telecommunications Industry Association	TIA	Industry Trade Association.

TABLE II–3—LIST OF COMMENTERS—Continued

Organization	Abbreviation	Organization type
Wahl Clipper Corporation	Wahl Clipper	Manufacturer.

III. General Discussion

A. Compliance Date

The compliance date is the date when a new standard becomes operative, i.e., the date by which EPS manufacturers must manufacture products that comply with the standard. EISA 2007 directed DOE to complete a rulemaking to amend the Class A EPS standards by July 1, 2011, with compliance required by July 1, 2013, i.e., giving manufacturers a two-year lead time to satisfy those standards. (42 U.S.C. 6295(u)(3)(D)(i)) There are no similar requirements for non-Class A EPSs. DOE used a compliance date of 2013 in the analysis it prepared for its March 2012 NOPR. As a result, some interested parties assumed in their comments to DOE that the compliance date would be July 1, 2013.

Many parties submitted comments on the duration of the compliance period for EPS standards. Nokia and Plantronics requested 18 to 24 months; AHAM, CEA, Eastman Kodak, Flextronics, ITI, Microsoft, and Salcomp requested two years; Panasonic requested a minimum of two years and preferably three years; Nintendo of America requested four years; and Motorola Mobility requested at least five years. These commenters cited the need to make engineering design changes, conduct reliability evaluations, and obtain regulatory approvals for safety, EMC, and other global standards. (Nokia, No. 132 at p. 2; Plantronics, No. 156 at p. 1; AHAM, No. 124 at p. 5; CEA, No. 106 at p. 6; Eastman Kodak, No. 125 at p. 1; Flextronics, No. 145 at p. 1; ITI, No. 131 at p. 6; Microsoft, No. 110 at p. 3; Salcomp, No. 73 at p. 2; Panasonic, No. 120 at p. 5; Nintendo of America, No. 135 at p. 1; Motorola Mobility, No. 121 at p. 2) NEMA also cautioned that the broad scope and severe limits in the proposed rule would force the withdrawal of systems from the marketplace until testing is concluded and threaten the availability of certain consumer products if insufficient lead time is provided. (NEMA, No. 134 at p. 2) CEA and Panasonic later submitted supplemental comments in response to DOE's March 2013 Request for Information requesting that DOE require compliance in 2017, to harmonize with the standards the European Union has proposed adopting. (CEA, No. 208 at p. 4; Panasonic, No. 210 at p. 2)

Consistent with the two-year lead time provided in EPCA, and in light of the passing of the statutorily-prescribed 2013 effective date, DOE will provide manufacturers with a lead-time of the same duration as prescribed by statute to comply with the new and amended standards set forth in today's final rule. EISA 2007 directed DOE to publish a final rule for EPSs by July 1, 2011 and further stipulated that any amended standards would apply to products manufactured on or after July 1, 2013, two years later. (42 U.S.C. 6295(u)) In DOE's view, Congress created this two-year interval to ensure that manufacturers would have sufficient time to meet any new and amended standards that DOE may set for EPSs. In effect, DOE is preserving the original compliance period length contained in EISA 2007 and ensuring that manufacturers will have sufficient time to transition to the new and amended standards.

B. Product Classes and Scope of Coverage

1. General

When evaluating and establishing energy conservation standards, DOE may divide covered products into product classes by the type of energy used or by capacity or other performance-related features that would justify a different standard. In making a determination whether a performance-related feature justifies a different standard, DOE must consider such factors as the utility to the consumer of the feature and other factors DOE determines are appropriate. See 42 U.S.C. 6295(q) (outlining the criteria by which DOE may set different standards for a product). EPS product classes are discussed in section IV.A.2.

An ''external power supply'' is an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product. (42 U.S.C. 6291(36)(A)) EPCA, as amended by EISA 2007, also prescribes the criteria for a subcategory of EPSs—those classified as Class A EPSs (or in context, ''Class A''). Under 42 U.S.C. 6291(36)(C)(i), a Class A EPS is a device that:

1. Is designed to convert line voltage AC input into lower voltage AC or DC output;
2. is able to convert to only one AC or DC output voltage at a time;
3. is sold with, or intended to be used with, a separate end-use product that constitutes the primary load;
4. is contained in a separate physical enclosure from the end-use product;
5. is connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring; and
6. has nameplate output power that is less than or equal to 250 watts.

The Class A definition excludes any device that either (a) requires Federal Food and Drug Administration listing and approval as a medical device in accordance with section 513 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360(c)) or (b) powers the charger of a detachable battery pack or charges the battery of a product that is fully or primarily motor operated. See 42 U.S.C. 6291(36)(C)(ii).

Based on DOE's examination of product information, all EPSs appear to share four of the six criteria under the Class A definition in that all are:

- Designed to convert line voltage AC input into lower voltage AC or DC output;
- sold with, or intended to be used with, a separate end-use product that constitutes the primary load;
- contained in a separate physical enclosure from the end-use product; and
- connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring.

Examples of devices that fall outside of Class A (in context, ''non-Class A'') include EPSs that can convert power to more than one output voltage at a time (multiple voltage), EPSs that have nameplate output power exceeding 250 watts (high-power), EPSs used to power medical devices, and EPSs that provide power to the battery chargers of motorized *a*pplications and *d*etachable *b*attery packs (MADB). After examining the potential for energy savings that could result from standards for non-Class A devices, DOE concluded that standards for these devices would be likely to result in significant energy savings and be technologically feasible and economically justified. 75 FR 27170 (May 14, 2010). With today's notice, DOE is amending the current standards for Class A EPSs and adopting new standards for multiple-voltage and high-power EPSs.

NEMA commented in response to the NOPR that combining battery chargers and EPSs into a single rulemaking created burden on manufacturers in terms of being able to process the standards proposed in the NOPR. NEMA recommended that DOE delay the announcement of new and amended standards for EPSs and begin a new rulemaking process dedicated solely to EPSs after publishing a final rule for battery chargers. According to NEMA, EISA 2007 allows DOE to opt out of amending standards at this time if those standards are not warranted and instead revisit the possibility of amending EPS standards as part of a second rulemaking cycle. (NEMA, No. 134 at p. 6)

With respect to battery chargers, DOE issued a Request for Information (RFI) on March 26, 2013, in which DOE sought additional information. (78 FR 18253) The RFI sought, among other things, information on battery chargers that manufacturers had certified as compliant with the California Energy Commission (CEC) standards that became effective on February 1, 2013. The notice also offered commenters the opportunity to raise for comment any other issues relevant to the proposal.

Several efficiency advocates submitted comments in response to DOE's RFI, requesting that DOE split the combined battery charger and EPS rulemaking into two separate rulemakings and issue EPS standards as soon as possible. (NRDC, *et al.,* No. 209 at p. 2; CA IOUs, No. 197 at p. 9; California Energy Commission, No. 199 at p. 14; NEEA and NPCC, No. 200 at p. 2) These commenters gave three reasons for quickly finalizing the EPS rule: (1) The significant energy and economic savings expected to result from the EPS standard, (2) the need to move quickly to finalize standards before the underlying technical data become outdated, and (3) the statutory deadline of July 1, 2011 for publishing the EPS final rule. In response to DOE's March 2013 Request for Information, Dual-Lite, a division of Hubbell Lighting, commented that it ''challenges the DOE to adopt a bias towards action in rulemakings, whereby initial rules are performed with a cant towards getting a more modest rule out the door in a timely manner, versus chasing every 0.01 watt of potential savings . . . and delaying actual energy savings by months or years.'' (Dual-Lite, No. 189 at p. 3)

As explained above, this rulemaking initially addressed both battery chargers and EPSs. After proposing standards for both product types in March 2012, and giving careful consideration to the complexity of the issues related to the setting of standards for battery chargers, DOE has decided to adopt energy conservation standards for EPSs while weighing for further consideration the promulgation of energy conservation standards for battery chargers at a later date. The battery charger rulemaking has been complicated by a number of factors, including the setting of standards by the CEC, which other states have chosen to follow.[14] Because the California standards have already become effective, manufacturers are already required to meet that battery charger standard. DOE has previously indicated that the facts before it did not indicate that it would be likely manufacturers would continue to create separate products for California and the rest of the country. See 77 FR at 18502. The likelihood of this split-approach occurring is even less likely, given that other states have adopted the California standards. As a result, DOE believes that manufacturers are already making efforts to meet the levels set by California. To avoid unnecessary disruptions to the market, provide some level of consistency and stability to affected entities, and to further evaluate the impacts associated with the California-based standards, DOE is deferring the setting of battery charger standards at this time. Consequently, today's notice focuses solely on the standards that are being adopted today for EPSs, along with the detailed product classes that will apply. For further detail, see the March 2013 Request for Information.

2. Definition of Consumer Product

As noted above, the term ''external power supply'' refers to an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product.

DOE received comments from a number of stakeholders seeking clarification on the definition of a consumer product. Schneider Electric commented that the definition of consumer product is ''virtually unbounded'' and ''provides no definitive methods to distinguish commercial or industrial products from consumer products.'' (Schneider Electric, No. 119 at p. 2) ITI commented that a more narrow definition of a consumer product is needed to determine which state regulations are preempted by federal standards. (ITI, No. 131 at p. 2) NEMA commented that the FAQ on the DOE Web site is insufficient to resolve its members' questions. (NEMA, No. 134 at p. 2) NEMA further sought clarification on whether EPSs that power building system components are within the scope of this rulemaking. According to NEMA, such EPSs typically are permanently installed in electrical rooms near the electrical entrance to the building and power such things as communication links, central processors for building or lighting management systems, and motorized shades. (NEMA, No. 134 at pp. 6–7) These stakeholders suggested ways that DOE could clarify the definition of a consumer product:

- Adopt the ENERGY STAR battery charger definition.
- Limit the scope to products marketed as compliant with the FCC's Class B emissions limits.
- Define consumer products as ''pluggable Type A Equipment (as defined by IEC 60950–1), with an input rating of less than or equal to 16A.''

Lutron Electronics commented that it does not believe that the EPSs that power components of the lighting control systems and window shading systems it manufactures are within the scope of the EPS rulemaking because EPSs that meet the special requirements of such applications and meet the proposed standards are not commercially available. (Lutron Electronics, No. 141 at p. 2) DOE also received comments from NEMA and Philips regarding how DOE would treat illuminated exit signs and egress lighting. (NEMA, No. 134 at p. 6; Philips, No. 128 at p. 2)

EPCA defines a consumer product as any article of a type that consumes or is designed to consume energy and which, to any significant extent, is distributed in commerce for personal use or consumption by individuals. See 42 U.S.C. 6291(1). Manufacturers are advised to use this definition (in conjunction with the EPS definition) to determine whether a given device shall be subject to EPS standards. Additional guidance is contained in the FAQ document that NEMA referred to, which can be downloaded from DOE's Web site.[15]

Consistent with the statutory language and guidance noted above, DOE notes that Congress treated EPSs, along with illuminated exit signs, as consumer products. See 42 U.S.C. 6295(u) and (w) (provisions related to requirements for EPSs and illuminated exit signs, both of

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[14] Oregon has adopted the California standards; Washington, Connecticut and New Jersey are considering doing the same.

[15] *http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/cce_faq.pdf.*

which are located in Part A of EPCA, which addresses residential consumer products). In light of this treatment, by statute, EPSs are considered consumer products under EPCA. Accordingly, DOE is treating these products in a manner consistent with the framework established by Congress.

3. Power Supplies for Solid State Lighting

NEMA and Philips commented that power supplies for solid state lighting (SSL) should not be included in the scope of this rulemaking. (NEMA, No. 134 at pp. 3–7; Philips, No. 128 at p. 2) They offered the following arguments against the inclusion of SSL power supplies:

- SSL is often used in commercial applications, and therefore should not be considered a consumer product;
- SSL power supplies are considered a part of the system as a whole and typically tested as such;
- SSL power supplies perform other functions in addition to power conversion, such as dimming;
- SSL is an emerging technology and increasing efficiency could lead to costs that are prohibitive to most consumers; and
- Regulating components of SSL could contradict DOE's other efforts, which include promoting the adoption of SSL.

DOE notes that Congress prescribed the criteria for an EPS to meet in order to be considered a covered product. A device meeting those criteria is an EPS under the statute and subject to the applicable EPS standards. DOE has no authority to alter these statutorily-prescribed criteria.

Further, all Class A EPSs are subject to the current Class A EPS standards, and those that are direct operation EPSs will be subject to the amended EPS standards being adopted today. The fact that a given type of product, such as SSL products, is often used in commercial applications does not mean that it is not a consumer product, as explained above. DOE recognizes that many EPSs are considered an integral part of the consumer products they power and may be tested as such; however, this does not obviate the need to ensure that the EPS also meets applicable EPS standards. DOE has determined that there are no technical differences between the EPSs that power certain SSL (including LED) products and those that are used with other end-use applications. And as DOE indicated in its proposal, although it did not initially include these devices as part of its NOPR analysis, DOE indicated that it may consider revising this aspect of its analysis. 77 FR at 18503. Therefore, DOE believes that subjecting SSL EPSs to EPS standards will not adversely impact SSL consumers, since these devices should be able to satisfy the standards. DOE notes that following this approach is also consistent with DOE's other efforts, including those to promote the broader adoption of SSL technologies.

4. Medical Devices

As explained above, EPSs for medical devices are not subject to the current standards created by Congress in December 2007. In its May 2010 determination, DOE initially determined that standards for EPSs used to power medical devices were warranted because they would result in significant energy savings while being technologically feasible and economically justified. As a result, in the March 2012 NOPR, DOE proposed standards for these devices.

DOE subsequently received comments from GE Healthcare and Jerome Industries, which manufactures power supplies for medical devices. These commenters gave several reasons not to apply standards to these products. The commenters noted that the design, manufacture, maintenance, and post-market monitoring of medical devices is highly regulated by the U.S. FDA, and EPS standards would only add to this already quite substantial regulatory burden. They also commented that there are a large number of individual medical device models, each of which must be tested along with its component EPS to ensure compliance with applicable standards; redesign of the EPS to meet DOE standards would require that all of these models be retested and reapproved, at a significant per-unit cost, especially for those devices that are produced in limited quantities. Jerome Industries also expressed concern that the proposed EPS standards are inconsistent with the reliability and safety requirements incumbent on some medical devices, *i.e.,* asserting that an EPS cannot be engineered to meet the proposed standards and these other requirements. Lastly, Jerome Industries noted that medical EPSs are exempt from EPS standards in other jurisdictions, including Europe, Australia, New Zealand, and California. (GE Healthcare, No. 142 at p. 2; Jerome Industries, No. 191 at pp. 1–2)

Given these concerns, DOE has reevaluated its proposal to set energy conservation standards for medical device EPSs. While DOE believes, based on available data, that standards for these devices may result in energy savings, DOE also wishes to avoid any action that could potentially impact reliability and safety. In the absence of sufficient data on this issue, and consistent with DOE's obligation to consider such adverse impacts when identifying and screening design options for improving the efficiency of a product, DOE has decided to refrain from setting standards for medical EPSs at this time. See 42 U.S.C. 6295(o)(2)(b)(i)(VII). See also 10 CFR part 430, subpart C, appendix A, (4)(a)(4) and (5)(b)(4) (collectively setting out DOE's policy in evaluating potential energy conservation standards for a product).

5. Security and Life Safety Equipment

The Security Industry Association sought confirmation that ''security or life safety alarms or surveillance systems'' would continue to be excluded from the no-load power requirements that were first established in EISA 2007. (SIA, No. 115 at pp. 1–2) See also 42 U.S.C. 6295(u)(3)(E). This exclusion applies only to the no-load mode standard established in EISA 2007 for Class A EPSs. Consistent with this temporary exemption, DOE is not requiring these devices to meet a no-load mode requirement. Therefore, life safety and security system EPSs will, until the statutorily-prescribed sunset date of July 1, 2017, not be required to meet a no-load standard. At the appropriate time, DOE will re-examine this exemption and may opt to prescribe no-load standards for these products in the future.

6. Service Parts and Spare Parts

Several commenters requested a temporary exemption from the standards being finalized today for service part and spare part EPSs. (CEA, No. 106 at p. 7; Eastman Kodak, No. 125 at p. 2; ITI, No. 131 at p. 9; Motorola Mobility, No. 121 at p. 11; Nintendo of America, No. 135 at p. 2) Panasonic commented that ''a seven-year exemption is necessary for manufacturers to meet their legal and customer service obligations to stock and supply spare parts for sale, product servicing, and warranty claims for existing products.'' (Panasonic, No. 120 at p. 6) Panasonic later requested a 9-year exemption, in response to DOE's March 2013 Request for Information. (Panasonic, No. 210 at p. 2) Brother International cited the added cost and unnecessary electronic waste that would result from having to stockpile a sufficient quantity of legacy EPSs to meet future needs for service or spare parts. (Brother International, No. 111 at p. 2)

EPCA exempts Class A EPSs from meeting the statutorily prescribed standards if the devices are manufactured before July 1, 2015, and are made available by the manufacturer as service parts or spare parts for end-use consumer products that were manufactured prior to the end of the compliance period (July 1, 2008). (42 U.S.C. 6295(u)(3)(B)) Congress created this limited (and temporary) exemption as part of a broad range of amendments under EISA 2007. The provision does not grant DOE with the authority to expand or extend the length of this exemption and Congress did not grant DOE with the general authority to exempt any already covered product from the requirements set by Congress. Accordingly, DOE cannot grant the relief sought by these commenters.

C. Technological Feasibility

Energy conservation standards promulgated by DOE must be technologically feasible. This section addresses the manner in which DOE assessed the technological feasibility of the new and amended standards being adopted today.

1. General

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

After DOE has determined that particular technology options are technologically feasible, it further evaluates each technology option in light of the following additional screening criteria: (1) Practicability to manufacture, install, or service; (2) adverse impacts on product utility or availability; and (3) adverse impacts on health or safety. Section IV.B of this notice discusses the results of the screening analysis for EPSs, particularly the designs DOE considered, those it screened out, and those that are the basis for the trial standard levels (TSLs) analyzed in this rulemaking. For further detail, see chapter 4 of the technical support document (TSD), which accompanies this final rule and can be found in the docket on regulations.gov.

2. Maximum Technologically Feasible Levels

When proposing an amended standard for a type or class of covered product, DOE must determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible for such product. (42 U.S.C. 6295(p)(1)) Accordingly, in the engineering analysis, DOE determined the maximum technologically feasible (''max-tech'') improvements in energy efficiency for EPSs using the design parameters for the most efficient products available on the market or in working prototypes. (See chapter 5 of the final rule TSD.) The max-tech levels that DOE determined for this rulemaking are described in section IV.C of this final rule.

D. Energy Savings

1. Determination of Savings

For each TSL, DOE projected energy savings from the products that are the subject of this rulemaking purchased in the 30-year period that begins in the year of compliance with new and amended standards (2015–2044). The savings are measured over the entire lifetime of products purchased in the 30-year period.[16] DOE quantified the energy savings attributable to each TSL as the difference in energy consumption between each standards case and the base case. The base case represents a projection of energy consumption in the absence of new and amended mandatory efficiency standards, and considers market forces and policies that affect demand for more efficient products.

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

DOE has also begun to estimate full-fuel-cycle energy savings. 76 FR 51282 (Aug. 18, 2011), as amended at 77 FR 49701 (August 17, 2012). The full-fuel-cycle (FFC) metric includes the energy consumed in extracting, processing, and transporting primary fuels, and thus presents a more complete picture of the impacts of energy efficiency standards. For this final rule, DOE did not include the FFC in the NIA. However, DOE developed a sensitivity analysis that estimates these additional impacts from production activities. DOE's approach is based on calculation of an FFC multiplier for each of the energy types used by covered products.

2. Significance of Savings

As noted above, 42 U.S.C. 6295(o)(3)(B) prevents DOE from adopting a standard for a covered product unless such standard would result in ''significant'' energy savings. Although the term ''significant'' is not defined in the Act, the U.S. Court of Appeals, in *Natural Resources Defense Council* v. *Herrington,* 768 F.2d 1355, 1373 (D.C. Cir. 1985), indicated that Congress intended ''significant'' energy savings in this context to be savings that were not ''genuinely trivial.'' The energy savings for all of the TSLs considered in this rulemaking (presented in section V.B.3) are nontrivial, and, therefore, DOE considers them ''significant'' within the meaning of section 325 of EPCA.

E. Economic Justification

1. Specific Criteria

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

a. Economic Impact on Manufacturers and Consumers

In determining the impacts of a new and amended standard on manufacturers, DOE first uses an annual cash-flow approach to determine the quantitative impacts. This step includes both a short-term assessment—based on the cost and capital requirements during the period between when a regulation is issued and when entities must comply with the regulation—and a long-term

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

assessment over a 30-year period. The industry-wide impacts analyzed include industry net present value (INPV), which values the industry on the basis of expected future cash flows; cash flows by year; changes in revenue and income; and other measures of impact, as appropriate. Second, DOE analyzes and reports the impacts on different types of manufacturers, including impacts on small manufacturers. Third, DOE considers the impact of standards on domestic manufacturer employment and manufacturing capacity, as well as the potential for standards to result in plant closures and loss of capital investment. Finally, DOE takes into account cumulative impacts of various DOE regulations and other regulatory requirements on manufacturers.

For individual consumers, measures of economic impact include the changes in life-cycle cost (LCC) and payback period (PBP) associated with new and amended standards. The LCC, which is specified separately in EPCA as one of the seven factors to be considered in determining the economic justification for a new and amended standard, 42 U.S.C. 6295(o)(2)(B)(i)(II), is discussed in the following section. For consumers in the aggregate, DOE also calculates the national net present value of the economic impacts applicable to a particular rulemaking.

b. Life-Cycle Costs

The LCC is the sum of the purchase price of a product (including its installation) and the operating expense (including energy, maintenance, and repair expenditures) discounted over the lifetime of the product. The LCC savings for the considered efficiency levels are calculated relative to a base case that reflects projected market trends in the absence of new and amended standards. The LCC analysis requires a variety of inputs, such as product prices, product energy consumption, energy prices, maintenance and repair costs, product lifetime, and consumer discount rates. For its analysis, DOE assumes that consumers will purchase the considered products in the first year of compliance with new and amended standards.

To account for uncertainty and variability in specific inputs, such as product lifetime and discount rate, DOE uses a distribution of values, with probabilities attached to each value. DOE identifies the percentage of consumers estimated to receive LCC savings or experience an LCC increase, in addition to the average LCC savings associated with a particular standard level. DOE also evaluates the LCC impacts of potential standards on identifiable subgroups of consumers that may be affected disproportionately by a national standard.

c. Energy Savings

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

d. Lessening of Utility or Performance of Products

In establishing classes of products, and in evaluating design options and the impact of potential standard levels, DOE evaluates standards that would not lessen the utility or performance of the considered products. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) DOE received no comments that EPS standards would increase their size and reduce their convenience nor have any other significant adverse impacts on consumer utility. Thus, DOE believes that the standards adopted in today's final rule will not reduce the utility or performance of the products under consideration in this rulemaking.

e. Impact of Any Lessening of Competition

EPCA directs DOE to consider the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of a standard. (42 U.S.C. 6295(o)(2)(B)(i)(V) It also directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a standard and to transmit such determination to the Secretary within 60 days of the publication of a proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(ii)) DOE transmitted a copy of its proposed rule to the Attorney General with a request that the Department of Justice (DOJ) provide its determination on this issue. DOJ did not file any comments or determination with DOE on the proposed rule.

f. Need for National Energy Conservation

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

The new and amended standards also are likely to result in environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases associated with energy production. DOE reports the emissions impacts from today's standards and from each TSL it considered in section V.B.6 of this notice. DOE also reports estimates of the economic value of emissions reductions resulting from the considered TSLs.

g. Other Factors

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

2. Rebuttable Presumption

As set forth in 42 U.S.C. 6295(o)(2)(B)(iii), EPCA creates a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the consumer of a product that meets the standard is less than three times the value of the first year's energy savings resulting from the standard, as calculated under the applicable DOE test procedure. DOE's LCC and PBP analyses generate values used to calculate the effect potential new and amended energy conservation standards would have on the payback period for consumers. These analyses include, but are not limited to, the 3-year payback period contemplated under the rebuttable-presumption test. In addition, DOE routinely conducts an economic analysis that considers the full range of impacts to consumers, manufacturers, the nation, and the environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this analysis serve as the basis for DOE's evaluation of the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification). The rebuttable presumption payback calculation is discussed in sections IV.F.15 and V.B.1.c of this final rule.

IV. Methodology and Discussion

A. Market and Technology Assessment

For the market and technology assessment, DOE develops information that provides an overall picture of the market for the products concerned, including the purpose of the products, the industry structure, and market characteristics. This activity includes both quantitative and qualitative assessments, based primarily on publicly available information. The subjects addressed in the market and technology assessment for this rulemaking include product classes and manufacturers; quantities and types of products sold and offered for sale; retail market trends; regulatory and non-regulatory programs; and technologies or design options that could improve the energy efficiency of the products under examination. See chapter 3 of the TSD for further detail.

1. Market Assessment

To characterize the market for EPSs, DOE gathered information on the products that use them. DOE refers to these products as end-use consumer products or EPS ''applications.'' This method was chosen for two reasons. First, EPSs are nearly always bundled with or otherwise intended to be used with a given application; therefore, the demand for applications drives the demand for EPSs. Second, because most EPSs are not stand-alone products, their shipments, lifetimes, usage profiles, and power requirements are all determined by the associated application.

DOE analyzed the products offered by online and brick-and-mortar retail outlets to determine which applications use EPSs and which EPS technologies are most prevalent. The list of applications analyzed and a full explanation of the market assessment methodology can be found in chapter 3 of the TSD.

While DOE identified the majority of EPS applications, some may not have been included in the NOPR analysis. This is due in part because the EPS market is dynamic and constantly evolving. As a result some applications that use EPSs were not found because they either made up an insignificant market share or were introduced to the market after the NOPR analysis was conducted. The EPSs for any other applications not explicitly analyzed in the market assessment will still be subject to the standards announced in today's notice as long as they meet the definition of a covered product outlined in the previous section. That is, DOE's omission of any particular EPS application from its analysis is not by itself an indication that the EPSs that power that application are not subject to EPS standards.

DOE relied on published market research to estimate base-year shipments for all applications. DOE estimated that in 2009 a total of 345 million EPSs were shipped for final sale in the United States.

DOE did not receive any comments on its assumptions for total base year (2009) EPS shipments, but did receive comments on its efficiency distributions. ARRIS Group commented that it is nearly impossible to purchase EPSs at level IV (the current federal standard level) because nearly all products comply with the ENERGY STAR standard (level V); ARRIS Group, however, provided no data in support of this claim.[17] (ARRIS Group, No. 105 at p. 1) To determine the distribution of shipments at different efficiency levels, DOE relied on EPS testing conducted as part of the Engineering Analysis. Of the products DOE tested, 61% were below level V. DOE assumed that half of the EPSs below level V would improve in efficiency up to level V by the beginning of the analysis period in 2015, leaving 30% at level IV and the remaining 70% at level V or higher. When the ENERGY STAR program for EPSs ended in 2010, EPA estimated that over 50% of the market had reached level V efficiency or higher.[18] DOE appreciates ARRIS Group's input on this subject, but has maintained its estimate from the NOPR because it is in line with the available data.

2. Product Classes

When necessary, DOE divides covered products into classes by the type of energy used, the capacity of the product, and any other performance-related feature that justifies different standard levels, such as features affecting consumer utility. (42 U.S.C. 6295(q)) DOE then conducts its analysis and considers establishing or amending standards to provide separate standard levels for each product class.

a. Proposed EPS Product Classes

In the NOPR, DOE proposed dividing EPSs into those that can directly operate an end-use consumer product and those that cannot, termed ''direct operation EPSs'' and ''indirect operation EPSs,'' respectively. DOE proposed standards only for direct operation EPSs.

There exist both Class A and non-Class A indirect operation EPSs. DOE believes that these two groups of devices are technically equivalent, *i.e.,* there is no difference in performance-related features between the two groups that would justify different standard levels for the two groups. (42 U.S.C. 6295(q)) Because of this technical equivalency, DOE grouped these EPSs into one product class for analysis, product class N.

DOE proposed to divide direct operation EPSs into six product classes. Two of these six product classes were treated as non-Class A EPSs: Product class X for multiple-voltage EPSs (multiple simultaneous output currents) and product class H for high-output power EPSs (nameplate output power > 250 Watts). All other direct operation EPSs were divided among the remaining four product classes (B, C, D, and E) and are largely composed of Class A EPSs.

These classes, however, also contain some non-Class A EPSs, specifically direct operation EPSs for battery charged motorized applications. Medical EPSs were previously included, but have since been removed, as explained in section IV.A.1 above. While these devices are functionally the same as Class A devices, they were excluded from the Class A definition through Congressional action. See 42 U.S.C. 6291(36).

The primary criteria for determining which of these four product classes a given EPS falls into are the type of output current (AC or DC) and the nameplate output voltage (low-voltage or basic-voltage). These are the same parameters used by the former ENERGY STAR program, which DOE used to develop a framework for its EPS analysis. DOE proposed adopting the ENERGY STAR definitions for low-voltage and standard voltage EPSs with minor variations. According to these definitions, if a device has a nameplate output voltage of less than 6 volts and its nameplate output current is greater than or equal to 550 milliamps, DOE considers that device a low-voltage EPS. A product that does not meet the criteria for being a low-voltage EPS is classified as a standard-voltage EPS. DOE proposed to use the term ''basic voltage'' in place of ''standard voltage.''

DOE also proposed definitions for AC–DC and AC–AC EPSs. If an EPS converts household electrical current into DC output, DOE classifies that product as an AC–DC EPS. Conversely, a device that converts household electrical current into a lower voltage AC output is an AC–AC EPS. Using these parameters, DOE was able to outline the specific requirements for its

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[17] By statute, Class A EPSs be marked with a Roman numeral IV. See 42 U.S.C. 6295(u)(3)(C). Since the enactment of that requirement, EPA adopted the Roman numeral V mark for products that meet the ENERGY STAR criteria (version 2.0). These Roman numerals correspond to higher levels of efficiency—i.e. V denotes a higher level of efficiency than IV.

[18] U.S. Environmental Protection Agency, May 26, 2010, Accessed at *http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/eps_eup_sunset_stakeholder_proposal.pdf?6ec1-54bb*

product classes included in the EPS rulemaking.

The next two subsections summarize comments DOE received on the proposed product classes and explain how DOE has addressed these comments. The subsection that follows contains a list of the product classes and definitions being adopted today.

b. Differentiating Between Direct and Indirect Operation EPSs

An indirect operation EPS is an EPS that cannot power a consumer product (other than a battery charger) without the assistance of a battery. In other words, if an end-use product only functions when drawing power from a battery, the EPS associated with that product is classified as an indirect operation EPS. Because the EPS must first deliver power and charge the battery before the end-use product can function as intended, DOE considers this device an indirect operation EPS and defined a separate product class, N, for all such devices. Conversely, if the battery's charge status does not impact the end-use product's ability to operate as intended, and the end-use product can function using only power from the EPS, DOE considers that device a direct operation EPS.

DOE's initial approach for determining whether a given EPS has direct operation capability involved removing the battery from the application and attempting to operate the application using only power from the EPS. While this approach gave the most definitive EPS classifications, this procedure had the potential to create complications during testing since it frequently requires the removal of integral batteries prior to testing. The removal of such batteries can often require access to internal circuitry via sealed moldings capable of shattering and damaging the application. DOE also considered revising this method to account for removable and integral batteries, but believed it might create an overly burdensome process for manufacturers to follow.

DOE then developed a new method to distinguish between direct and indirect operation EPSs that minimizes both the risk of damage to the application and the complexity associated with the removal of internal batteries. This approach requires manufacturers to determine whether an EPS can operate its end-use product once the associated battery has been fully discharged. Based on its close examination of a variety of products, DOE believes that direct operation EPSs are able to power the application regardless of the state of the battery, while indirect-operation EPSs need to charge the battery before the application can be used as intended. Comparing the time required for an application to operate once power is applied during fully discharged and fully charged battery conditions would provide a reliable indication of whether a given EPS is an indirect or direct operation device. Recording the time for the application to reach its intended functionality is necessary because certain applications, such as smartphones, contain firmware that can delay the EPS from operating the end-use product as expected. If the application takes significantly longer to operate once the battery has been fully discharged, DOE views this EPS as one that indirectly operates the end-use consumer product and classifies it as part of product class N. Using this methodology, one can readily determine whether a given device is a direct or indirect operation EPS. See Chapter 5 and Appendix 3C of the TSD for further details.

DOE received several comments on its proposed method for identifying indirect operation EPSs. Philips suggested that DOE allow manufacturers to submit data showing that their products are rarely powered directly from the AC mains despite being designed with such capability and asked that the EPSs used with these products be classified as indirect operation EPSs. (Philips, No. 128 at pp. 3–4) AHAM and Wahl Clipper requested that DOE explicitly define what is considered to be a ''fully discharged'' battery for determining whether a given device is a direct operation EPS. (AHAM, No. 124 at p. 6: Wahl Clipper, No. 153 at p. 2)

The method for determining whether a device is an indirect operation EPS was developed to separate EPSs into direct operation product classes and the indirect operation product class N, with the emphasis specifically on MADB products. It was developed based on the technical capabilities of the EPS and battery charging systems. Any product's classification determination must be based on the observable technical characteristics of that product. The method evaluates whether the EPS can power the product when the battery is depleted to the point that the battery can no longer operate the end-use consumer product as it was intended to be used. DOE considers this point to be when a battery is ''fully discharged.''

NRDC commented that DOE's proposed method for determining whether a given device is an indirect operation EPS ''incorrectly captures products, such as mobile, smart phones and MP3 players, that have firmware delays on [detection of a] dead battery, but are otherwise capable of operating without the battery.'' (NRDC, No. 114 at p. 15) NRDC proposed an alternative method that first checks whether the end-use consumer product has a removable battery, similar to the first approach considered by DOE in evaluating whether a particular device is an indirect operation EPS. If the device to which the EPS connects has a removable battery, NRDC suggested removing the battery, connecting the EPS, and attempting to use the product as it was intended. If it operates, NRDC believes it should be considered a direct operation EPS, but if it does not it should be considered an indirect operation EPS. If the battery in the end-use product is not capable of being removed, NRDC suggested using DOE's proposed method but with one modification. Rather than use the five second delay period DOE proposed in the NOPR, NRDC suggested that the delay period be extended to a longer period of time closer to five minutes to ''give enough time for firmware functions to complete and avoid any temptation to game the system by introducing artificial delays.'' (NRDC, No. 114 at p. 15)

Based on the stakeholder comments, DOE has chosen to partially adopt NRDC's proposed method for determining indirect operation with the exception that the determination delay remains five seconds in all cases. DOE closely examined the operational behavior of several smart phones, beard trimmers, and shavers in developing the indirect operation determination method it proposed in the March 2012 NOPR. Based on its analysis, DOE believes that five seconds is an acceptable tolerance for the indirect operation determination method because there was a clear dividing point among the test data that reflected the ability of the battery to operate the end-use products based on the operating time. See Appendix 3C for the full test results from the indirect operation determination. During charging, batteries initially enter a bulk charge mode where a float voltage, or fast-charge voltage, is applied to the battery and the initial charge current is high compared to the average charging current throughout the duration of the charge cycle. DOE believes that this initial cycle could be enough to operate the end-use consumer product after a short period of time, but it does not change the fact that the product is still drawing power from the battery rather than drawing power directly from the EPS itself. No product DOE examined that met the indirect operation criteria under the determination method came close to operating near the five-second buffer. Instead, the indirect operation EPSs took as little as three times longer (15 seconds) to operate after being discharged and much longer in several cases (85 seconds). DOE believes the 5-second buffer accurately distinguishes between indirect and direct operation EPSs. As NRDC did not provide any data supporting its view that a 5-minute delay was necessary, DOE sees no reason to modify its proposed method in the manner suggested by NRDC.

Regarding NRDC's contention that a longer delay would reduce the risk of gaming, DOE will continue to monitor the operation of these products as part of its periodic review of the test procedures required under 42 U.S.C. 6293. Should DOE discover any anomalies suggesting a manufacturer is circumventing the applicable standards, DOE will make the necessary adjustments to prevent this from occurring.

As part of today's final rule, DOE is combining its proposed methods for determining indirect operation into a single method. DOE previously considered such a hybrid approach, but initially believed the testing might become too burdensome for manufacturers. In light of the comments submitted by interested parties, however, DOE believes the hybrid approach will reduce the complexity involved in examining consumer products that contain a removable battery. There may also be side benefits, outside of identifying whether a device is an indirect or direct operation EPS, including reducing possible ambiguity with the test procedure. See appendix 3C to the TSD for the determination method for indirect operation EPSs.

c. Multiple-Voltage

A multiple-voltage EPS is defined as ''an external power supply that is designed to convert line voltage AC input into *more than one simultaneous lower-voltage output.''* See 10 CFR Part 430 Subpart B Appendix Z. Direct operation EPSs that meet this definition are considered multiple-voltage EPSs and will be evaluated using the multiple-voltage EPS test procedure. These products must comply with the new standards being adopted today for multiple-voltage EPSs. An EPS cannot be in more than one product class, so such an EPS need not also comply with the standards being adopted today for product classes B, C, D, E, or H.

In response to the NOPR regarding multiple-voltage EPSs, Cobra Electronics commented that an EPS with multiple simultaneous outputs but only one output voltage would be considered both a multiple-voltage EPS and a Class A EPS and, thus, in its view, would have to be tested according to DOE's multiple-voltage and single-voltage EPS test procedures. (Cobra Electronics, No. 130 at p. 3)

Cobra correctly deduced that an EPS with multiple simultaneous outputs, but only one output voltage could be treated either as a multiple-voltage EPS or a Class A EPS. The term ''class A external power supply'' means a device that, among other things, is able to convert to *only one AC or DC output voltage at a time.* See 42 U.S.C. 6291(36)(C)(i). As such, an EPS of this type must meet the current standards for Class A EPSs prescribed by Congress in EISA 2007. DOE notes, however, that the new standards being adopted today for multiple-voltage EPSs are more stringent than the current Class A standards. Therefore, any EPS that is tested and shown to comply with the new multiple-voltage EPS standards will be presumed to also comply with the Class A EPS standards prescribed by Congress in EISA 2007.

d. Low-Voltage, High-Current EPSs

PTI supported DOE's efforts to discern which MADB products should be regulated as EPSs and which should be treated as part of a battery charger. According to PTI, the inclusion of product class N ''fulfills one of PTI's longstanding concerns that components of battery chargers and battery chargers themselves should not both be regulated, as this 'double indemnity' creates a situation where designs are over-constrained with no incremental consumer benefit.'' (PTI, No. 133 at p. 3) AHAM and Wahl Clipper, however, submitted identical comments taking issue with the classification of MADB direct operation EPSs and the CSLs DOE considered for these types of products. Instead, both stakeholders suggested DOE split product class C, where their products would fall, into two classes. The first would encompass all direct operation, low-voltage EPSs with a nameplate output voltage rating of 3–6 volts and a current rating of 550–1000 mA. The second class would include all direct operation, low-voltage EPSs with a nameplate output voltage rating of less than 3 volts and a current rating greater than 1000mA. Under the stakeholders' alternative approach, the first group would need to comply with the standard level established in today's amended EPS standards, and the second class would not. These suggestions were based on the stakeholders' shared concern that the standards DOE proposed for product class C were too stringent and beyond the achievable efficiency for low-voltage, high-current EPSs. (Wahl Clipper, No. 153 at p. 2; AHAM, No. 124 at p. 6) Duracell also commented on the proposed standards for direct operation EPSs, expressing concern that EPSs that charge the batteries of motor-operated products such as shavers, epilators, hair clippers, and stick mixers would not be able to meet the proposed minimum active-mode efficiency requirements. (Duracell, No. 109 at pp. 2–3)

The commenters' concern relates to those EPSs that are designed both to charge multiple low-voltage battery cells in parallel and to directly operate an end-use consumer product such as a shaver or beard trimmer. These are often called ''cord-cordless'' products. The ability to operate an end-use product directly from mains is a distinct consumer utility, as it enables the consumer to use the end-use product when the battery contains insufficient charge. However, having multiple cells generally means that the charging currents are higher and that these types of MADB EPSs will incur significantly greater resistive power losses than other similar direct operation EPSs, as power consumption grows exponentially with an increase in the output current.

Recognizing this technical difference, DOE has introduced an additional criterion for classifying direct operation EPSs that recognizes that certain devices with low-voltage and high-current outputs have a distinct consumer utility, yet would have extreme difficulty meeting the standards being adopted today. Thus, DOE is subdividing product class C, splitting out certain low-voltage, high-current EPSs into a separate product class, product class C–1.[19] Product classes C and C–1 together encompass all direct operation, AC–DC EPSs with nameplate output voltage less than 6 volts and nameplate output current greater than or equal to 550 milliamps (''low-voltage''). Any product in this group that also has nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps and charges the battery of a product that is fully or primarily motor operated is in product class C–1. All others remain in product class C.

Given the differences in these low-voltage, high-current EPSs from the other products falling into product class C, DOE believes there is merit in

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[19] In the NOPR analysis, DOE mistakenly placed the EPSs for cord-cordless products in product class B, which contains basic-voltage EPSs. Based on public comments, DOE now recognizes that the EPSs in question are low-voltage EPSs and should have been placed in product class C.

treating them as a separate product class and is currently gathering additional information about this subset of EPSs. In the meantime, DOE is not adopting standards for EPSs in product class C–1 today, but intends to study these products further and may elect to propose efficiency standards for them in a future rulemaking. DOE will issue appropriate notices when undertaking studies to evaluate this class of products. To the extent that any products may be regulated as both a battery charger and an EPS, DOE may consider the treatment of those products as part of its further consideration of these energy conservation standards.

e. Final EPS Product Classes

DOE is establishing eight product classes for EPSs for the reasons discussed above. The eight EPS product classes are listed in Table IV–1.

TABLE IV–1—EXTERNAL POWER SUPPLY PRODUCT CLASSES

Class ID	Product class
B	Direct Operation, AC–DC, Basic-Voltage.
C	Direct Operation, AC–DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated).
C-1	Direct Operation, AC–DC, Low-Voltage with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps and charges the battery of a product that is fully or primarily motor operated.
D	Direct Operation, AC–AC, Basic-Voltage.
E	Direct Operation, AC–AC, Low-Voltage.
X	Direct Operation, Multiple-Voltage.
H	Direct Operation, High-Power.
N	Indirect Operation.

DOE is also adopting definitions for the following terms: Basic-voltage external power supply, direct operation external power supply, indirect operation external power supply, and low-voltage external power supply. These definitions will appear at 10 CFR 430.2. DOE proposed, but is not adopting, definitions for AC–AC external power supply, AC–DC external power supply, and multiple-voltage external power supply because similar terms have already been codified. See definitions for single-voltage external AC–AC power supply, single-voltage external AC–DC power supply, and multiple-voltage external power supply at 10 CFR 430 Subpart B Appendix Z.

3. Technology Assessment

In the technology assessment, DOE identifies technology options that appear to be feasible to improve product efficiency. This assessment provides the technical background and structure on which DOE bases its screening and engineering analyses. The following discussion provides an overview of the technology assessment for EPSs. Chapter 3 of the TSD provides additional detail and descriptions of the basic construction and operation of EPSs, followed by a discussion of technology options to improve their efficiency and power consumption in various modes.

a. EPS Efficiency Metrics

DOE used its EPS test procedures as the basis for evaluating EPS efficiency over the course of the standards rulemaking for EPSs. These procedures, which are codified in appendix Z to subpart B of 10 CFR Part 430 (''Uniform Test Method for Measuring the Energy Consumption of EPSs''), include a means to account for the energy consumption from single-voltage EPSs, switch-selectable EPSs, and multiple-voltage EPSs.

On December 8, 2006, DOE codified a test procedure final rule for single output-voltage EPSs. See 71 FR 71340. On June 1, 2011, DOE added a test procedure to cover multiple output-voltage EPSs. See 76 FR 31750. DOE's test procedures yield two measurements: Active mode efficiency and no-load mode (standby mode) power consumption.

Active-mode efficiency is the ratio of output power to input power. For single-voltage EPSs, the DOE test procedure averages the efficiency at four loading conditions—25, 50, 75, and 100 percent of maximum rated output current—to assess the performance of an EPS when powering diverse loads. For multiple-voltage EPSs, the test procedure provides those four metrics individually, which DOE averages to measure the efficiency of these types of devices. The test procedure also specifies how to measure the power consumption of the EPS when disconnected from the consumer product, which is termed ''no-load'' power consumption because the EPS outputs zero percent of the maximum rated output current to the application.

To develop the analysis and to help establish a framework for setting EPS standards, DOE considered both combining average active-mode efficiency and no-load power into a single metric, such as unit energy consumption (UEC), and maintaining separate metrics for each. DOE chose to evaluate EPSs using the two metrics separately. Using a single metric that combines active-mode efficiency and no-load power consumption to determine the standard may inadvertently permit the ''backsliding'' of the standards established by EISA 2007. Specifically, because a combined metric would regulate the overall energy consumption of the EPS as the aggregation of active-mode efficiency and no-load power, that approach could permit the performance of one metric to drop below the EISA 2007 level if it is sufficiently offset by an improvement in the other metric. Such a result would, in DOE's view, constitute a backsliding of the standards and would violate EPCA's prohibition from setting such a level. DOE's approach seeks to avoid this result.

The DOE test procedure for multiple-voltage EPSs yields five values: no-load power consumption as well as efficiency at 25, 50, 75, and 100 percent of maximum load. In the March 2012 standards NOPR, DOE proposed averaging the four efficiency values to create an average efficiency metric for multiple-voltage EPSs, similar to the approach followed for single-voltage EPSs. Alternatively, DOE introduced the idea of averaging the efficiency measurements at 50 percent and 75 percent of maximum load because the only known application that currently uses a multiple-voltage EPS, a video game console, operates most often between those loading conditions. DOE sought comment from interested parties on these two approaches.

Microsoft commented that setting a standard based on arbitrary loads that do not represent the intended loading point of the end-use application is counterproductive because EPSs are designed to be most efficient under the loading conditions they operate in most frequently. Instead, Microsoft believes that ''to optimize energy savings in real life, loading requirements in energy conservation standards should be based on the expected product load.'' (Microsoft, No. 110 at p. 2)

Although it is aware of only one currently available consumer product using multiple-voltage EPSs, DOE believes that evaluating multiple-voltage EPSs using an average-efficiency metric (based on the efficiencies at 25%, 50%, 75%, and 100% of each output's normalized maximum nameplate output power) would allow the standard to be applied to a diverse range of future products that may operate under different loading conditions. In addition, DOE's test data of the only product that currently falls into the multiple-voltage product class indicate that there is only a fractional percentage difference in the average active-mode efficiency when comparing DOE's weighting of the efficiency loading measurements and the alternative approach of averaging the efficiencies at 50% and 75% load where the console is most likely to operate. Therefore, DOE evaluated multiple-voltage EPSs using no-load mode power consumption and an average active-mode efficiency metric based on the measured efficiencies at 25%, 50%, 75%, and 100% of rated output power in developing the new energy conservation standards for these products. This loading point averaging methodology is consistent with the calculation of average active-mode efficiency for single-voltage external supplies as outlined in Appendix Z to Subpart B of 10 CFR Part 430.

b. EPS Technology Options

DOE considered seven technology options, fully detailed in Chapter 3 of the TSD, which may improve the efficiency of EPSs: (1) Improved Transformers, (2) Switched-Mode Power Supplies, (3) Low-Power Integrated Circuits, (4) Schottky Diodes and Synchronous Rectification, (5) Low-Loss Transistors, (6) Resonant Switching, and (7) Resonant (''Lossless'') Snubbers.

During its analysis, DOE found that some technology options affect both efficiency and no-load performance and that the individual contributions from these options cannot be separated from each other in a cost analysis. Given this finding, DOE adopted a ''matched pairs'' approach for defining the EPS CSLs. This approach used selected test units to characterize the relationship between average active-mode efficiency and no-load power dissipation. In the matched pairs approach, EPS energy consumption decreases as you move from one CSL to the next higher CSL either through higher active mode efficiency, lower no-load mode power consumption, or both. If DOE allowed one metric to decrease in stringency between CSLs, then the cost-efficiency results might have shown cost reductions at higher CSLs and skewed the true costs associated with increasing the efficiency of EPSs. To avoid this result, DOE used an approach that increases the stringency of both metrics for each CSL considered during the process of amending the EISA standard for EPSs.

DOE considered all technology options when developing CSLs for all four EPS representative units in product class B. DOE considered the same efficiency improvements in its analysis for EPSs in product classes X and H as it did for Class A EPSs. Where representative units were not explicitly analyzed (*i.e.,* product classes C, D, and E), DOE extended its analysis from a directly analyzed class. As a result, all design options that could apply to these products were implicitly considered because the efficiency levels of the analyzed product class will be scaled to other product classes, an approach supported by interested parties throughout the rulemaking process. The equations were structured based on the relationships between product classes C, D, and E and representative product class B such that the technology options not implemented by the other classes were accounted for in the proposed candidate standard levels. For example, AC–AC EPSs (product classes C and E) tend to have higher no-load power dissipation than AC–DC EPSs because they do not use switched-mode topologies (see Chapter 3 of the TSD for a full technical description). Therefore, to account for this characteristic in these products, DOE used higher no-load power metrics when generating CSLs for these product classes than are found in the corresponding CSLs for the representative product class B.

c. High-Power EPSs

DOE examined the specific design options for high-power EPSs as they relate to ham radios, the sole consumer application for these EPSs. DOE found that high-power EPSs are unique because both linear and switched-mode versions are available as cost-effective options, but the linear EPSs are more expensive and inherently limited in their achievable efficiency despite sharing some of the same possible efficiency improvements as EPSs in other product classes.[20] Interested parties have expressed concern that setting an efficiency standard higher than a linear EPS can achieve would reduce the utility of these devices because ham radios are sensitive to the electromagnetic interference (EMI) generated by switched-mode EPSs. In some cases, EMI can couple through the EPS to the transmitter of ham radios and be transmitted on top of the intended signal causing distortion.

DOE sought comment on the impacts of excessive EMI in amateur radio applications using EPSs with switched-mode topologies. PTI acknowledged that EMI generated from switched-mode power supplies is more of a factor in radio applications, but could not definitively attest to any adverse impacts on consumer utility due to the changeover from linear power supplies. (PTI, No. 133 at p. 4)

DOE believes there is no reduction in utility because EPSs used in telecommunication applications are required to meet the EMI regulations of the Federal Communications Commission (47 CFR part 15, subpart B), regardless of the underlying technology. These regulations specifically limit the amount of EMI for ''unintentional radiators'', which are devices that are not intended to generate radio frequency signals but do to some degree due to the nature of their design. Many such devices limit the amount of EMI coupled to the end use product through EMI filters and proper component arrangement on the printed circuit board (PCB). As part of its engineering analysis, DOE constructed the high power cost-efficiency curves using two teardown units including one that utilized switched-mode technology and made use of similar EMI-limiting techniques. This switched-mode design complied with the FCC requirements with no reduction in utility or performance despite a higher efficiency than the baseline design DOE analyzed. Given the presence of switched-mode designs that comply with the FCC regulations and the existence of EMI-limiting technology, DOE does not believe that the new standard will negatively affect the consumer utility of high-power EPSs.

d. Power Factor

Power factor is a relative measure of transmission losses between the power plant and a consumer product or the

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[20] A linear mode or linear regulated EPS is an EPS that has its resistance regulated and results in a constant output voltage. In contrast, a switched mode EPS is an EPS that switches on and off to maintain an average value of output voltage.

ratio of real power to the total power drawn by the EPS. Due to nonlinear and energy-storage circuit elements such as diodes and inductors, respectively, electrical products often draw currents that are not proportional to the line voltage. These currents are either distorted or out of phase in relation to the line voltage, resulting in no real power drawn by the EPS or transmitted to the load. However, although the EPS itself consumes no real power, these currents are real and cause power dissipation from conduction losses in the transmission and distribution wiring. For a given nameplate output power and efficiency, products with a lower power factor cause greater power dissipation in the wiring, an effect that also becomes more pronounced at higher input powers. DOE examined the issue of power factor in section 3.6 of the May 2009 framework document for the present rulemaking and noted that certain ENERGY STAR specifications limit power factor.

DOE notes that regulating power factor includes substantial challenges, such as quantifying transmission losses that depend on the length of the transmission wires, which differ for each residential consumer. Further, DOE has not yet conclusively analyzed the benefits and burdens from regulating power factor. While DOE plans to continue analyzing power factor and the merits of its inclusion as part of a future rulemaking, it is DOE's view that the above factors weigh in favor of not setting a power factor-based standard at this time.

B. Screening Analysis

DOE uses the following four screening criteria to determine which design options are suitable for further consideration in a standards rulemaking:

1. *Technological feasibility.* DOE considers technologies incorporated in commercial products or in working prototypes to be technologically feasible.

2. *Practicability to manufacture, install, and service.* If mass production and reliable installation and servicing of a technology in commercial products could be achieved on the scale necessary to serve the relevant market at the time the standard comes into effect, then DOE considers that technology practicable to manufacture, install, and service.

3. *Adverse impacts on product utility or product availability.* If DOE determines a technology would have significant adverse impact on the utility of the product to significant subgroups of consumers, or would result in the unavailability of any covered product type with performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as products generally available in the United States at the time, it will not consider this 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 this technology further. See 10 CFR part 430, subpart C, appendix A, (4)(a)(4) and (5)(b).

For EPSs, DOE did not screen out any technology options after considering the four criteria. For additional details, see chapter 4 of the TSD.

Brother International commented that the design options DOE considered for lowering no-load power consumption could adversely impact the health and safety of consumers as manufacturers might eliminate existing safety controls to comply with the amended standards. Specifically, citing to one example, Brother pointed to the lack of a device to discharge residual charge from one of their candidate EPS designs, which they believed was removed in order to comply with the proposed no-load requirements from the NOPR. Brother believes this omission could impact safety to consumers and that DOE should not lower the no-load requirements for EPSs below the current federal maximum of 0.5 watts. However, they did not elaborate on the component involved or state that removing said component was the only design option in order to meet the proposed standard. (Brother International, No. 111 at p. 3)

DOE conducts a screening analysis on all the technology options it identifies during the technology assessment portion of the rulemaking by applying a strict set of statutory criteria. At no point during interviews with manufacturers or DOE's independent testing, was there concern expressed over the no-load levels DOE was analyzing. The no-load power metric for each CSL DOE considered was supported by data compiled from already commercially available units, which posed no such health or safety risk to consumers. While Brother International did not expand on its concerns, DOE is aware of certain components in general EPS design, such as X capacitors and bleeder resistors. EPS designers typically use X capacitors on the input filter stages to protect the EPS against line voltage spikes and bleeder resistors to bleed off the residual charge from the devices when the EPS is disconnected. It is common design to practice to include these components; however, should the resistor be omitted, the capacitors will still discharge within seconds of the power being removed. In any case, based on its examination of this issue, DOE does not believe these design practices present any shock hazard to consumers provided they do not attempt to physically tear down or otherwise destroy the EPS under live power conditions. As a result, DOE did not screen out any additional technology options based on adverse impacts to health and safety associated with decreasing the no-load power consumption through the amended EPS standards.

Additionally, DOE notes that it has received no comments from interested parties regarding patented technologies and proprietary designs that would inhibit manufacturers from achieving the energy conservation standards adopted in today's rule. DOE believes that those standards will not mandate the use of any such technologies.

C. Engineering Analysis

In the engineering analysis (detailed in chapter 5 of the TSD), DOE describes the relationship between the manufacturer selling price (MSP) and increases in EPS efficiency. The efficiency values range from that of an inefficient EPS sold today (the baseline) to the maximum technologically feasible efficiency level. For each efficiency level examined, DOE determines the MSP; this relationship is referred to as a cost-efficiency curve.

DOE structured its engineering analysis around two methodologies: (1) Test and teardowns, which involves testing products for efficiency and determining cost from a detailed bill of materials derived from tear-downs and (2) the efficiency-level approach, where the cost of achieving increases in energy efficiency at discrete levels of efficiency are estimated using information gathered in manufacturer interviews supplemented by, and verified through, technology reviews and subject matter experts (SMEs). When analyzing the cost of each CSL—whether based on existing or theoretical designs—DOE distinguishes between the cost of the EPS and the cost of the associated end-use product.

1. Representative Product Classes and Representative Units

DOE selected representative product class B (AC to DC conversion, basic-voltage EPSs), which contains most Class A EPSs and some MADB EPSs that can directly power an application, as the focus of its engineering analysis because it constituted the majority of shipments and national energy consumption related to EPSs. Within product class B, DOE analyzed four representative units with output powers of 2.5 watts, 18 watts, 60 watts, and 120 watts because the associated consumer applications for these, and similar, EPSs constitute a significant portion of shipments and energy consumption. Based on DOE's analysis of product class B, DOE was able to scale the results for product classes C, D, and E. EPSs in each have inherent technical limitations that prevent them from meeting the same efficiency and no-load levels as EPSs in product class B. The lower-voltage product classes C and E typically have higher loss ratios than EPSs in product class B due to their lower nameplate output voltages and higher nameplate output currents. Therefore, it was necessary for DOE to scale down the efficiency levels established in product class B to more technically achievable levels for product classes C and E.

Similarly, EPSs in product class D do not possess control circuitry to lower the no-load power consumption. DOE found that including such circuitry would increase the no-load consumption while increasing the overall cost of EPSs in product class D. DOE subsequently scaled the no-load power consumption results established from the analysis of product class B to adjust for this limitation of EPSs in product class D. Despite the comparatively small percentage of EPSs in product classes C, D, and E compared to those in product class B, DOE has taken steps to ensure that the standards for each class are technically feasible for EPSs in each product class. More detail on DOE's scaling methodology can be found in chapter 5 of the final rule TSD.

Some interested parties supported DOE's approach in creating and analyzing representative product classes and representative units during the rulemaking process. The California IOUs agreed with using product class B as the representative product class and scaling to other product classes because of their inherent similarities. (CA IOUs, No. 138 at p. 13) Although no specific data were provided, the California IOUs also commented in support of the four representative units within the product class, noting that their own research[21] into the power supply market corroborates DOE's selections. (CA IOUs, No. 138 at p. 13) ARRIS Group, however, claimed that ''by analyzing EPSs at the 18W representative unit, DOE overstates annual power cost savings'' and suggested that averaging energy savings across output powers is more accurate. (ARRIS Group, No. 105 at p. 2) Both of the methodologies DOE presented during the NOPR public meeting were identical to those originally drafted as part of the preliminary analysis.

The representative units DOE selected align with a wide range of EPS output powers for consumer applications. The purpose was to select units that capture the most common output voltages and output powers available on the market. In most cases, as output power increases, nameplate output voltage also increases, but DOE found that most EPS designs tended to cluster around certain common output voltage and output power levels. DOE used this trend in EPS design to categorize its four representative units. DOE was also able to test several EPS units that exactly met the representative units' specifications and scaled units with small variations based on output power, output voltage, cord length, and/or cost as described in chapter 5 of the final rule TSD. While the costs are analyzed on an individual unit basis, the standard levels considered by DOE, and ultimately the energy savings, are examined across the entire range of EPSs. National energy savings (NES) and consumer NPV are calculated for an entire product class, not an individual representative unit. To date, stakeholders have supported this approach and the overall engineering analysis methodology. Therefore, DOE elected to maintain its selections for the EPS representative units and its methodology for estimating the cost savings from the standards adopted today.

2. EPS Candidate Standard Levels (CSLs)

DOE applied the same methodology to establish CSLs in today's final rule as it did for its proposal and preliminary analysis. DOE created CSLs as pairs of EPS efficiency metrics for each representative unit with increasingly stringent standards having higher-numbered CSLs. The CSLs were generally based on (1) voluntary (e.g. ENERGY STAR) specifications or mandatory (*i.e.,* those established by EISA 2007) standards that either require or encourage manufacturers to develop products at particular efficiency levels; (2) the most efficient products available in the market; and (3) the maximum technologically feasible (''max tech'') level. These CSLs are summarized for each representative unit in Table IV–2. In section IV.C.5, DOE discusses how it developed equations to apply the CSLs from the representative units to all EPSs.

TABLE IV–2—SUMMARY OF EPS CSLS FOR PRODUCT CLASSES B, C, D, AND E

CSL	Reference	Basis
0	EISA 2007	EISA 2007 equations for efficiency and no-load power.
1	ENERGY STAR 2.0	ENERGY STAR 2.0 equations for efficiency and no-load power.
2	Intermediate	Interpolation between test data points.
3	Best-in-Market	Most efficient test data points.
4	Max Tech	Maximum technologically feasible efficiency.

DOE conducted several rounds of interviews with manufacturers who produce EPSs, integrated circuits for EPSs, and applications using EPSs. All of the manufacturers interviewed identified ways that EPSs could be modified to achieve efficiencies higher than those available with current products. These manufacturers also described the costs of achieving those efficiency improvements, which DOE examines in detail in chapter 5 of the TSD. DOE independently verified the accuracy of the information described by manufacturers.[22] Verifying this information required examining and testing products at the best-in-market efficiency level and determining what

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[21] *http://www.energy.ca.gov/appliances/archive/2004rulemaking/documents/case_studies/CASE_Power_Supplies.pdf.*

[22] In confirming this information, DOE obtained technical assistance from two subject matter experts—These two experts were selected after having been found through the Institute of Electrical and Electronics Engineers (IEEE). Together, they have over 30-years of combined experience with power supply design. The experts relied on their experience to evaluate the validity of both the design and the general cost of the max-tech efficiency levels provided by manufacturers.

design options could still be added to improve their efficiency. By comparing the improved best-in-market designs (using predicted performance and cost) to the estimates provided by manufacturers, DOE was able to assess the reasonableness of the max-tech levels developed.

DOE created the max-tech candidate standard level (CSL 4) equations for average efficiency and no-load power using curve-fits (*i.e.,* creating a continuous mathematical expression to represent the trend of the data as accurately as possible) of the aggregated manufacturer data (see chapter 5 of the TSD for details on curve fits). DOE created the equations for no-load power based on a curve fit of the no-load power among the four representative units. For both the average efficiency and no-load power CSL equations, DOE used equations similar to those for CSL 1, involving linear and logarithmic terms in the nameplate output power. DOE chose the divisions at 1 watt and 49 watts in the CSL 4 equations to ensure consistency with the nameplate output power divisions between the equations for CSL 1.

DOE evaluated EPSs using the two EPS efficiency metrics, no-load power consumption and active-mode average efficiency, which it grouped into ‘‘matched pairs.’’ Under the matched pairs approach, each CSL would increase in stringency in at least one of the metrics and no metric would ever be lowered in moving to a higher CSL. DOE's goal in using this approach was to ensure that when it associated costs with the CSLs, that the costs would reflect the complete costs of increased efficiency. If DOE followed an approach that permitted a decrease in stringency for a given metric, the result might be a projected reduction in EPS cost, which would mask the full cost of increasing EPS efficiency.

Interested parties supported DOE's matched pairs approach for EPS CSLs. Stakeholders, such as the California Energy Commission, commented that DOE's approach focused directly on what is measured rather than introducing usage assumptions to weight the values of standby mode and active-mode power consumption. The California Energy Commission believes that regulating active-mode efficiency and no-load power consumption rather than a combined unit energy consumption (UEC) metric is the most appropriate course of action for DOE (California Energy Commission, No. 117 at p. 17). While supportive of DOE's approach, interested parties, including the California IOUs, also cautioned DOE to avoid setting levels for no-load power that were too stringent when compared to active-mode efficiency improvements. (CA IOUs, No. 138 at p. 13)

DOE received additional comments regarding its EPS CSLs. NRDC and ASAP both urged DOE to ‘‘evaluate an intermediate level for EPS product class B between CSL 3 and CSL 4’’, suggesting that there may be a more stringent standard that is cost-effective between DOE's estimates for the best-in-market and maximum technologically feasible CSLs. (NRDC, No. 114 at p. 12; ASAP, *et al.,* No. 136 at p. 10)

As discussed above, DOE's CSL equations are a function of nameplate output power and are based on existing standards, incentive programs, the most efficient tested units on the market, intermediate levels between those points, and a maximum technologically feasible or ‘‘max-tech’’ level. No-load requirements were carefully considered consistent in light of the submitted comments. The difference in performance between the CSLs noted by NRDC corresponds to the difference between the best-in-market level, which is supported by test data, and the ‘‘max-tech’’ level, which is theoretical and based on estimates from manufacturers and industry experts. DOE's comprehensive engineering analysis selected specific CSLs based on real world data and discussions with manufacturers. NRDC did not provide any additional data to support its recommendation that DOE examine more stringent standard. Instead, it asserted that DOE did not find more efficient EPSs on the market above the CSL proposal because market demand is shaped primarily by the efficiency marking protocol and there is currently little incentive for the market to demand efficiencies higher than Level V. (NRDC, No. 114 at p. 12)

In DOE's view, adopting NRDC's approach would create a standard based entirely on theoretical design improvements to the most efficient EPSs already on the market today. Such an approach would not be supportable by any actual data—whether market-based or through the testing of available products. DOE notes that since a second determination is required in 2015, any further analysis of efficiency levels beyond the current best-in-market CSL would likely occur as part of that effort. As a result, based on currently available information, DOE chose to maintain its CSLs in the engineering analysis for today's final rule.

Brother International expressed concern that requiring more efficient EPSs in line with the proposed minimum efficiency active-mode limits would disrupt the stable product supply due to the lack of non-proprietary semiconductors (Brother International, No. 111 at p. 3). It noted that there is one key component needed to meet the proposed efficiency levels for EPSs, and that it has been told by EPS suppliers that there are a small number of component manufacturers that can produce this patented technology. Brother International did not provide any evidence to support this. However, during manufacturer interviews, DOE was consistently told the candidate standard levels (CSLs) analyzed for EPSs were technically achievable without the use of patented technologies. Each component manufacturer, original design manufacturer (ODMs), or those that design and manufacturer EPSs based on a set of specifications, and original equipment manufacturers (OEMs), or those that purchase EPSs from ODMs to be solid in retail markets, interviewed had different pathways to achieving the proposed standard suggesting there are multiple design options to lower EPS energy consumption. At no point in discussions with manufacturers has DOE been told that a patented technology would be required to meet a CSL for any of the product classes, even at the maximum technologically feasible level.

DOE also maintained the same CSLs for multiple-voltage EPSs (product class X) as it proposed in the NOPR because it received no comments and has no new information that would merit a change in the CSLs for this product class. The CSLs are shown in Table IV–3.

TABLE IV–3—SUMMARY OF EPS CSLS FOR PRODUCT CLASS X

CSL	Reference	Basis
0	Market Bottom	Test data of the least efficient unit in the market.
1	Mid-Market	Test data of the typical unit in the market.
2	Best-in-Market	Manufacturer's data.

TABLE IV–3—SUMMARY OF EPS CSLS FOR PRODUCT CLASS X—Continued

CSL	Reference	Basis
3	Max Tech	Maximum technologically feasible efficiency.

DOE received no comments concerning the CSLs for high-power EPSs in response to the NOPR. Therefore, DOE maintained its selections for CSLs from the NOPR in the engineering analysis for today's final rule. The CSLs for product class H are listed in Table IV–4.

TABLE IV–4—SUMMARY OF EPS CSLS FOR PRODUCT CLASS H

CSL	Reference	Basis
0	Line Frequency	Test data of a low-efficiency unit in the market.
1	Switched-Mode Low Level	Test data of a high-efficiency unit in the market.
2	Switched-Mode High Level	Manufacturers' theoretical maximum efficiency.
3	Scaled Best-in-Market	Scaled from 120W EPS CSL 3.
4	Scaled Max Tech	Scaled from 120W EPS CSL 4.

3. EPS Engineering Analysis Methodology

DOE relied upon data gathered from manufacturer interviews to construct its engineering analysis for EPSs. DOE's cost-efficiency analysis for each of the representative units in product class B was generated using aggregated manufacturer cost data. DOE attempted to corroborate these estimates by testing and tearing down several EPSs on the market. For those products that did not exactly match its representative units, DOE scaled the test results for output power, output voltage, and cord length as necessary to align with the representative unit specifications. The units were then torn down by iSuppli to estimate the manufacturer selling price (MSP) and create a unique cost-efficiency curve entirely based on measurable results. The test and teardown data were inconclusive and generally showed decreasing costs with increasing efficiency. DOE previously presented both sets of cost-efficiency data to stakeholders for comment and consistently received support for using the manufacturer data as the basis for any standard setting action. Stakeholders argued that the negative cost-efficiency trends seen in the teardown data were not representative of the EPS market and that the manufacturer data was much more consistent and reliable since the data were more comprehensive. Stakeholders indicated that the data collected from manufacturer interviews better reflected the industry trends because it was derived from the estimates of manufacturers who produce EPSs in volume rather than backed out from an overall BOM cost by iSuppli. Therefore, in section IV.C of the NOPR, DOE proposed to use only the data gathered from manufacturers for its engineering analysis.

With respect to the scaled test results, Salcomp disagreed with DOE's results, stating that the ''scaled average efficiency results in the reference data are not in line with theoretical calculations related to 5V/1A EPSs'' and that ''it appears that the real effects of the cable have not been taken into account.'' Salcomp also proposed that USB–A EPS products be measured without the cable, as EPS manufacturers do not know anything about the cables that are ultimately supplied with the product. (Salcomp, No. 73 at p. 1)

NRDC suggested that the teardowns commissioned by DOE for the cost-efficiency curves were not conducted on EPSs of comparable utility, but commented that up-to-date manufacturer data should be sufficient to conduct an accurate cost-efficiency analysis going forward. (NRDC, No. 114 at p. 11)

As stated in DOE's test procedure for single-voltage EPSs, ''power supplies must be tested in their final, completed configuration in order to represent their measured efficiency on product labels or specification sheets.'' (74 FR 13318) USB–A EPSs must, therefore, be tested with the USB cable, as supplied by the manufacturer of the EPS, connected. DOE took this into account as part of its engineering analysis methodology and established a representative DC cable length to help scale the measured efficiency of an EPS based on its nameplate output power and output voltage. As described in chapter 5 of the TSD, the resistivity of a wire is dependent on the resistivity of the copper used, the length of the wire, and the cross-sectional area of the wire. With all other factors the same, a longer cord length would increase the resistivity of the wire and subsequently increase the losses associated with the output cord, ultimately lowering the conversion efficiency of the EPS. Scaling the measured efficiency using a standard cable length meant that DOE needed to factor in any expected resistive losses associated with the current provided by the EPS in question. However, the scaling was applied not to correct for potential cable losses, but to take efficiency data measured with the manufactured cable and adjust it to the standard length. In all cases, the output cord loss was taken into account in the efficiency results of the EPSs DOE tested. Ultimately, these data were only used to support DOE's CSLs and not directly factored into the cost-efficiency curves DOE used to select standard levels for EPSs. DOE relied only on manufacturer interview data in its cost-efficiency analysis.

4. EPS Engineering Results

DOE characterized the cost-efficiency relationship of the four representative units in product class B as shown in Table IV–5, Table IV–6, Table IV–7, and Table IV–8. During interviews, manufacturers indicated that their switched-mode EPSs currently meet CSL 1, the ENERGY STAR 2.0 specification level. This factor is reflected in the analysis by setting the incremental MSP for the 18W, 60W, and 120W EPSs to $0 at CSL 1, which means that there is no incremental cost above the baseline to achieve CSL 1. Costs for the 2.5W EPS, however, are estimated at $0.15 for CSL 1. This result occurs because of DOE's assumption (based on available information) that the lowest cost solution for improving the efficiency of the 2.5W EPS is through the use of linear EPSs, which are manufactured both at the EISA 2007 level as well as the ENERGY STAR 2.0 level. Specifically, as commenters suggested, DOE examined linear EPSs and found that they might be a cost-effective solution at CSL 0 and CSL 1 for 2.5W EPSs. Thus, $0.15 indicates the incremental cost for a 2.5W linear EPS to achieve higher efficiency. For all four representative units, the more stringent CSLs—CSL 2, CSL 3, and CSL 4—correspond to switched-mode EPSs designed during the same design cycle, which would cause their costs to increase with increased efficiency as more efficient designs require more efficient and more expensive components.

Table IV-5 2.5W EPS Engineering Analysis Results

	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
Efficiency [%]:	58.3	67.9	71.0	73.5	74.8
No-Load Power [W]:	0.500	0.300	0.130	0.100	0.039
CSL Description:	EISA	ENERGY STAR 2.0	Intermediate	Best-in-Market	Max Tech
Incremental MSP[$]:	0.00	0.15	0.33	0.45	0.52

Table IV-6 18W EPS Engineering Analysis Results

	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
Efficiency [%]:	76.0	80.3	83.0	85.4	91.1
No-Load Power [W]:	0.500	0.300	0.200	0.100	0.039
CSL Description:	EISA	ENERGY STAR 2.0	Intermediate	Best-in-Market	Max Tech
Incremental MSP[$]:	0.00	0.00	0.17	0.64	2.89

Table IV-7 60W EPS Engineering Analysis Results

	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
Efficiency [%]:	85.0	87.0	87.0	88.0	92.2
No-Load Power [W]:	0.500	0.500	0.200	0.073	0.050
CSL Description:	EISA	ENERGY STAR 2.0	Intermediate	Best-in-Market	Max Tech
Incremental MSP[$]:	0.00	0.00	0.13	0.33	1.43

Table IV-8 120W EPS Engineering Analysis Results

	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
Efficiency [%]:	85.0	87.0	88.0	88.4	93.5
No-Load Power [W]:	0.500	0.500	0.230	0.210	0.089
CSL Description:	EISA	ENERGY STAR 2.0	Intermediate	Best-in-Market	Max Tech
Incremental MSP[$]:	0.00	0.00	0.31	0.45	6.41

NRDC had a number of comments on DOE's cost-efficiency results from the NOPR. In general, NRDC asserted that DOE had overestimated the cost of efficiency improvements for the 2.5 watt, 18 watt, and 60 watt representative units, based on NRDC's own discussions with industry professionals. (NRDC, No. 114 at p. 11) In some cases, DOE's estimates for the incremental MSPs are nearly three times greater than NRDCs estimates. ASAP, who echoed these concerns, stated that the costs of highly efficient EPSs are rapidly declining and that DOE should reevaluate its estimates to reflect the most recent price trends. (ASAP, *et al.,* No. 136 at p. 10)

While ASAP and NRDC had comments concerning the cost-efficiency relationships of several representative units, many stakeholders mentioned the 60 watt representative unit cost-efficiency curves as being particularly skewed. NRDC stated that the fact that the 60 watt costs were higher than the 120 watt costs for most CSLs was not accurate, as higher power EPSs require higher material costs. They noted that perhaps DOE's analysis of the 60 watt unit included features unrelated to efficiency, which would explain the higher than expected costs for the lower order CSLs. (NRDC, No. 114 at p. 11) The PSMA submitted similar comments stating that the incremental costs for EPSs increase ''steadily and predictably with power supply size'' such that the 60 watt incremental costs should be lower than those for the 120 watt representative unit. (PSMA, No. 147 at p. 2) NEEP commented that the LCC results derived from the cost-efficiency curves for the 60 watt representative unit show unexplained irregularities that were attributed to manufacturer-provided cost data and suggested DOE conduct an additional independent engineering analysis on the 60 watt discrepancy. (NEEP, No. 160 at p. 2) These comments were based on the negative weighted-average LCC savings for the 60W representative unit at all CSLs above the baseline. DOE believes these results were due to the large incremental cost associated with moving from CSL 1 to CSL 2 and the relatively small increases in cost for the higher order CSLs.

DOE aggregated costs from OEMs, ODMs and component manufacturers to reflect the costs associated with incremental improvements in the energy efficiency of four representative units within product class B. Those costs were presented as the manufacturer selling price (MSP), or the price that the OEM pays the ODM for an EPS that meets its specifications. These costs were estimated through a series of manufacturer interviews to establish a range of average markups and incremental costs for efficiency improvements. The MSPs gleaned from interviews included only improvements to efficiency-related components over the manufacturer's baseline EPS model. Therefore, the incremental costs in DOE's analyses are only representative of improvements to the energy efficiency of EPSs.

DOE took the stakeholder comments into consideration when revising its engineering analysis for today's final rule. NRDC's assertion that the costs are overestimated for the 2.5W EPS representative unit fails to acknowledge that certain linear power supplies are still cost-effective and technically feasible for efficiencies up to CSL 1 for low power EPSs. The final cost-efficiency curve incorporates not only changes to switched-mode designs for higher efficiencies, but costs incurred by manufacturers of linear power supplies to improve the efficiency over the current designs. The result of this aggregation shows higher overall costs than estimated by NRDC for this representative unit.

In revisiting the cost-efficiency curves, DOE noted that the 60W cost aggregation contained the largest concentration of data from manufacturer interviews conducted during the preliminary analysis. Since the LCC results for the 60W representative unit largely depend on the cost changes between the CSLs and the efficiency distribution of the current products on the market, DOE decided to revise its aggregation using only the most recent data gathered from manufacturer interviews to generate the cost-efficiency curves presented in today's final rule. DOE believes that these curves better reflect the cost impacts of improving the efficiency of 60W EPSs and notes they align with NRDC's incremental MSP estimates for achieving the efficiency level of the amended standard. The resulting cost-efficiency curve shows a substantially smaller incremental cost at the proposed standard level of $0.33 compared to $1.29 in the NOPR. This modification caused the life-cycle cost savings at the proposed standard level for the 60W representative unit to turn strongly positive from the negative result depicted in the NOPR. The full LCC impacts can be found in Section V.B.1.a. For the 2.5W, 18W, and 120W representative units, DOE maintained its cost estimates from the NOPR because they represent the aggregated results from DOE's most recent data gathering efforts.

Unlike product class B, DOE analyzed only a single 203W representative unit for multiple-voltage EPSs. In Chapter 5 of the TSD, DOE outlines the cost-efficiency relationship for 203W multiple-voltage EPSs that it developed as part of the non-Class A EPS determination analysis. DOE received no comments on its engineering results for this product class and, therefore, maintained the same results in today's final rule. The results for the 203W multiple-voltage EPS product class are shown in Table IV–9.

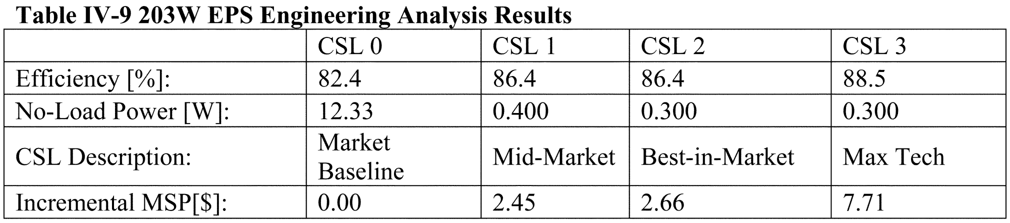
Table IV-9 203W EPS Engineering Analysis Results

	CSL 0	CSL 1	CSL 2	CSL 3
Efficiency [%]:	82.4	86.4	86.4	88.5
No-Load Power [W]:	12.33	0.400	0.300	0.300
CSL Description:	Market Baseline	Mid-Market	Best-in-Market	Max Tech
Incremental MSP[$]:	0.00	2.45	2.66	7.71

Similar to the analysis of multiple-voltage EPSs, DOE analyzed one 345W representative unit for high-power EPSs. In chapter 5 of the NOPR TSD, DOE indicated that it was considering applying the cost-efficiency relationship for 345W high-power single-voltage EPSs that it developed as part of the non-Class A EPS determination analysis to high-power EPSs. In the determination analysis, DOE derived costs for CSL 0 and CSL 1 from test and teardown data, whereas costs for CSL 2 and CSL 3 came from manufacturer and component supplier interviews. DOE did not receive comments on this aspect of its approach in the NOPR. Hence, DOE used the results from the determination analysis to characterize the costs of the less-efficient CSLs for 345W high-power EPSs (CSL 0 and CSL 1) for today's final rule.

After discussions with its subject matter experts (SMEs), DOE believes that a 345W EPS can achieve higher efficiencies based on a theoretical model of a 360W EPS that exhibits the properties of three 120W EPSs connected in parallel. This model essentially demonstrates a ''black box'' approach that supplies the representative unit output voltage at a higher output current than a single 120W unit would be able to provide. As each EPS in this system would be operating at an identical efficiency, the system as a whole would meet the same efficiency as any one EPS and, therefore, the 345W unit can be modeled as several 120W EPSs connected in parallel.

These higher output devices are typically used with amateur radio equipment, which often transmit at power levels between 100 and 200 watts while simultaneously providing power to other components. DOE developed its costs for the higher-efficiency CSLs (CSL 2, CSL 3, and CSL 4) based on its 120W EPS analysis. DOE received no comments on this approach and thus retained the cost-efficiency relationship for the 345W EPS shown in Table IV–10 for today's final rule.

Table IV-10 345W EPS Engineering Analysis Results

	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
Efficiency [%]:	62.4	81.3	84.6	87.5	92.0
No-Load Power [W]:	15.43	6.01	0.500	0.500	0.266
CSL Description:	Market Baseline	Low Market	Mid-Market	Scaled Best-in-Market	Scaled Max Tech
Absolute MSP[$]:	132.68	104.52	104.52	107.30	143.92

5. EPS Equation Scaling

In support of the NOPR, DOE presented an approach to deriving the average efficiency and no-load power consumption requirements for each CSL over the full range of output power for Class A EPSs in chapter 5 of the NOPR TSD. Mathematical equations define each CSL as a pair of relationships that are functions of nameplate output power: (1) Average active-mode efficiency and (2) no-load mode power consumption. These equations allowed DOE to describe a CSL for any nameplate output power and served as the basis for its proposed standards. A complete description of the equations can be found in chapter 5 of the TSD.

For the baseline CSL and CSL 1, DOE relied on equations from EISA 2007 and ENERGY STAR 2.0, respectively, rather than developing new equations. DOE took this approach because EISA created a mandatory standard that established a baseline for DOE's analysis while the ENERGY STAR voluntary program served as an incentive for manufacturers to produce more efficient products in order to brand their products as ENERGY STAR compliant, a quality that that many consumers recognize and seek. Both equations are defined over ranges of output power, although the divisions between ranges are slightly different. EISA 2007 created divisions by establishing efficiency equations with breakpoints at 1 watt and 51 watts; ENERGY STAR 2.0 creates similar divisions at 1 watt and 49 watts. See 42 U.S.C. 6295(u)(3)(A) (creating nameplate output categories of under 1 watt, 1 watt to not more than 51 watts, and over 51 watts) and ''ENERGY STAR Program Requirements for Single Voltage External AC–DC and AC–AC Power Supplies'' (creating nameplate output categories of less than or equal to 1 watt, 1 watt to not more than 49 watts, and greater than 49 watts). DOE developed equations for all other CSLs and for consistency and simplicity used the ENERGY STAR 2.0 divisions at 1 watt and 49 watts for all CSLs. These divisions were created in conjunction with the EPS product classes discussed in section IV.A.2.a as part of a complete analysis by the EPA when it drafted the ENERGY STAR program requirements for single-voltage external AC–DC and AC–AC power supplies.

DOE derived CSL 2, CSL 3, and CSL 4 by fitting equations to the efficiency values of their respective manufacturer and test data points for each representative unit. DOE used an equation of the form $Y = a*\ln(P_{out}) + b*P_{out} + c$, for each of the nameplate output power ranges, where Y indicates the efficiency requirement; P_{out} indicates the nameplate output power; and a, b, and c represent variables defined for each CSL. DOE ensured that the equations met three conditions:

(1) The distance to each point was minimized.

(2) The equation did not exceed the tested efficiencies.

(3) DOE further restricted the parameter choice in order to ensure that the CSL curves adhered to a matched pairs approach fully detailed in chapter 5 of the TSD.

For the NOPR, DOE derived a revised max-tech scaling equation from data points obtained during manufacturer interviews as noted in section III.B.2.a. DOE received no comments averse to the revised max tech CSL equation. Therefore, DOE has maintained all of its CSL equations from the NOPR in today's final rule.

As in the NOPR, DOE scaled the CSL equations from product class B to the product classes representing low-voltage AC–DC and all AC–AC EPSs (product classes C, D, and E). See Chapter 5 of the TSD to today's final rule for more information regarding DOE's scaling methodology. The scaling for these equations was based on ENERGY STAR 2.0, which separates AC–DC conversion and AC–AC conversion into ''basic-voltage'' and ''low-voltage'' categories. ENERGY STAR 2.0 sets less stringent efficiency levels for low-voltage EPSs because they cannot typically achieve the same efficiencies as basic-voltage EPSs due to inherent design limitations. Similarly, ENERGY STAR 2.0 sets less stringent no-load standards for AC–AC EPSs because the devices do not use the overhead circuitry found in AC–DC EPSs to limit no-load power dissipation. As previously stated, the power consumed by the additional AC–AC EPS circuitry would actually increase their no-load power consumption. DOE used this approach to develop CSLs other than the baseline CSL for product classes C, D, and E. Because the EISA 2007 standard applies to all Class A EPSs, which comprise most of product classes B, C, D, and E, the baseline CSL is exactly the same for all four product classes.

As described throughout the EPS rulemaking, DOE created less stringent CSLs for product classes C, D, and E based on the technical differences outlined in Section III.A. The efficiency equations for CSL 1 come directly from the ENERGY STAR 2.0 low-voltage equation because of the impact the ENERGY STAR 2.0 levels had on the EPS market. The low-voltage curves for CSL 2, CSL 3, and CSL 4 were created by using their respective CSL 2, CSL 3, and CSL 4 basic-voltage efficiency curves, and altering all equation parameters by the difference in the coefficients between the CSL 1 basic-voltage and low-voltage equations. This approach had the effect of shifting the CSL 2, CSL 3, and CSL 4 low-voltage curves downward from their corresponding basic-voltage CSL 2, CSL 3, and CSL 4 curves, by a similar amount as the shift seen in the ENERGY STAR 2.0 equations. Today's amended standards for product classes C, D, and E were established using this methodology.

Eastman Kodak commented that the no-load equations should be a continuous function of output power for EPSs with nameplate output powers less than 250 watts. (Eastman Kodak, No. 125 at p. 2) However, as explained, DOE's approach is consistent with the EISA 2007 standards and the former ENERGY STAR 2.0 program for EPSs. In both cases, the no-load power requirement is a step function based on the power output of the EPS. Using that assumption, DOE conducted an engineering analysis and found no strong correlation between no-load power and output power that would warrant deviating from the analytical structure of these programs. The equations for no-load power and active-mode efficiency formed the foundation of DOE's standards analysis, and the approach has been largely supported by stakeholders throughout the course of the rulemaking. Therefore, DOE maintained its step function equations for no-load power in amending the standards for EPSs in today's final rule.

After applying the approach described above and analyzing the products at issue, DOE believes that the ENERGY STAR 2.0 low-voltage standard equation for AC–DC conversion is an appropriate standard for multiple-voltage EPSs because lower power EPSs tend to be less efficient. DOE took into account that fact and has created an equation that scales with output power, should any low-power multiple-voltage EPSs enter the market in the future. As detailed in chapter 5 of the TSD, the ENERGY STAR 2.0 low-voltage equation matches the CSL equation DOE is adopting for the multiple-voltage EPS standard at the representative unit's output power of 203 watts, but also sets less stringent efficiency standards for lower power EPSs. DOE applied the same constraints when fitting the equation to the test data as it did for product classes B, C, D, and E. DOE received no comments on this approach in setting a standard for multiple-voltage EPSs.

For product class H (high-power EPSs), DOE set a discrete standard for all EPSs greater than 250 watts. DOE believes this is appropriate for two main reasons: (1) DOE is aware of only one application for high-power EPSs (amateur radios) and (2) this approach is consistent with the standard for product class B, which is a discrete level for all EPSs with nameplate output powers greater than 49 watts. In light of these facts, setting a single efficiency level as the standard for all EPSs with output power greater than 250 watts (high-power EPSs) appears to be a reasonable approach to ensure a minimal level of energy efficiency while minimizing the overall level of burden on manufacturers. DOE received no comments on this approach in setting a standard for high power EPSs.

6. Proposed Standards

a. Product Classes B, C, D, and E

In the NOPR, DOE proposed standard levels for all the product classes that were analyzed as part of the EPS engineering analysis. For product classes B, C, D, and E, which contained Class A, medical, and some MADB EPSs broken out by type of power conversion and nameplate output voltage, DOE proposed CSL 3, or the best-in-market CSL. To develop the proposed standard level, DOE ''curve fit'' an equation to test results of the most efficient EPSs it could find on the market at each representative output power.[23] DOE announced its intention to designate the proposed level ''Level VI'' in a revised and updated version of the International Efficiency Marking Protocol for EPSs. DOE received many comments on the proposed standard levels for product classes B, C, D, and E.

Panasonic, Cobra Electronics, ITI, Salcomp, Duracell, the Republic of Korea, and Eastman Kodak all commented that DOE should forgo setting an EPS standard at level VI and adopt the current level V requirement as the Federal standard to harmonize with the E.U. and other international efficiency programs. (Panasonic, No. 120 at p. 2; Cobra Electronics, No. 130 at p. 8; ITI, No. 131 at p. 4, Salcomp, No. 73 at p. 2; Duracell, No. 109 at p. 4; Republic of Korea, No. 148 at p. 1; Eastman Kodak, No. 125 at p. 2) ITI stated that DOE's proposed standard ''breaks away from global harmonization efforts and would require significant industry-wide redesign,'' and called it ''unjustifiable.'' (ITI, No. 131 at p. 4) AHAM also supported harmonization efforts and asserted that level V is ''the most stringent level that is technologically feasible.'' (AHAM, No. 124 at p. 7) These statements were supported by Philips, which suggested that DOE should adopt Level V, which is known to be technologically feasible, and contemplate higher levels in a later rule. (Philips, No. 128 at p. 3) ITI also suggested such a phased approach, in which DOE would first adopt a standard at Level V for Class A EPSs and later investigate mandatory or voluntary standards for non-Class A EPSs. (ITI, No. 131 at p. 5) Nokia claimed that the DOE standards proposal ''lacks sufficient economic justification to warrant such swift and demanding changes.'' (Nokia, No. 132 at p. 2) For all the reasons suggested by other stakeholders, the CEA noted that ''further analysis is needed before DOE promulgates an amended energy conservation standard for Class A external power supplies.'' (CEA, No. 106 at p. 5)

Some interested parties made specific comments about the no-load power equation of the proposed standard. Flextronics claimed that with a compliance date two years from the publication of today's final rule, DOE should decrease the no-load power proposal from 100mW to 50mW for EPSs for mobile phones. (Flextronics, No. 145 at p. 1) Conversely, Logitech argued that they had just undergone costly design improvements to meet the no-load power requirement for the former ENERGY STAR program for EPSs and the E.U., which is 300 mW. (Logitech, No. 157 at p. 1)

DOE received support from energy efficiency advocates in favor of the standards proposed in the NOPR. NEEP noted that DOE's proposal represents a strong push toward rapidly increasing the energy efficiency of EPSs. (NEEP, No. 160 at p. 2) ARRIS Group also supported DOE's conclusion that ''changing to a code V energy efficiency requirement will have little to no material cost impact since the majority of EPS products already comply.'' (ARRIS Group, No. 105 at p. 1)

In any efficiency standards rulemaking, DOE seeks to identify the most stringent standard that is economically justified and technically feasible. In the NOPR for EPSs, DOE proposed to amend the EISA 2007 regulations and increase the minimum efficiency standards to the best-in-market levels identified in the engineering analysis.

The comments submitted by manufacturers suggest that DOE has overestimated the capabilities of EPSs and that it should propose Level V as the federal standard (or equivalently to harmonize with the EU standards). The most recent EPS standards in the E.U. came into effect in 2011 and are equal to the Level V efficiency standard. However, more recent E.U. documents on EPS standards indicate a proposal to revise those standards to match the levels proposed by DOE in the NOPR by 2017 for the no-load, 25%, 50%, 75%, and 100% loading scenarios. The E.U. is also considering an additional 10% loading requirement outside the average efficiency metric from the other four loading conditions.[24] Other standards for EPSs outside the United States, including those in Canada and New Zealand, have set less stringent standards equal to the EISA 2007 level

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[23] The term ''curve fit'' refers to generating an equation based on a set of data in order to describe the information mathematically.

[24] ''Review Study on Commission Regulation (EC) No. 278/2009 External Power Supplies: Draft Final Report.'' March 13, 2012. Prepared for European Commission—Directorate-General for Energy. *http://www.powerint.com/sites/default/files/greenroom/docs/EPSReviewStudy_DraftFinalReport.pdf.*

(level IV). In addition, the E.U. instituted standby power consumption standards in 2010 and will revise those standards effective 2013. DOE notes that current international efficiency standards for EPSs are not all harmonized around efficiency level V, but it is possible that efficiency standards in the U.S. and E.U. may harmonize around the standards announced in today's final rule within the next several years. For more detail, see section IV.G.3 below and chapter 9 of the TSD.

As stakeholders have said, and as is shown in DOE's engineering analysis, the majority of EPSs already meet or exceed the Level V requirements so, in addition to the most recent E.U. standards, the incremental cost to manufacturers to achieve this level is nearly zero and any additional energy savings beyond today's market would be negligible. (ARRIS Group, No. 105 at p. 1). The DOE analysis of EPS shipments projects a base case assumption of the efficiency of EPSs that would be shipped in the future if DOE did not issue today's final rule. DOE only accounts for the energy savings and incremental costs that occur between this base case projection and the standards case that results from issuing today's final rule. In the base case projection, DOE presumes that 69% of all EPSs sold in the United States in 2015 would meet or exceed Level V, while 31% would only meet the Level IV requirements. This assumption is equal to the shipments-weighted average distribution for product classes B, C, D, and E, and is based on test results from the engineering analysis and assumptions about increases in product efficiency that would occur as a result of the ENERGY STAR program and mandatory standards in the European Union. Chapters 3 and 9 of the TSD describe DOE's efficiency distribution assumptions in greater detail. While DOE believes the baseline efficiency levels used in today's final rule are justified, DOE conducted an additional sensitivity analysis using different assumptions about the base case efficiency of EPSs that will be on the market in 2015. The results of this sensitivity analysis, presented in Appendix 10–A of the TSD, depict the national economic and energy impacts that would occur under alternative scenarios.

Commenters also claimed, without providing any supporting data, that any standard that is more stringent than Level V is technically infeasible and economically unjustifiable despite DOE's detailed analysis. The proposal put forth by DOE in the NOPR clearly points out that the selected standard level can be supported by products on the market and is not ''technically infeasible''. DOE outlines its complete analysis of the current EPS market as well as pathways to higher efficiencies based on information gathered from manufacturers and independent consultants in chapter 5 of the TSD to today's final rule.

Concerning the no-load mode proposal, DOE created matched pairings of efficiency and no-load power for all representative units, as discussed in section IV.C.2. Under that structure, any standard would match a continuous active-mode efficiency equation with a no-load step function. While DOE's analysis shows that 50 mW is technically achievable, which is equivalent to Flextronic's recommendation, it is only achievable for lower power EPSs (*e.g.,* those for cell phones), and would not be applicable as a flat standard for all EPSs as outlined in Chapter 5 of the TSD. Therefore, in today's final rule, DOE is not adopting a no-load power requirement that is flat and equivalent to 50 mW across all nameplate output powers and instead is adopting a step function equation that sets a specific no-load power limit for EPSs based on output power.

DOE is not adopting a standard for either average active-mode efficiency or no-load power consumption for EPSs in product class C–1 in today's final rule. DOE believes the low-voltage high-current output inherent in the design of these products limits their achievable efficiencies due to input rectification voltage drops relative to the output voltage, resistive losses in the higher current outputs, and the potential to decrease the utility of these products to improve efficiency by forcing manufacturers to utilize more expensive and larger components to meet the proposed standards.

NRDC commented that indirect operation EPSs should be subject to the same standards as direct operation EPSs, citing a lack of technical differences between the two groups of products. NRDC asserted that the proposed battery charger standards, if adopted, might be insufficient to increase the efficiency of indirect operation EPSs to the levels shown in the EPS standards analysis to be cost-effective. NRDC also expressed concern that because there is no obvious way to visually distinguish between direct and indirect operation EPSs, a manufacturer could circumvent standards by misrepresenting a direct operation EPS as an indirect operation EPS. (NRDC, No. 114 at p. 16) The California IOUs concurred with NRDC's comments. (CA IOUs, No. 138 at p. 20)

DOE continues to believe that a distinction between indirect and direct operation EPSs is justified. DOE recognizes that some wall adapters that are part of battery charging systems serve a different purpose than ''regular'' EPSs, have different design constraints, and should be regulated differently from each other.

In the determination analysis and in the standards preliminary analysis, the characteristic that distinguished this group of devices was the presence of ''charge control.'' (Non-Class A EPS Determination Final Rule, 75 FR 27170, May 14, 2010; Preliminary Analysis TSD, No. 31 at p. 78, September 2010) DOE concluded from this analysis that standards would be warranted for non-Class A EPSs based in part on its understanding that devices with charge control were outside the scope of analysis because they were intended to charge batteries and therefore not considered EPSs. This understanding carried over into the analyses conducted as part of the present standards rulemaking.

This general approach has received support from manufacturers and utilities throughout the rulemaking process. For example, AHAM, PTI, and Wahl Clipper commented in response to the preliminary analysis that MADB wall adapters should be regulated as battery charger components, but not as EPSs. (AHAM, No. 42 at pp. 2, 3, 13; PTI, No. 45 at p. 4; Wahl Clipper, No. 53 at p. 1) Similarly, PG&E, two other energy utilities, and five efficiency advocates submitted a joint comment expressing their support for requiring wall adapters that perform charge control functions to be regulated as battery charger components, but not as EPSs. (PG&E, *et al.,* No. 47 at pp. 3–4) In the March 2012 NOPR, DOE maintained this approach but altered the specific criteria for differentiating between the two types of devices by proposing that those EPSs that cannot operate an end-use product directly would not be subject to the proposed standards. DOE continues to believe that it would be inappropriate to require indirect operation EPSs to meet the new and amended standards being adopted today.

DOE notes that battery charger standards will be handled separately from EPSs. And while NRDC asserts that DOE's proposed standards for battery chargers would not compel manufacturers to increase the efficiency of indirect operation EPSs, any battery charger standards DOE may adopt would need to achieve the maximum improvement in energy efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) These standards would be evaluated based on the expected improvements in the energy efficiency of battery chargers, not of the EPSs—for which Congress has created a separate regulatory scheme. Manufacturers would have the flexibility to decide how to modify their products to achieve the improvements in energy efficiency necessitated by any battery charger standard DOE might adopt. The available choices could include using more efficient EPSs or other alternative design paths.

As for NRDC's concern that manufacturers might mistakenly or intentionally misrepresent direct operation EPSs as indirect operation EPSs and circumvent any applicable standards, DOE notes that it has created a regulatory framework for EPSs that meet statutory requirements while minimizing complexity. To that end, DOE developed a straightforward method (discussed above) for identifying indirect operation EPSs. DOE believes it has developed a method that is simple enough that any manufacturer can use it to determine whether a given EPS is an indirect operation EPS. Furthermore, Class A indirect operation EPSs continue to be required to meet the standards in EISA 2007 established by Congress.

b. Product Class X

DOE proposed adopting the ENERGY STAR specification for low-voltage EPSs as its standard for multiple-voltage EPSs. In DOE's view, this standard would be economically justified because DOE's analysis indicated that the standard would provide the greatest accumulation of net social benefits for the one product DOE analyzed in product class X (see section V.C.1.b of the NOPR). The equation on which this standard was based provided a means to apply the standard using a continuous function of output power that would readily enable a manufacturer to determine what efficiency level it would need to meet for any future multiple-voltage products that might be produced. DOE sought comment on this proposal from interested parties.

Microsoft commented that DOE's proposed standard for multiple-voltage EPSs does not yield results that are comparable or representative of actual use citing the fact that the game console EPS that would be required to meet the proposed standard is most efficient between the loading points it operates in most frequently, roughly between 46 and 63 percent load. Microsoft believes that because DOE's test procedure requires averaging the efficiency over multiple loading points beyond that range, the procedure would not accurately capture real world efficiency and energy savings potential of its game console EPS. (Microsoft, No. 110 at p. 2) The CEA agreed, stating that the ''standard for multiple-voltage EPSs is inappropriate for the one product impacted by it.'' (CEA, No. 106 at p. 6) NRDC suggested that, in lieu of DOE's proposed standard, multiple-voltage EPSs should be required to meet only the efficiency level of their lowest output voltage. (NRDC, No. 114 at p. 14)

In the case of multiple-voltage EPSs, DOE's intent was to propose a continuous standard as a function of output power similar to the single-voltage EPS proposal. While only one product currently falls into this class, this situation may not always be the case. To account for the possibility of additional types of multiple-voltage EPSs becoming commercially available, DOE proposed using an average efficiency metric over the four loading conditions identified in the multiple-voltage test procedure. Using the current methodology, any future products that are sold with multiple-voltage EPSs will have a universal test method and set of measurable efficiency metrics to evaluate against the new federal standard.

Adopting the NRDC approach (i.e. setting requirements only on the lowest output voltage) would not ensure that the lowest voltage bus would provide any significant power to the end-use product in a real-world application. Consequently, the overall efficiency of the EPS could be far less than testing would indicate. In such a situation, a highly efficient lower voltage output would have a negligible impact on the overall system efficiency should the higher voltage output provide significantly more power to the end-use consumer product. For instance, the low-voltage output on the EPS in question provides only 2.5 percent of the overall system power at full load. While the output may be highly efficient, its overall impact on the system is minimal and using NRDC's method would not allow DOE to properly capture the additional energy usage of the EPS.

Manufacturers of multiple-voltage EPSs could also take advantage of such a loophole by designing a highly efficient low-voltage output despite its contribution, or lack thereof, to the overall energy consumption of the EPS while paying little attention to the higher voltage output(s). There are several ways manufacturers can design multiple output EPSs (i.e. multiple transformer taps, separate filter stages, paralleling several outputs of a single voltage) and there is no guarantee that improving one output bus would result in improvements to any other outputs. In any case where DOE does not measure all outputs, the reported energy consumption of the EPS (based on NRDC's approach) would not be an accurate representation of how much energy a given device would use. In light of the potential for this problematic result, DOE is opting to adopt its proposed approach to ensure (1) the universal applicability of its procedure and the standard and (2) reasonably accurate measurements of energy efficiency for these products.

c. Product Class H

To develop the efficiency standard level proposed in the NOPR for product class H (high power) EPSs, DOE scaled the CSLs from the 120W representative unit to the 345W representative unit in the high power product class. Like the proposed standards for the other EPS product classes, DOE chose the most stringent level that was technologically feasible and economically justified. DOE sought comment on the methodology for selecting a standard for high power EPSs, and received only one comment.

NRDC recommended that ''DOE set the same efficiency levels for class H as for class B instead of the current proposal of 87.5%.'' (NRDC, No. 114 at p. 14) However, like multiple-voltage EPSs, there is only one product (amateur radios) that DOE could identify that uses high power EPSs. The 120W products in product class B have a representative nameplate output voltage of 19 volts while the high power EPSs in product class H have a representative nameplate output voltage of 13 volts. While the EPSs in product class B do not have higher nameplate output powers than 250 watts, the high power product class H covers all EPSs above 250 watts. In comparing the 120 watt unit at 19 volts to the 345 watt unit at 13 volts, DOE found that the high power EPSs have much higher output currents since the nameplate output power (i.e. watts) is the product of nameplate output current and nameplate output voltage. Higher output currents create greater resistive losses associated with the output cord and secondary side filtering. When scaling the 120W results to the 345W representative unit, DOE adjusted for this disparity using the voltage scaling techniques it developed during its EPS testing, as detailed in chapter 5 of the TSD, and ultimately proposed an efficiency standard slightly lower than the direct operation EPSs below 250W nameplate output power. This technical limitation on the achievable efficiency remains and the standards adopted in today's final rule accounts for this limitation.

D. Markups Analysis

The markups analysis develops appropriate markups in the distribution chain to convert the MSP estimates derived in the engineering analysis to consumer prices. At each step in the distribution chain, companies mark up the price of the product to cover business costs and profit margin. Given the variety of products that use EPSs, distribution varies depending on the product class and application. As such, DOE assumed that the dominant path to market establishes the retail price and, thus, the markup for a given application. The markups applied to end-use products that use EPSs are approximations of the EPS markups.

In the case of EPSs, the dominant path to market typically involves an end-use product manufacturer (i.e. OEM) and retailer. DOE developed OEM and retailer markups by examining annual financial filings, such as Securities and Exchange Commission (SEC) 10–K reports, from more than 80 publicly traded OEMs, retailers, and distributors engaged in the manufacturing and/or sales of consumer applications that use EPSs.

DOE typically calculates two markups for each product in the markups analysis. These are: a markup applied to the baseline component of a product's cost (referred to as a baseline markup) and a markup applied to the incremental cost increase that results from standards (referred to as an incremental markup). The incremental markup relates the change in the MSP of higher-efficiency models (the incremental cost increase) to the change in the retailer's selling price.

Commenting on retail markups, Phillips, Schumacher, and Wahl Clipper stated that the concept of margins is very significant to retailers, and it is not realistic to predict that retailers voluntarily will act in a way that reduces their margins. (Philips, No. 128 at p. 6; Schumacher, No. 182 at p. 6; Wahl Clipper, No 153 at p. 2) Motorola commented that retailers will not be willing to lower their markups because product efficiency has increased. (Motorola Mobility, No. 121 at p. 4) In contrast, PTI stated that DOE's estimates of markups are sufficient for the purposes of the analysis. (PTI, No. 133 at p. 6)

DOE recognizes that retailers may seek to preserve margins. However, DOE's approach assumes that appliance retail markets are reasonably competitive, so that an increase in the manufacturing cost of appliances is not likely to contribute to a proportionate rise in retail profits, as would be expected to happen if markups remained constant. DOE's methodology for estimating markups is based on a mix of economic theory, consultation with industry experts, and data from appliance retailers.[25] In conducting research, DOE has found that empirical evidence is lacking with respect to appliance retailer markup practices when a product increases in cost (due to increased efficiency or other factors). DOE understands that real-world retailer markup practices vary depending on market conditions and on the magnitude of the change in cost of goods sold (CGS) associated with an increase in appliance efficiency. DOE acknowledges that detailed information on actual retail practices would be helpful in evaluating change in markups on products after appliance standards take effect. For this rulemaking, DOE requested data from stakeholders in support of alternative approaches to markups, as well as any data that shed light on actual practices by retailers; however, no such data was provided. Thus, DOE continues to use an approach that is consistent with economic theory of firm behavior in competitive markets.

Chapter 6 of the TSD provides additional detail on the markups analysis.

E. Energy Use Analysis

The energy use analysis provides estimates of the annual energy consumption of EPSs at the considered efficiency levels. DOE uses these values in the LCC and PBP analyses and in the NIA. DOE estimated the annual energy use of EPSs in the field as they are used by consumers.

EPSs are power conversion devices that transform input voltage to a suitable voltage for the end-use application they are powering. A portion of the energy that flows into an EPS flows out to an end-use product and, thus, cannot be considered to be consumed by the EPS. However, to provide the necessary output power, other factors contribute to EPS energy consumption, *e.g.,* internal losses and overhead circuitry.[26] Therefore, the traditional method for calculating energy consumption—by measuring the energy a product draws from mains while performing its intended function(s)—is not appropriate for EPSs because that method would not factor in the energy delivered by the EPS to the end-use application, and thus would overstate EPS energy consumption. Instead, DOE considered energy consumption to be the energy dissipated by the EPS (losses) and not delivered to the end-use product as a more accurate means to determine the energy consumption of these products. Once the energy and power requirements of those end-use products were determined, DOE considered them fixed, and DOE focused its analysis on how standards would affect the energy consumption of EPSs themselves.

Applying a single usage profile to each application, DOE calculated the unit energy consumption for EPSs. In addition, DOE examined the usage profiles of multiple user types for applications where usage varies widely (for example, a light user and a heavy user or an amateur user and professional user). By examining these usage profiles DOE provided stakeholders with greater transparency in its energy consumption calculation, such that they could provide specific comments where DOE's estimates were incorrect.

AHAM voiced support for the usage profiles presented by DOE in the NOPR. While AHAM commented that DOE could more accurately capture the usage of infrequently used product classes, it largely supported DOE's efforts to consider the variation in usage for EPSs. AHAM recommended that DOE reevaluate these usage profiles in the future to more accurately quantify the usage profiles for infrequently charged products. (AHAM, No. 124 at p. 7) No other feedback was received on this issue. In light of the support expressed for its approach, and for the technical reasons explained above, DOE continued to apply the same approach.

With respect to the various loading points DOE used to estimate energy usage, NRDC commented that DOE overestimated its loading point assumption for laptop computer EPSs in the ''operating'' application state, which, given the reduced EPS efficiency at lower loading point levels, would lead to an understatement of energy

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[25] An extensive discussion of the methodology and justification behind DOE's general approach to markups calculation is presented in Larry Dale, et al. 2004. ''An Analysis of Price Determination and Markups in the Air-Conditioning and Heating Equipment Industry.'' LBNL–52791. Available for download at *http://eetd.lbl.gov/sites/all/files/an_analysis_of_price_determiniation_and_markups_in_the_air_conditioning_and_heating_equipment_industry_lbnl-52791.pdf.*

[26] Internal losses are energy losses that occur during the power conversion process. Overhead circuitry refers to circuits and other components of the EPS, such as monitoring circuits, logic circuits, and LED indicator lights, that consume power but do not directly contribute power to the end-use application.

losses. (These EPSs fall in product class B.) NRDC pointed to a recent EPA dataset underlying the ENERGY STAR v6.0 Computer Specification Revision[27] that showed loading points for a comparable application state of approximately 10–20% for most products. This loading point range, however, differs from DOE's test data, which showed the ''operating'' loading point to be at 28%. (NRDC, No. 114 at p. 18)

To address this comment, DOE worked with the EPA to better understand the data that it used to estimate the loading point. DOE learned that EPA's estimate was based on a separate set of empirical data from Ecma International (formerly the European Computer Manufacturers Association) in which measurements were taken from 17 notebook computers operating in real-world scenarios. DOE analyzed these data and found that idle loading points were approximately 30%, an estimate that is very much in line with DOE's estimated loading point of 28%. Therefore, in developing the final standards, DOE relied on the loading points presented in the NOPR.

DOE also explored high- and low-savings scenarios in an LCC sensitivity analysis. As part of the sensitivity analysis, DOE considered alternate usage profiles and loading points to account for uncertainty in the average usage profiles and explore the effect that usage variations might have on energy consumption, life-cycle cost, and payback. Additional information on this sensitivity analysis is contained in appendix 8B to the TSD.

DOE does not assume the existence of a rebound effect, in which consumers would increase use in response to an increase in energy efficiency and resulting decrease in operating costs. For EPSs, DOE expects that, in light of the small amount of savings expected to flow to each individual consumer over the course of the year, the rebound effect is likely to be negligible because consumers are unlikely to be aware of the efficiency improvements or notice the decrease in operating costs that would result from new standards for these products. DOE analyzed the impacts on individual consumers in its Life-Cycle Cost and Payback Period Analyses described below.

F. Life-Cycle Cost and Payback Period Analyses

This section describes the LCC and payback period analyses and the spreadsheet model DOE used for analyzing the economic impacts of possible standards on individual consumers. Details of the spreadsheet model, and of all the inputs to the LCC and PBP analyses, are contained in chapter 8 and appendix 8A of the TSD. DOE conducted the LCC and PBP analyses using a spreadsheet model developed in Microsoft Excel. When combined with Crystal Ball (a commercially-available software program), the LCC and PBP model generates a Monte Carlo simulation[28] to perform the analysis by incorporating uncertainty and variability considerations.

The LCC analysis estimates the impact of a standard on consumers by calculating the net cost of an EPS under a base-case scenario (in which no new energy conservation standard is in effect) and under a standards-case scenario (in which the proposed energy conservation standard is applied). The base-case scenario is determined by the efficiency level that a sampled consumer currently purchases, which may be above the baseline efficiency level. The life-cycle cost of a particular EPS is composed of the total installed cost (which includes manufacturer selling price, distribution chain markups, sales taxes, and any installation cost), operating expenses (energy and any maintenance costs), product lifetime, and discount rate. As noted in the NOPR, DOE considers installation costs to be zero for EPSs.

The payback period is the change in purchase expense due to a more stringent energy conservation standard, divided by the change in annual operating cost that results from the standard. Stated more simply, the payback period is the time period it takes to recoup the increased purchase cost of a more-efficient product through energy savings. DOE expresses this period in years.

Table IV–11 summarizes the approach and data that DOE used to derive the inputs to the LCC and PBP calculations for the NOPR and the changes made for today's final rule. The following sections discuss these inputs and comments DOE received regarding its presentation of the LCC and PBP analyses in the NOPR, as well as DOE's responses thereto.

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[27] *https://www.energystar.gov/products/specs/node/143* (last accessed October 23, 2012).

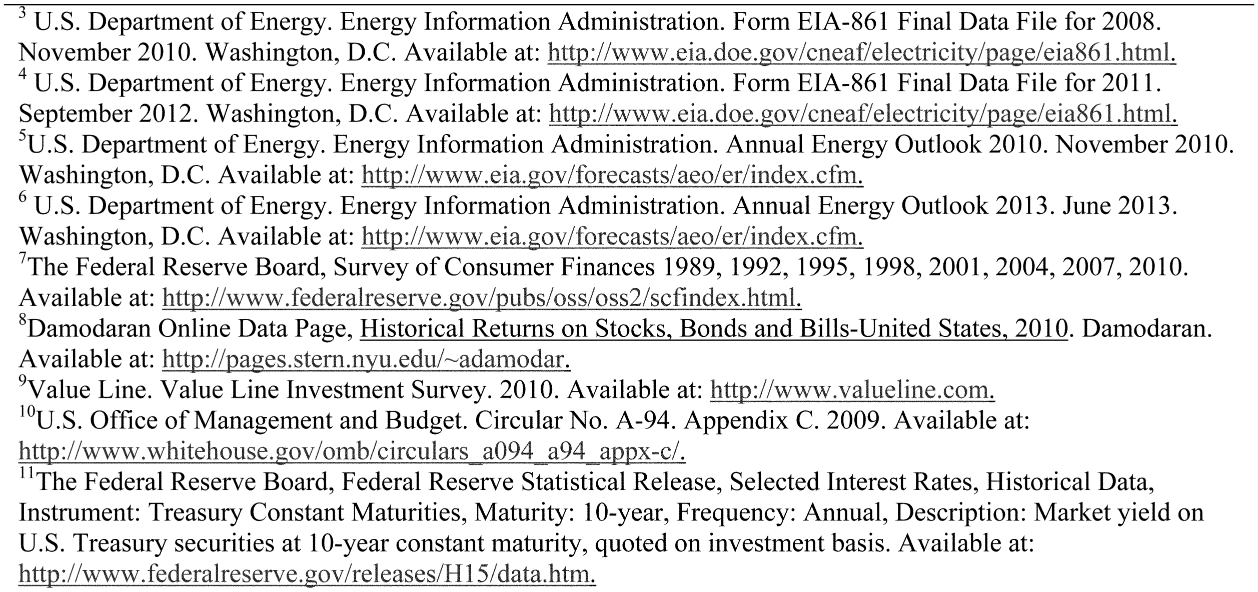
[28] Monte Carlo simulations model uncertainty by utilizing probability distributions instead of single values for certain inputs and variables.

Table IV-11 Summary of Inputs and Key Assumptions Used in the NOPR LCC Analyses and Final Rule LCC Analysis

Inputs	March 2012 NOPR	Changes from the Proposed Rule for the Final Rule
Manufacturer Selling Price	Derived from the Engineering Analysis through manufacturer interviews and test/teardown results.	Updated the manufacturer selling price for the 60 watt unit based on the most recent manufacturer data.
Markups	Considered various distribution channel pathways for different applications. Applied a reduced "incremental" markup to the portion of the product price exceeding the baseline price. See Chapter 6 for details.	No Change.
Sales Tax	Derived weighted-average tax values for each Census division and large State from data provided by the Sales Tax Clearinghouse.[1]	Updated the sales tax using the latest information from the Sales Tax Clearinghouse.[2]
Installation Cost	Assumed to be zero.	No change.
Maintenance Cost	Assumed to be zero.	No change.
Unit Energy Consumption	Determined for each application based on estimated loading points and usage profiles.	No Change.
Electricity Prices	Price: Based on EIA's 2008 Form EIA-861 data.[3] Variability: Regional energy prices determined for 13 regions. DOE also considered subgroup analyses using electricity prices for low-income consumers and top tier marginal price consumers.	Updated to EIA's 2011 Form EIA-861 data.[4]
Electricity Price Trends	Forecasted with EIA's Annual Energy Outlook 2010.[5]	Updated with EIA's Annual Energy Outlook 2013.[6]
Lifetime	Determined for each application based on multiple data sources. See chapter 3 of the TSD for details.	No Change.
Discount Rate	Residential: Approach based on the finance cost of raising funds to purchase and operate EPSs either through the financial cost of any debt incurred (based on the Federal Reserve's Survey of Consumer Finances data[7] for 1989, 1992, 1995, 1998, 2001, 2004, and 2007) or the opportunity cost of any equity used. Time-series data was based on geometric means from 1980-2009. Commercial: Derived discount rates using the cost of capital of publicly-traded firms based on data from Damodaran Online,[8] the Value Line Investment survey,[9] and the Office of Management and Budget (OMB) Circular No. A-94.[10] DOE used a 40-year average return on 10-year treasury notes to derive the risk-free rate. DOE updated the equity risk premium to use the geometric average return on the S&P 500 over a 40-year time period.	Residential: DOE updated the calculations to consider the geometric means for all time-series data from 1982-2011. DOE added data from the Federal Reserve's Survey of Consumer Finances for 2010. Commercial: DOE updated all sources to the most recent version (Damodaran Online,[8] the Value Line Investment survey,[9] and the Office of Management and Budget (OMB) Circular No. A-94).
Sectors Analyzed	All reference case results represent a weighted average of the residential and commercial sectors.	No Change.
Base Case Market Efficiency Distribution	Where possible, DOE derived market efficiency distributions for specific applications within a representative unit or product class.	No Change.

[1] The four large States are New York, California, Texas, and Florida.

[2] Sales Tax Clearinghouse, Aggregate State Tax Rates. Available at: https://thestc.com/STRates.stm.



[3] U.S. Department of Energy. Energy Information Administration. Form EIA-861 Final Data File for 2008. November 2010. Washington, D.C. Available at: http://www.eia.doe.gov/cneaf/electricity/page/eia861.html.

[4] U.S. Department of Energy. Energy Information Administration. Form EIA-861 Final Data File for 2011. September 2012. Washington, D.C. Available at: http://www.eia.doe.gov/cneaf/electricity/page/eia861.html.

[5] U.S. Department of Energy. Energy Information Administration. Annual Energy Outlook 2010. November 2010. Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/er/index.cfm.

[6] U.S. Department of Energy. Energy Information Administration. Annual Energy Outlook 2013. June 2013. Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/er/index.cfm.

[7] The Federal Reserve Board, Survey of Consumer Finances 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010. Available at: http://www.federalreserve.gov/pubs/oss/oss2/scfindex.html.

[8] Damodaran Online Data Page, Historical Returns on Stocks, Bonds and Bills-United States, 2010. Damodaran. Available at: http://pages.stern.nyu.edu/~adamodar.

[9] Value Line. Value Line Investment Survey. 2010. Available at: http://www.valueline.com.

[10] U.S. Office of Management and Budget. Circular No. A-94. Appendix C. 2009. Available at: http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/.

[11] The Federal Reserve Board, Federal Reserve Statistical Release, Selected Interest Rates, Historical Data, Instrument: Treasury Constant Maturities, Maturity: 10-year, Frequency: Annual, Description: Market yield on U.S. Treasury securities at 10-year constant maturity, quoted on investment basis. Available at: http://www.federalreserve.gov/releases/H15/data.htm.

1. Manufacturer Selling Price

In the preliminary analysis, DOE used a combination of test and teardown results and manufacturer interview results to develop manufacturer selling prices. For the final rule, DOE maintained the manufacturer selling prices used in the NOPR analysis, with the exception of the 60-Watt representative unit, as discussed in section IV.C. Further detail on the MSPs can be found in chapter 5 of the TSD.

Examination of historical price data for a number of appliances that have been subject to energy conservation standards indicates that an assumption of constant real prices and costs may overestimate long-term trends in appliance prices. Economic literature and historical data suggest that the real costs of these products may in fact trend downward over time according to ''learning'' or ''experience'' curves. On February 22, 2011, DOE published a Notice of Data Availability (NODA, 76 FR 9696) stating that DOE may consider improving regulatory analysis by addressing equipment price trends. In the NODA, DOE proposed that when sufficiently long-term data are available on the cost or price trends for a given product, it would analyze the available data to forecast future trends.

To forecast a price trend for the NOPR, DOE considered the experience curve approach, in which an experience rate parameter is derived using two historical data series on price and cumulative production, but in the absence of historical data on shipments of EPSs and of sufficient historical Producer Price Index (PPI) data for small electrical appliance manufacturing from the Bureau of Labor Statistics (BLS),[29] DOE could not use this approach. This situation is partially due to the nature of EPS design. EPSs are made up of many electrical components whose size, cost, and performance rapidly change, which leads to relatively short design lifetimes. DOE also considered performing an exponential fit on the deflated AEO's Projected Price Indexes that most narrowly include EPSs. However, DOE believes that these indexes are too broad to accurately capture the trend for EPSs. Furthermore, EPSs are not typical consumer products; they are more like a commodity that OEMs purchase.

Given the uncertainty, DOE did not incorporate product price changes into the NOPR analysis and is not including them in today's final rule. For the NIA, DOE also analyzed the sensitivity of results to two alternative EPS price forecasts. Appendix 10–B of the NOPR TSD describes the derivation of alternative price forecasts.

2. Markups

DOE applies a series of markups to the MSP to account for the various distribution chain markups applied to the analyzed product. These markups are evaluated for each application individually, depending on its path to market. Additionally, DOE splits its markups into ''baseline'' and ''incremental'' markups. The baseline markup is applied to the entire MSP of the baseline product. The incremental markups are then applied to the marginal increase in MSP over the baseline's MSP. The approach used for markups in the NOPR was maintained for the final rule. Further detail on the markups can be found in section IV.D above and in chapter 6 of the TSD.

3. Sales Tax

As in the NOPR, DOE obtained State and local sales tax data from the Sales Tax Clearinghouse for the final rule. The data represented weighted averages that include county and city rates. DOE used the data to compute population-weighted average tax values for each Census division and four large States (New York, California, Texas, and Florida). For the final rule, DOE retained this methodology and used updated sales tax data from the Sales Tax Clearinghouse.[30] DOE also obtained up-to-date population estimates from the U.S. Census Bureau for today's final rule.[31]

4. Installation Cost

As detailed in the NOPR, DOE considered installation costs to be zero for EPSs because installation would typically entail a consumer simply unpacking the EPS from the box in which it was sold and connecting the device to mains power and its associated product. Because the cost of this ''installation'' (which may be considered temporary, as intermittently used devices might be unplugged for storage) is not quantifiable in dollar terms, DOE considered the installation cost to be zero.

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[29] Series ID PCU33521–33521; *http://www.bls.gov/ppi/*.

[30] Sales Tax Clearinghouse, Aggregate State Tax Rates. *https://thestc.com/STRates.stm*.

[31] The U.S. Census Bureau. Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009 *http://www.census.gov/popest/data/state/totals/2009/tables/NST-EST2009-01.xls*.

In response to the NOPR, NEMA noted that no installation costs were accounted for in the LCC and PBP calculations. NEEA pointed out that the LCC focuses on incremental costs, rather than overall costs. It noted that it would be very difficult to find data supporting an installation cost that increases with increasing efficiency levels. (NEEA, Pub. Mtg. Transcript, No. 104 at p. 189) DOE agrees with the comments made by NEEA and has maintained zero installation costs for the final rule analysis.

5. Maintenance Cost

In the NOPR analysis, DOE did not consider repair or maintenance costs for EPSs. In making this decision, DOE recognized that the service life of an EPS typically exceeds that of the consumer product it powers. Furthermore, DOE noted that the cost to repair the EPS might exceed the initial purchase cost as these products are relatively low cost. Thus, DOE estimated that it would be extremely unlikely that a consumer would incur repair or maintenance costs for an EPS. Also, if an EPS failed, DOE expects that consumers would typically discard the EPS and purchase a replacement. DOE received no comments challenging this assumption and has continued relying on this assumption for purposes of calculating the final rule's potential costs and benefits.

6. Product Price Forecast

As noted in section IV.F.1, to derive its central estimates DOE assumed no change in EPS prices over the 2015–2044 period. In addition, DOE conducted a sensitivity analysis using two alternative price trends based on AEO indexes. These price trends, and the NPV results from the associated sensitivity cases, are described in appendix 10–B of the TSD.

7. Unit Energy Consumption

The final rule analysis uses the same approach for determining UECs as the one used in the NOPR. The UEC was determined for each application based on estimated loading points and usage profiles. Further detail on the UEC calculations can be found in section IV.E above and in chapter 7 of the TSD.

8. Electricity Prices

DOE determined energy prices by deriving regional average prices for 13 geographic areas consisting of the nine U.S. Census divisions, with four large states (New York, Florida, Texas, and California) treated separately. The derivation of prices was based on data in EIA's Form EIA–861. For the final rule, DOE updated to EIA's Form EIA–861 2011.

9. Electricity Price Trends

In the NOPR analysis, DOE used data from EIA's *Annual Energy Outlook* (*AEO*) *2010* to project electricity prices to the end of the product lifetime.[32] For the final rule, DOE used the final release of the AEO 2013,[33] which contained reference, high- and low-economic-growth scenarios. DOE received no comments on the electricity price forecasts it used in its analyses.

10. Lifetime

For the NOPR analysis, DOE considered the lifetime of an EPS to be from the moment it is purchased for end-use up until the time when it is permanently retired from service. Because the typical EPS is purchased for use with a single associated application, DOE assumed that it would remain in service for as long as the application does. Even though many of the technology options to improve EPS efficiencies may result in an increased useful life for the EPS, the lifetime of the EPS is still directly tied to the lifetime of its associated application. With the exception of EPSs for mobile phones and smartphones (see below), the typical consumer will not continue to use an EPS once its application has been discarded. For this reason, DOE used the same lifetime estimate for the baseline and standard level designs of each application for the LCC and PBP analyses. DOE maintained this approach in the final rule analysis. Further detail on product lifetimes and how they relate to applications can be found in chapter 3 of the TSD.

The one exception to this approach (i.e. that EPSs do not exceed the lifetime of their associated end-use products) is the lifetime of EPSs for mobile phones and smartphones. While the typical length of a mobile phone contract is two years, and many phones are replaced and no longer used after two years, DOE assumed that the EPSs for these products will remain in use for an average of four years. This assumption is based on an expected standardization of the market around micro-USB plug technology, driven largely by the GSMA Universal Charging Solution.[34] However, Motorola Mobility commented that DOE incorrectly assumed that the mobile phone market is standardizing around a micro-USB plug. Motorola Mobility stated that as batteries increase in storage capacity, manufacturers may need to abandon micro-USB technology because of the limits it places on charge currents. (Motorola Mobility, No. 121 at p. 7)

To verify that this evolution towards micro-USB plug technology is in fact taking place, DOE examined more than 30 top-selling basic mobile phone and smartphone models offered online by Amazon.com, Sprint, Verizon Wireless, T-Mobile, and AT&T. DOE found that all of the newest smartphone models, other than the Apple iPhone, use micro-USB plug technology. DOE expects the micro-USB market to increase as more phones comply with the IEC 62684–2011. This standard mandates the use of common micro-USB chargers for all cellphones and is aimed at standardizing EPSs across all mobile phone manufacturers for the benefit of the consumer.

If new EPSs are compatible with a wide range of mobile phone and smartphone models, a consumer may continue to use the EPS from their old phone after upgrading to a new phone. Even though it is currently standard practice to receive a new EPS with a phone upgrade, DOE assumes that in the near future consumers will no longer expect manufacturers to include an EPS with each new phone.

For the NOPR analysis, DOE compared LCC results for each CSL for mobile and smartphones with a two-year lifetime, to those with a four-year lifetime. Assuming a lifetime of two (rather than four) years for mobile phone and smartphone EPSs resulted in lower life-cycle cost savings (or greater net costs) for consumers of those products. However, the net effect on Product Class B as a whole was negligible because mobile phones and smartphones together comprise only 7 percent of shipments in Product Class B. DOE did not receive any comments on this approach following the NOPR publication, and therefore retained the same lifetime approach used in the NOPR for the final rule analysis. LCC results for these and all other applications in Product Class B are shown in chapter 11 of the TSD.

DOE notes that the lifetime of the EPS is directly tied to the lifetime of its

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[32] U.S. Department of Energy. Energy Information Administration. Annual Energy Outlook 2010. November, 2010. Washington, DC *http://www.eia.doe.gov/oiaf/aeo/*.

[33] U.S. Department of Energy. Energy Information Administration. Annual Energy Outlook 2013. June, 2013. Washington, DC *http://www.eia.doe.gov/oiaf/aeo/*.

[34] The GSMA Universal Charging Solution is an agreement between 17 mobile operators and manufacturers to have the majority of all new mobile phones support a universal charging connector by January 1, 2012. The press release for the agreement can be accessed here: *http://www.gsma.com/newsroom/mobile-industry-unites-to-drive-universal-charging-solution-for-mobile-phones/*.

associated application, even if many of the technology options to improve EPS efficiencies may result in a longer useful life for the EPS. The typical consumer will not use the EPS once the application has been discarded. For this reason, the baseline and standard level designs use the same lifetime estimate for the LCC and PBP analysis. See chapter 8 of the TSD for more details.

11. Discount Rate

In the NOPR analysis, DOE derived residential discount rates by identifying all possible debt or asset classes that might be used to purchase and operate products, including household assets that might be affected indirectly. DOE estimated the average shares of the various debt and equity classes in the average U.S. household equity and debt portfolios using data from the Survey of Consumer Finances (SCF)[35] from 1989 to 2007. DOE used the mean share of each class across the seven sample years as a basis for estimating the effective financing rate for products. DOE estimated interest or return rates associated with each type of equity and debt using SCF data and other sources. The mean real effective rate across the classes of household debt and equity, weighted by the shares of each class, is 5.1 percent.

For the commercial sector, DOE derived the discount rate from the cost of capital of publicly-traded firms falling in the categories of products that involve the purchase of EPSs. To obtain an average discount rate value for the commercial sector, DOE used the share of each category in total paid employees provided by the U.S. Census Bureau[36] and Federal,[37] State, and local[38] governments. By multiplying the discount rate for each category by its share of paid employees, DOE derived a commercial discount rate of 7.1 percent.

For the final rule, DOE used the same methodology as the preliminary analysis and NOPR with applicable updates to data sources. When deriving the residential discount rates, DOE added the 2010 Survey of Consumer Finances to their data set. For all time-series data, DOE evaluated rates over the 30-year time period of 1983–2012. The new discount rates were derived as 5.2 percent and 5.1 percent in the residential and commercial sectors, respectively. For further details on discount rates, see chapter 8 and appendix 8D of the TSD.

12. Sectors Analyzed

The NOPR analysis included an examination of a weighted average of the residential and commercial sectors as the reference case scenario. Additionally, all application inputs were specified as either residential or commercial sector data. Using these inputs, DOE then sampled each application based on its shipment weighting and used the appropriate residential or commercial inputs based on the sector of the sampled application. This approach provided more specificity as to the appropriate input values for each sector, and permitted an examination of the LCC results for a given representative unit or product class in total. DOE maintained this approach in the final rule. For further details on sectors analyzed, see chapter 8 of the TSD.

13. Base Case Market Efficiency Distribution

For purposes of conducting the LCC analysis, DOE analyzed candidate standard levels relative to a base case (*i.e.,* a case without new federal energy conservation standards). This analysis required an estimate of the distribution of product efficiencies in the base case (*i.e.,* what consumers would have purchased in 2015 in the absence of new federal standards). Rather than analyzing the impacts of a particular standard level assuming that all consumers will purchase products at the baseline efficiency level, DOE conducted the analysis by taking into account the breadth of product energy efficiencies that consumers are expected to purchase under the base case.

In preparing the NOPR analysis, DOE derived base case market efficiency distributions that were specific to each application where it had sufficient data to do so. This approach helped to ensure that the market distribution for applications with fewer shipments was not disproportionately skewed by the market distribution of the applications with the majority of shipments. As a result, the updated analysis more accurately accounted for LCC and PBP impacts. For today's final rule, DOE maintained the base case market efficiency distributions used in the NOPR analysis.

14. Compliance Date

The compliance date is the date when a new standard becomes operative, i.e., the date by which EPS manufacturers must manufacture products that comply with the standard. DOE calculated the LCC savings for all consumers as if each would purchase a new product in the year that manufacturers would be required to meet the new standard. DOE used a compliance date of 2013 in the analysis it prepared for its March 2012 NOPR and a compliance date of 2015 in the final rule analysis.

15. Payback Period Inputs

The PBP is the amount of time a consumer needs to recover the assumed additional costs of a more-efficient product through lower operating costs. As in the NOPR, DOE used a ''simple'' PBP for the final rule, because the PBP does not take into account other changes in operating expenses over time or the time value of money. As inputs to the PBP analysis, DOE used the incremental installed cost of the product to the consumer for each efficiency level, as well as the first-year annual operating costs for each efficiency level. The calculation requires the same inputs as the LCC, except for energy price trends and discount rates; only energy prices for the year the standard becomes required for compliance (2015 in this case) are needed.

DOE received multiple comments on its payback period analysis. ITI pointed out that the NOPR stated ''a standard is economically justified if the Secretary finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the energy savings during the first year.'' (ITI, No. 131 at p. 6) ITI further noted that it was aware of preliminary cost-benefit analyses that indicate costs of the proposal exceeding the benefits to consumers by more than 10 times during the first year. Id. As ITI did not provide any data, DOE was unable to verify this claim.

Cobra Electronics also asserted that the projected energy savings would yield benefits for a minority of consumers and viewed the payback period as requiring that the price the consumer pays for a product will not increase more than three times what the value of the energy savings will be during the first year after its purchase. (Cobra Electronics, No. 130 at p. 7)

DOE notes that under 42 U.S.C. 6295(o)(2)(B)(iii), if the additional cost to the consumer of purchasing the product complying with an energy conservation standard level will be less

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[35] *http://ww.federalreserve.gov/econresdata/scf/scfindex.htm.*

[36] U.S. Census Bureau. The 2010 Statistical Abstract. Table 607—Employment by Industry. *http://www.census.gov/compendia/statab/2010/tables/10s0607.xls.*

[37] U.S. Census Bureau. The 2010 Statistical Abstract. Table 484—Federal Civilian Employment and Annual Payroll by Branch. *http://www.census.gov/compendia/statab/2010/tables/10s0484.xls.*

[38] U.S. Census Bureau. Government Employment and Payroll. 2008 State and Local Government. *http://www2.census.gov/govs/apes/08stlall.xls.*

than three times the value of the energy savings during the first year that the consumer will receive as a result of the standard, there shall be a rebuttable presumption that such standard level is economically justified. In essence, the statute creates a presumption that a standard level satisfying this condition would be economically justified. It does not, however, indicate that the standard is necessarily economically justified if the payback period is under three years, nor does it indicate that the rebuttable presumption is the only methodology to show economic justification. DOE notes that it does not perform a stand-alone rebuttable presumption analysis, as it is already embodied in the LCC and PBP analysis. The rebuttable presumption is an alternative to the consideration of the seven factors set forth in 42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII) for establishing economic justification. The LCC and PBP analyses DOE conducted as part of the NOPR show that the standard levels proposed for EPSs in product class B are economically justified. Furthermore, DOE notes that in today's final rule, three out of four of the representative units for product class B have payback periods under three years, qualifying the adopted standard level for these representative units as economically justified under the rebuttable presumption. (The rebuttable presumption payback period is discussed further in section III.E.2 above, section V.B.1.c below, and in chapter 8 of the TSD.)

ARRIS Group also expressed concern over the payback periods presented in the NOPR. It noted that adjusting to a Level V baseline and averaging cost savings across all output powers would more than double the payback period to around 7 years, which would exceed the product's lifetime and provide no justified savings for the user. (ARRIS Group, No. 105 at p. 2)

As noted in section IV.A.1, level IV is the current federal standard, and therefore, units that meet level IV efficiency are currently permitted to be sold in the United States. While voluntary programs and efficiency standards outside the United States are driving the improvement of EPSs so that many EPSs sold in the United States meet level V, DOE has observed that EPSs that meet level IV currently exist in the marketplace. Therefore, as discussed in section C.6, DOE does not believe that adjusting the baseline assumption for all EPSs to level V would be appropriate. LCC savings estimates are weighted averages of the savings from improving efficiency from each efficiency level below the standard level up to the standard level. Thus, DOE's analysis accounts for the large percentage of units that would already be at level V in the absence of amended federal standards.

G. Shipments Analysis

Projections of product shipments are needed to predict the impacts standards will have on the Nation. DOE develops shipment projections based on an analysis of key market drivers for each considered product. In DOE's shipments model, shipments of products were calculated based on current shipments of product applications powered by EPSs. For the National Impact Analysis, DOE built an inventory model to track shipments over their lifetime to determine the vintage of units in the installed base for each year of the analysis period.

1. Shipment Growth Rate

In the NOPR, DOE noted that the market for EPSs had grown tremendously in the previous ten years. Additionally, DOE found that many market reports had predicted enormous future growth for the applications that employ EPSs. However, in projecting the size of these markets over the next 30-years, DOE considered the possibility that much of the market growth associated with EPSs had already occurred. In many reports predicting growth of applications that employ EPSs, DOE noted that growth was predicted for new applications, but older applications were generally not included. That is, EPS demand did not grow, but the products using these devices have transitioned to a new product mix. For example, during its initial market assessment, DOE identified mobile phones, digital cameras, personal digital assistants, and MP3 players as applications that use EPSs. However, in the past several years, the use of smart phones, which can function as all four of these individual applications, has accelerated, and these individual products may no longer be sold in large volumes in the near future. A quantitative example of this is shown in Table IV–12.

TABLE IV–12—EXAMPLE OF PRODUCT TRANSITION

Application	2007 Shipments	2008 Shipments	2009 Shipments
Smart Phones	19,500,000	28,555,000	41,163,000
Mobile Phones	101,500,000	102,775,000	94,239,000
Personal Digital Assistants	2,175,000	1,977,000	1,750,000
MP3 Players	48,020,000	43,731,000	40,101,000
Total	171,195,000	177,038,000	177,253,000

With this in mind, DOE based its shipments projections such that the per-capita consumption of EPSs will remain steady over time, and that the overall number of individual units that use EPSs will grow at the same rate as the U.S. population.

In the NOPR analysis, to estimate future market size while assuming no change in the per-capita EPS purchase rate, DOE used the projected population growth rate as the compound annual market growth rate. Population growth rate values were obtained from the U.S. Census Bureau 2009 National Projections, which forecast U.S. resident population through 2050. DOE took the average annual population growth rate, 0.75 percent, and applied this rate to all EPS product classes.

NRDC commented that EPS shipments had been growing significantly faster than the growth shown in the NOPR, driven in part by growth in consumer electronics and portable appliances over the previous few years. They attributed the slower shipment growth in 2009 and 2010 to the recession. By 2042, NRDC projected that annual shipments would grow to 1.3 billion units, 32% higher than DOE's projection of 1.0 billion units. (NRDC, No. 114 at p. 19) The California Investor-Owned Utilities also asserted that EPS stocks would grow faster than the population. These faster growth rates would increase the energy savings attributable to the standards. The CA IOU's stated that they supported the conclusions of NRDC, but did not present additional data of their own. (CA IOUs, No. 138 at p. 20)

DOE recognizes that shipments for certain applications are increasing very rapidly. However, DOE researched product growth trends dating back to 2006 and found that other products, like digital cameras, have seen flat shipments. Some critical applications have even had shipments decline year-over-year. There is also significant convergence in the consumer electronics industry, in which one new device may replace multiple retired devices (such as a single smart phone replacing a mobile phone, digital camera, GPS device, and PDA). DOE seeks to forecast shipments for EPSs as a whole, but given the complexity of these markets, any attempts to forecast behavior of the market will be inherently inexact. Therefore, in today's final rule, DOE decided to maintain its assumption of 0.75% growth per year from the NOPR. In its shipment forecasts, DOE projects that by 2044, shipments of EPSs will be 30 percent greater than they were in 2009.

2. Product Class Lifetime

For the NOPR, DOE calculated product class lifetime profiles using the percentage of shipments of applications within a given product class, and the lifetimes of those applications. These values were combined to estimate the percentage of units of a given vintage remaining in use in each year following the initial year in which those units were shipped and placed in service.

DOE received no comments regarding this methodology and maintained this methodology for the Final Rule. For more information on the calculation of product class lifetime profiles, see chapter 10 of the TSD.

3. Forecasted Efficiency in the Base Case and Standards Cases

A key component of the NIA is the trend in energy efficiency forecasted for the base case (without new and amended standards) and each of the standards cases. Chapter 3 of the TSD explains how DOE developed efficiency distributions (which yield shipment-weighted average efficiency) for EPS product classes for the first year of the forecast period. To project the trend in efficiency over the entire forecast period, DOE considered recent standards, voluntary programs such as ENERGY STAR, and other trends.

DOE found two programs that could influence domestic EPS efficiency in the short term: (1) The ENERGY STAR program for EPSs (called ''external power adapters''), which specified that EPSs be at or above CSL 1 and (2) the European Union's (EU's) Eco-design Requirements on Energy Using Products. When the Preliminary Analysis was published, the ENERGY STAR program was very active, with more than 3,300 qualified products as of May 2010.[39] However, EPA announced that this program would end on December 31, 2010.[40] The EU program requires that EPSs sold in the EU be at or above CSL 1, effective April 2011. This program applies primarily to Class A EPSs. Recently published documents indicate that the EU is currently considering an update to its Ecodesign requirements for EPSs which would bring them to a level between levels V and VI by 2015. These documents also indicate that the EU's approach would bring the EU into harmony with DOE's proposed level VI standards by 2017. This approach, however, has not been finalized by the EU. The same documents also include a proposal for a more efficient standard—approximately 0.25% more efficient than level VI—to come into effect in 2019.[41]

Because Europe currently represents approximately one-third of the global EPS market, DOE believes that standards established by the EU will affect the U.S. market, due to the global nature of EPS design, production, and distribution. With the EU and previous ENERGY STAR programs in mind, DOE's NOPR analysis assumed that approximately half of the Class A EPS market at CSL 0 in 2009 would transition to CSL 1 by 2013 and that there would be no further improvement in the market in the absence of standards. Any EU standards that would come into effect after the beginning of the analysis period in 2015 have not been announced officially; therefore, DOE's analysis does not account for any additional improvement in EPS efficiency beyond the above discussed improvements. Aside from the comments from ARRIS Group addressed above in sections IV.A.2 and IV.C.6, DOE did not receive comments on the improvement of EPS efficiency between 2009 and the beginning of the analysis period in 2015, or other factors that may affect EPS efficiency after 2015 in the absence of federal standards. Therefore, DOE is maintaining this assumption for the Final Rule.

To estimate efficiency trends in the standards cases, 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 reorients the distribution above the new minimum energy conservation standard.

In the NOPR, DOE proposed to use the ''roll-up'' scenario and solicited comments from stakeholders on whether such an approach is appropriate for EPSs. Delta-Q Technologies agreed with DOE's methodology (Delta-Q Technologies, No. 113 at p. 1). PTI commented that the ENERGY STAR program could provide an incentive for products to improve their efficiency (PTI, No 133 at p. 5). Because the ENERGY STAR program for EPS ended, it will not impact the EPS market going forward; therefore, DOE has maintained the ''roll-up'' approach for the final rule. For further details about the forecasted efficiency distributions, see chapter 9 of the TSD.

H. National Impact Analysis

The National Impact Analysis (NIA) assesses the national energy savings (NES) and the net present value (NPV) of total consumer costs and savings that would be expected to result from new and amended standards at specific efficiency levels. DOE calculates the NES and NPV based on projections of annual unit shipments, along with the annual energy consumption and total installed cost data from the energy use and LCC analyses. DOE projected the energy savings, operating cost savings, product costs, and NPV of net consumer benefits for products sold over a 30-year period—from 2015 through 2044.

CEA commented that it is unreasonable for DOE to project shipments, energy savings, and emissions reductions over a 30-year period. Product lifecycles for many of the covered products are typically measured in months, so it can be difficult to make projections years out. (CEA, No. 106 at p. 9) Although the 30-year analysis period is longer than the average lifetime of EPSs, DOE estimates that the considered standard levels

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[39] EPA, ''ENERGY STAR External Power Supplies AC–DC Product List,'' May 24, 2010 and EPA, ''ENERGY STAR External Power Supplies AC–AC Product List,'' May 24, 2010. Both documents last retrieved on May 28, 2010 from *http://www.energystar.gov/index.cfm?fuseaction=products_for_partners.showEPS.*

[40] EPA, ''ENERGY STAR EPS EUP Sunset Decision Memo,'' July 19, 2010. Last retrieved on July 8, 2011 from *http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/eps_eup_sunset_decision_july2010.pdf.*

[41] ''Review Study on Commission Regulation (EC) No. 278/2009 External Power Supplies: Draft Final Report.'' March 13, 2012. Prepared for European Commission—Directorate-General for Energy. *http://www.powerint.com/sites/default/files/greenroom/docs/EPSReviewStudy_DraftFinalReport.pdf.*

analyzed will transform the market to higher energy efficiencies than in the base-case, therefore realizing energy and emission savings throughout the analysis period. Further, DOE has conducted a sensitivity analysis that projects NIA results out over nine years of shipments instead of 30 years. Results of this sensitivity analysis are available in section V.B.3 of this notice.

As in the LCC analysis, DOE evaluates the national impacts of new and amended standards by comparing base-case projections with standards-case projections. The base-case projections characterize energy use and consumer costs for each product class in the absence of new and amended energy conservation standards. DOE compares these projections with projections characterizing the market for each product class if DOE adopted new and amended standards at specific energy efficiency levels (*i.e.,* the TSLs or standards cases) for that class.

To make the analysis more accessible and transparent to all interested parties, DOE used an MS Excel spreadsheet model to calculate the energy savings and the national consumer costs and savings from each TSL. The TSD and other documentation that DOE provides during the rulemaking help explain the models and how to use them, and interested parties can review DOE's analyses by changing various input quantities within the spreadsheet. The NIA spreadsheet model uses average values as inputs (as opposed to probability distributions).

For today's final rule, the NIA used projections of energy prices from the *AEO 2013* Reference case. In addition, DOE analyzed scenarios that used inputs from the *AEO 2013* High Economic Growth, and Low Economic Growth cases. These cases have higher or lower energy price trends compared to the Reference case. NIA results based on these cases are presented in appendix 10A to the TSD.

Table IV–13 summarizes the inputs and key assumptions DOE used in the NIA. Discussion of these inputs and changes follows the table. See chapter 10 of the TSD for further details.

TABLE IV–13—SUMMARY OF INPUTS, SOURCES AND KEY ASSUMPTIONS FOR THE NATIONAL IMPACT ANALYSIS

Inputs	NOPR description	Changes for Final rule
Base Year Shipments	Annual shipments from Market Assessment	No change.
Shipment Growth Rate	0.75 percent annually, equal to population growth.	No change.
Lifetimes	EPS lifetime is equal to the lifetime of the end-use product it powers.	No changes in methodology. Product Class lifetimes were revised based on removal of Product Class C–1 and medical products.
Base Year Efficiencies	From Market Assessment	No change.
Base-Case Forecasted Efficiencies	Efficiency distributions remain unchanged throughout the forecast period.	No change.
Standards-Case Forecasted Efficiencies	"Roll-up" scenario	No change.
Annual Energy Consumption per Unit	Annual shipment weighted-average marginal energy consumption values for each product class.	No change in the methodology. Inputs to the calculation were revised based on removal of Product Class C–1 and medical products.
Improvement Cost per Unit	From the Engineering Analysis	No change.
Markups	From Markups Analysis	No change.
Repair and Maintenance Cost per Unit	Assumed to be zero	No change.
Energy Prices	*AEO 2010* projections (to 2035) and extrapolation for 2044 and beyond.	Updated to AEO 2013.
Electricity Site-to-Source Conversion Factor	Based on *AEO 2010*	Updated to AEO 2013.
Present Year	2011	2013.
Discount Rate	3% and 7% real	No change.
Compliance Date of Standard (Start of Analysis Period).	2013	2015.

1. Product Price Trends

As noted in section IV.F.6, DOE assumed no change in EPS pricing over the 2015–2044 period in the reference case. AHAM commented that it opposes the use of "experience curves" to project price trends and agreed that DOE should not use that approach. (AHAM, No. 124 at p. 9) In contrast, PG&E and SDG&E supported DOE's consideration of falling costs in its NIA sensitivity and recommended that falling costs be incorporated into the reference case, given past declines in the costs of electronic products. (PG&E and SDG&E, No. 163 at p. 1) PSMA agreed, stating that while improvements to overall power supply efficiency do entail cost premiums, these premiums are often reduced as volumes increase and manufacturing technologies improve. (PSMA, No. 147 at p. 2)

As discussed in section IV.G.1, it is difficult to predict the consumer electronics market far in advance. To derive a price trend for EPSs, DOE did not have any historical shipments data or sufficient historical Producer Price Index (PPI) data for small electrical appliance manufacturing from the Bureau of Labor Statistics (BLS).[42] Therefore, DOE also examined a projection based on the price indexes that were projected for *AEO2012*. DOE performed an exponential fit on two deflated projected price indexes that may include the products that EPSs are components of: information equipment (Chained price index—investment in non-residential equipment and software—information equipment), and consumer durables (Chained price index—other durable goods). However, DOE believes that these indexes are too broad to accurately capture the trend for EPSs. Furthermore, most EPSs are unlike typical consumer products in that they are typically not purchased independently by consumers. Instead, they are similar to other commodities and typically bundled with end-use products.

Given the above considerations, DOE decided to use a constant price assumption as the default price factor index to project future EPSs prices in 2015. While a more conservative method, following this approach helped ensure that DOE did not understate the

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[42] Series ID PCU33521–33521; *http://www.bls.gov/ppi/.*

incremental impact of standards on the consumer purchase price. Thus, DOE's product prices forecast for the LCC and PBP analysis for the final rule's analysis were held constant for each efficiency level in each product class. DOE also conducted a sensitivity analysis using alternative price trends based on AEO indexes. These price trends, and the NPV results from the associated sensitivity cases, are described in Appendix 10–B of the TSD.

2. Unit Energy Consumption and Savings

DOE uses the efficiency distributions for the base case along with the annual unit energy consumption values to estimate shipment-weighted average unit energy consumption under the base and standards cases, which are then compared against one another to yield unit energy savings values for each CSL.

To better evaluate actual energy savings when calculating unit energy consumption for a product class at a given CSL, DOE considered only those units that would actually be at that CSL and did not consider any units already at higher CSLs. That is, the shipment-weighted average unit energy consumption for a CSL ignored any shipments from higher CSLs.

In addition, when calculating unit energy consumption for a product class, DOE used marginal energy consumption, which was taken to be the consumption of a unit above the minimum energy consumption possible for that unit. Marginal unit energy consumption values were calculated by subtracting the unit energy consumption values for the highest considered CSL from the unit energy consumption values at each CSL.

As discussed in section IV.G.3, DOE assumes that energy efficiency will not improve after 2015 in the base case. Therefore, the projected UEC values in the analysis, as well as the unit energy savings values, do not vary over time. Per the roll-up scenario, the analysis assumes that manufacturers would respond to a standard by improving the efficiency of underperforming products but not those that already meet or exceed the standard.

DOE received no comments on its methodology for calculating unit energy consumption and savings in the NOPR and maintained its methodology in the final rule. For further details on the calculation of unit energy savings for the NIA, see chapter 10 of the TSD.

3. Unit Costs

DOE uses the efficiency distributions for the base case along with the unit cost values to estimate shipment-weighted average unit costs under the base and standards cases, which are then compared against one another to give incremental unit cost values for each CSL. In addition, when calculating unit costs for a product class, DOE uses that product class's marginal costs—the costs of a given unit above the minimum costs for that unit.

DOE received no comments on its methodology for calculating unit costs in the NOPR and maintained its methodology in the final rule. For further details on the calculation of unit costs for the NIA, see chapter 10 of the TSD.

4. Repair and Maintenance Cost per Unit

In the preliminary analysis and NOPR, DOE did not consider repair or maintenance costs for EPSs because the vast majority cannot be repaired and do not require any maintenance. DOE received no comments on this approach, and maintained this assumption for the Final Rule.

5. Energy Prices

While the focus of this rulemaking is on consumer products, typically found in the residential sector, DOE is aware that many products that employ EPSs are located within commercial buildings. Given this fact, the NOPR analysis relied on calculated energy cost savings from such products using commercial sector electricity rates, which are lower in value than residential sector rates. DOE used this approach so as to not overstate energy cost savings in calculating the NIA.

In order to determine the energy usage split between the residential and commercial sector, DOE first separated products into residential-use and commercial-use categories. Then, for each product class, using shipment values for 2015, average lifetimes, and base-case unit energy consumption values, DOE calculated the approximate annual energy use split between the two sectors. DOE applied the resulting ratio to the electricity pricing to obtain a sector-weighted energy price for each product class. This ratio was held constant throughout the period of analysis.

DOE received no comments on its methodology for calculating energy costs in the NOPR and maintained its approach for the final rule. For further details on the determination of energy prices for the NIA, see chapter 10 of the TSD.

6. National Energy Savings

For each year in the forecast period, DOE calculates the national energy savings for each standard level by multiplying the shipments of EPSs affected by the energy conservation standards by the per-unit annual energy savings. Cumulative energy savings are the sum of the NES for all products shipped during the analysis period, 2015–2044. Site energy savings were converted to primary energy savings using annual conversion factors derived from the *AEO 2013* version of the National Energy Modeling System (NEMS).

DOE has historically presented NES in terms of primary energy savings, as it did in the March 2012 NOPR. However, on August 17, 2012, DOE published a statement of amended policy in which it determined that all rulemakings that reach the NOPR stage after that date must present energy savings in terms of full-fuel-cycle (FFC). 77 FR 49701. Because the NOPR was published prior to August 17, 2012, DOE is maintaining its use of primary energy savings today's final rule; however, it has also decided to present FFC savings as a sensitivity analysis in order to be consistent with DOE's current standard practice. The FFC multipliers that were applied and the results of that analysis are described in appendix 10–C of the TSD.

For further details about the calculation of national energy savings, see chapter 10 of the TSD.

7. Discount Rates

The inputs for determining the NPV of the total costs and benefits experienced by consumers of EPSs are: (1) Total increased product cost, (2) total annual savings in operating costs, and (3) a discount factor. For each standards case, DOE calculated net savings each year as total savings in operating costs less total increases in product costs, relative to the base case. DOE calculated operating cost savings over the life of each product shipped from 2015 through 2044.

DOE multiplied the net savings in future years by a discount factor to determine their present value. DOE estimated the NPV of consumer benefits using both a 3-percent and a 7-percent real discount rate. DOE uses these discount rates in accordance with guidance provided by the Office of Management and Budget (OMB) to Federal agencies on the development of regulatory analysis.[43] The 7-percent real value is an estimate of the average before-tax rate of return to private

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[43] OMB Circular A–4 (Sept. 17, 2003), section E, ''Identifying and Measuring Benefits and Costs. Available at: *http://www.whitehouse.gov/omb/memoranda/m03–21.html.*

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.

For further details about the calculation of net present value, see chapter 10 of the TSD.

I. Consumer Subgroup Analysis

In analyzing the potential impacts of new and amended standards, DOE evaluates the impacts on identifiable subgroups of consumers (*e.g.,* low-income households or small businesses) that may be disproportionately affected by a national standard. In the NOPR, DOE analyzed four consumer subgroups of interest—low-income consumers, small businesses, top marginal electricity price tier consumers, and consumers of specific applications within a representative unit or product class. For each subgroup, DOE considered variations on the standard inputs.

DOE defined low-income consumers as residential consumers with incomes at or below the poverty line, as defined by the U.S. Census Bureau. DOE found that these consumers face electricity prices that are 0.2 cents per kWh lower, on average, than the prices faced by consumers above the poverty line.

For small businesses, DOE analyzed the potential impacts of standards by conducting the analysis with different discount rates, as small businesses do not have the same access to capital as larger businesses. DOE estimated that for businesses purchasing EPSs, small companies have an average discount rate that is 4.5 percent higher than the industry average.

For top tier marginal electricity price consumers, DOE researched inclined marginal block rates for the residential and commercial sectors. DOE found that top tier marginal rates for general usage in the residential and commercial sectors were $0.306 and $0.221, respectively.

Lastly, for the application-specific subgroup, DOE used the inputs from each application for lifetime, markups, market efficiency distribution, and UEC to calculate LCC and PBP results. DOE's subgroup analysis for consumers of specific applications considered the LCC impacts of each application within a representative unit or product class. This approach allowed DOE to consider the LCC impacts of individual applications when choosing the proposed standard level, regardless of the application's weighting in the calculation of average impacts. The impacts of the standard on the cost of the EPS as a percentage of the application's total purchase price are not relevant to DOE's LCC analysis. The LCC considers the incremental cost between different standard levels. DOE used the cost of the EPS component, not the final price of the application, in the LCC. Therefore, a $2,000 and $20 product are assumed to have the same cost for a EPS (e.g., $5) if they are within the same CSL of the same representative unit or product class. The application-specific subgroup analyses represent an estimate of the marginal impacts of standards on consumers of each application within a representative unit or product class.

DOE received no comments on its methodology for the Consumer Subgroup Analysis in the NOPR and maintained its approach in the final rule. Chapter 11 of the TSD contains further information on the LCC analyses for all subgroups.

J. Manufacturer Impact Analysis

DOE conducted a manufacturer impact analysis (MIA) on EPSs to estimate the financial impact of new and amended energy on this industry. The MIA is both a quantitative and qualitative analysis. The quantitative part of the MIA relies on the Government Regulatory Impact Model (GRIM), an industry cash flow model customized for EPSs covered in this rulemaking. The key MIA output is industry net present value, or INPV. DOE used the GRIM to calculate cash flows using standard accounting principles and to compare the difference in INPV between the base case and various TSLs (the standards case). The difference in INPV between the base and standards cases represents the financial impact of the new and amended standards on EPS manufacturers. Different sets of assumptions (scenarios) produce different results.

DOE calculated the MIA impacts of new and amended energy conservation standards by creating a GRIM for EPS ODMs. In the GRIM, DOE grouped similarly impacted products to better analyze the effects that the new and amended standards will have on each industry. DOE presented the EPS impacts by grouping the four representative units in product class B (with output powers at 2.5, 18, 60, and 120 Watts) to characterize the results for product classes B, C, D, and E. The results for product classes X and H are presented separately.

DOE outlined its complete methodology for the MIA in the NOPR. The complete MIA is presented in chapter 12 of the final rule TSD.

1. Manufacturer Production Costs

Through the MIA, DOE attempts to model how changes in efficiency impact the manufacturer production costs (MPCs). The MPCs and the corresponding prices for which fully assembled EPSs are sold to OEMs (frequently referred to as ''factory costs'' in the industry) are major factors in industry value calculations. DOE's MPCs include the cost of components (including integrated circuits), other direct materials of the finalized EPS, the labor to assemble all parts, factory overhead, and all other costs borne by the ODM to fully assemble the EPS.

In the engineering analysis presented in the NOPR, DOE developed and subsequently analyzed cost-efficiency curves for four representative units in product class B and for representative units in product classes X and H. The MPCs are calculated in one of two ways, depending on product class. For the product class B representative units, DOE based its MPCs on information gathered during manufacturer interviews. In these interviews, manufacturers described the costs they would have to incur to achieve increases in energy efficiency. For product classes X and H, the engineering analysis created a complete bill of materials (BOM) derived from the disassembly of the units selected for teardown; BOM costs were used to calculate MPCs.

NRDC commented that DOE overestimated the incremental MPCs in the NOPR analysis for EPSs, particularly product class B EPSs, which caused DOE to overstate the negative financial impacts reported in the NOPR MIA. (NRDC, No. 114 at p. 21) NRDC, however, did not give any specific data supporting its view. DOE derived its MPCs from either tear-downs or direct manufacturer input. These estimates represent the most accurate and comprehensive cost data available to DOE. Accordingly, DOE continued to rely on these data in conducting its analysis and did not alter the MPCs for the final rule.

2. Product and Capital Conversion Costs

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

In response to the NOPR, NEMA commented that the results of the manufacturer impact analysis did not accurately reflect the impact to industry, as the cost of compliance was consistently underestimated resulting in an overestimation of net savings. NEMA stated the cost to manufacturers fails to include safety and reliability testing and these testing processes are required to ensure long term efficiency gains. (NEMA, No. 134 at p. 2) DOE notes that it included the cost of safety and reliability testing as well as certification in the estimated product conversion costs for the NOPR. See chapter 12 of the TSD for a complete explanation of the conversion costs. Since NEMA did not provide any data on the costs of safety and reliability testing, DOE was unable to verify if the safety and reliability testing cost used in the NOPR were underestimated.

NRDC commented that DOE overestimated the conversion costs associated with EPS standards, which caused the MIA results to overstate the negative financial impacts on EPS manufacturers. NRDC believes the changes required by the selected standards for EPSs are simple and will only require limited capital conversion costs. (NRDC, No. 114 at p. 21) In contrast, Dell commented that DOE may have underestimated the conversion costs related to production. (Dell, Pub. Mtg. Transcript, No. 104 at p. 242) After reviewing the EPS conversion costs, DOE agrees it overstated the capital and product conversion costs because it overestimated the length of the product design cycle of the covered products. In the final rule MIA, DOE corrected its estimate of the length of the product design cycle, which reduced the EPS conversion costs by approximately 50 percent from the initial estimated conversion costs in the NOPR. See chapter 12 of this final rule TSD for further explanation.

3. Markup Scenarios

For the NOPR, DOE modeled two standards case markup scenarios in the MIA: (1) A flat markup scenario and (2) a preservation of operating profit scenario. These two scenarios represent the uncertainty regarding the potential impacts on prices and profitability for manufacturers following the implementation of new and amended energy conservation standards. Each scenario leads to different markup values, which when applied to the inputted MPCs, result in varying revenue and cash flow impacts.

In the flat markup scenario, DOE assumes that the cost of goods sold for each product is marked up by a flat percentage to cover SG&A expenses, R&D expenses, and profit. In the standards case for the flat markup scenario, manufacturers are able to fully pass the additional costs that are caused by standards through to their customers.

DOE also modeled the preservation of operating profit scenario in the NOPR MIA. During manufacturer interviews, ODMs and OEMs indicated that the electronics industry is extremely price sensitive throughout the distribution chain. Because of the highly competitive market, this scenario models the case in which ODMs' higher production costs for more efficient EPSs cannot be fully passed through to OEMs. In this scenario, the manufacturer markups are lowered such that manufacturers are only able to maintain the base case total operating profit in absolute dollars in the standards case, despite higher product costs and required investment. DOE implemented this scenario in the GRIM by lowering the manufacturer markups at each TSL to yield approximately the same earnings before interest and taxes in both the base case and standards cases in the year after the compliance date for the new and amended standards. This scenario generally represents the lower-bound of industry profitability following new and amended energy conservation standards because in this scenario higher production costs and the investments required to comply with new and amended energy conservation standards do not yield additional operating profit.

During the NOPR public meeting, ECOVA commented that DOE should consider a markup scenario where manufacturers can pass on the one-time conversion costs associated with new and amended energy standards. (ECOVA, Pub. Mtg. Transcript, No. 104 at p. 294) Based on the EPS market pricing conditions described during manufacturer interviews, DOE concludes that the markup scenario recommended by ECOVA is realistic and should be incorporated into the MIA. Therefore, DOE examined the INPV impacts of a return on invested capital markup scenario in the final rule MIA as a result of ECOVA's comment. The results of this markup scenario are displayed in section V.B.2.a, along with the rest of the manufacturer INPV results.

In the return on invested capital scenario, manufacturers earn the same percentage return on total capital in both the base case and standards cases in the year after the compliance date for the new and amended standards. This scenario models the situation in which manufacturers maintain a similar level of profitability from the investments required by new and amended energy conservation standards as they do from their current business operations. In the standards case under this scenario, manufacturers have higher net operating profit after taxes, but also have greater working capital and investment requirements. This scenario generally represents the upper-bound of industry profitability following new and amended energy conservation standards.

4. Impacts on Small Businesses

Cobra Electronics commented that it, and other small companies, were excluded from DOE's small business impacts analysis. Cobra stated that while it does not manufacture EPSs, it manufactures products that use EPSs and should have been included in DOE's small business impacts analysis. (Cobra Electronics, No. 130 at p. 2) DOE took into consideration only small businesses that either are directly impacted by these standards and/or manufacture EPSs domestically and found none that would be adversely affected by this rule. DOE believes that electronics manufacturers, like Cobra, that source their EPSs from other companies should not be directly examined, as the EPSs are simply one component of their products. DOE does not expect there to be any direct employment impacts on these application manufacturers that do not manufacture or design the EPSs used with their applications. Further, if these companies are not involved in the redesign or manufacturing of the EPS, they will not have significant conversion costs associated with this EPS standard. DOE acknowledges that the application price could increase due to the use of more expensive EPSs, which could negatively affect small business application manufacturers using EPSs. These price increases are the subject of the markups analysis, which is discussed in section IV.D above.

K. Emissions Analysis

In the emissions analysis, DOE estimated the reduction in power sector emissions of carbon dioxide (CO_2), nitrogen oxides (NO_X), sulfur dioxide

(SO_2), and mercury (Hg) from potential energy conservation standards for EPSs. In addition, for today's final rule, DOE developed a sensitivity analysis that estimates additional emissions impacts in production activities (extracting, processing, and transporting fuels) that provide the energy inputs to power plants. These are referred to as ''upstream'' emissions. Together, these emissions account for the full-fuel-cycle (FFC). In accordance with DOE's FFC Statement of Policy (76 FR 51282 (Aug. 18, 2011)), the FFC analysis includes impacts on emissions of methane (CH_4) and nitrous oxide (N_2O), both of which are recognized as greenhouse gases. The results of this FFC sensitivity analysis are described in appendix 13A of the final rule TSD.

DOE conducted the emissions analysis using emissions factors that were derived from data in EIA's *Annual Energy Outlook 2013* (*AEO 2013*), supplemented by data from other sources. DOE developed separate emissions factors for power sector emissions and upstream emissions. The method that DOE used to derive emissions factors is described in chapter 13 of the final rule TSD.

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

SO_2 emissions from affected electric generating units (EGUs) are subject to nationwide and regional emissions cap-and-trade programs. Title IV of the Clean Air Act sets an annual emissions cap on SO_2 for affected EGUs in the 48 contiguous States and the District of Columbia (DC). SO_2 emissions from 28 eastern states and DC were also limited under the Clean Air Interstate Rule (CAIR; 70 FR 25162 (May 12, 2005)), which created an allowance-based trading program that operates along with the Title IV program. CAIR was remanded to the U.S. Environmental Protection Agency (EPA) by the U.S. Court of Appeals for the District of Columbia Circuit but it remained in effect. See *North Carolina* v. *EPA,* 550 F.3d 1176 (D.C. Cir. 2008); *North Carolina* v. *EPA,* 531 F.3d 896 (D.C. Cir. 2008). On July 6, 2011 EPA issued a replacement for CAIR, the Cross-State Air Pollution Rule (CSAPR). 76 FR 48208 (August 8, 2011). On August 21, 2012, the DC Circuit issued a decision to vacate CSAPR. See *EME Homer City Generation, LP* v. *EPA,* 696 F.3d 7, 38 (D.C. Cir. 2012). The court ordered EPA to continue administering CAIR.[44] The *AEO 2013* emissions factors used for today's NOPR assumes that CAIR remains a binding regulation through 2040.

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

Beginning in 2015, however, SO_2 emissions will fall as a result of the Mercury and Air Toxics Standards (MATS) for power plants, which were announced by EPA on December 21, 2011. 77 FR 9304 (Feb. 16, 2012). In the final MATS rule, EPA established a standard for hydrogen chloride as a surrogate for acid gas hazardous air pollutants (HAP), and also established a standard for SO_2 (a non-HAP acid gas) as an alternative equivalent surrogate standard for acid gas HAP. The same controls are used to reduce HAP and non-HAP acid gas; thus, SO_2 emissions will be reduced as a result of the control technologies installed on coal-fired power plants to comply with the MATS requirements for acid gas. *AEO 2013* assumes that, in order to continue operating, coal plants must have either flue gas desulfurization or dry sorbent injection systems installed by 2015. Both technologies, which are used to reduce acid gas emissions, also reduce SO_2 emissions. Under the MATS, NEMS shows a reduction in SO_2 emissions when electricity demand decreases (e.g., as a result of energy efficiency standards). Emissions will be far below the cap established by CAIR, so it is unlikely that excess SO_2 emissions allowances resulting from the lower electricity demand would be needed or used to permit offsetting increases in SO_2 emissions by any regulated EGU. Therefore, DOE believes that efficiency standards will reduce SO_2 emissions in 2015 and beyond.

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

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

L. Monetizing Carbon Dioxide and Other Emissions Impacts

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

For today's final rule, DOE did not receive any comments on this section of the analysis and retained the same approach as in the NOPR. DOE is relying on a set of values for the social cost of carbon (SCC) that was developed by an interagency process. A summary of the basis for these values is provided below, and a more detailed description of the methodologies used is provided as an appendix to chapter 14 of the final rule TSD.

1. Social Cost of Carbon

The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human

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[44] On June 24, 2013, the Supreme Court granted certiorari in *EME Homer City. EPA* v. *EME Homer City Generation, LP,* 133 S.Ct. 2857 (2013), and has heard oral arguments on this matter on December 10, 2013. DOE notes that while the outcome of this litigation may eventually have an impact on the manner in which DOE calculates emissions impacts, accounting for those changes in the context of the present rule would be speculative given the uncertainty of the case's outcome at this time.

health, property damages from increased flood risk, and the value of ecosystem services. Estimates of the SCC are provided in dollars per metric ton of carbon dioxide. A domestic SCC value is meant to reflect the value of damages in the United States resulting from a unit change in carbon dioxide emissions, while a global SCC value is meant to reflect the value of damages worldwide.

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

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

a. Monetizing Carbon Dioxide Emissions

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

Despite the serious limits of both quantification and monetization, SCC estimates can be useful in estimating the social benefits of reducing carbon dioxide emissions. Most Federal regulatory actions can be expected to have marginal impacts on global emissions. For such policies, the agency can estimate the benefits from reduced emissions in any future year by multiplying the change in emissions in that year by the SCC value appropriate for that year. The net present value of the benefits can then be calculated by multiplying the future benefits by an appropriate discount factor and summing across all affected years. This approach assumes that the marginal damages from increased emissions are constant for small departures from the baseline emissions path, an approximation that is reasonable for policies that have effects on emissions that are small relative to cumulative global carbon dioxide emissions. For policies that have a large (non-marginal) impact on global cumulative emissions, there is a separate question of whether the SCC is an appropriate tool for calculating the benefits of reduced emissions. This concern is not applicable to this rulemaking, however.

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

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

Economic analyses for Federal regulations have used a wide range of values to estimate the benefits associated with reducing carbon dioxide emissions. In the final model year 2011 CAFE rule, the U.S. Department of Transportation (DOT) used both a ''domestic'' SCC value of $2 per metric ton of CO_2 and a ''global'' SCC value of $33 per metric ton of CO_2 for 2007 emission reductions (in 2007$), increasing both values at 2.4 percent per year. DOT also included a sensitivity analysis at $80 per metric ton of CO_2.[45] A 2008 regulation proposed by DOT assumed a domestic SCC value of $7 per metric ton of CO_2 (in 2006$) for 2011 emission reductions (with a range of $0–$14 for sensitivity analysis), also increasing at 2.4 percent per year.[46] A regulation for packaged terminal air conditioners and packaged terminal heat pumps finalized by DOE in October of 2008 used a domestic SCC range of $0 to $20 per metric ton CO_2 for 2007 emission reductions (in 2007$). 73 FR 58772, 58814 (Oct. 7, 2008). In addition, EPA's 2008 Advance Notice of Proposed Rulemaking on Regulating Greenhouse Gas Emissions Under the Clean Air Act identified what it described as ''very preliminary'' SCC estimates subject to revision. 73 FR 44354 (July 30, 2008). EPA's global mean values were $68 and $40 per metric ton CO_2 for discount rates of approximately 2 percent and 3 percent, respectively (in 2006$ for 2007 emissions).

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

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

[46] See *Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011–2015,* 73 FR 24352 (May 2, 2008) (Proposed Rule); Draft Environmental Impact Statement Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011–2015 at 3–58 (June 2008) (Available at: *http://www.nhtsa.gov/fuel-economy*) (Last accessed December 2012).

c. Current Approach and Key Assumptions

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

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

The interagency group selected four sets of SCC values for use in regulatory analyses.[47] Three sets of values are based on the average SCC from three integrated assessment models, at discount rates of 2.5 percent, 3 percent, and 5 percent. The fourth set, which represents the 95th-percentile SCC estimate across all three models at a 3-percent discount rate, is included to represent higher-than-expected impacts from climate change further out in the tails of the SCC distribution. The values grow in real terms over time. Additionally, the interagency group determined that a range of values from 7 percent to 23 percent should be used to adjust the global SCC to calculate domestic effects, although preference is given to consideration of the global benefits of reducing CO2 emissions. Table IV–14 presents the values in the 2010 interagency group report, which is reproduced in appendix 14–A of the final rule TSD.

TABLE IV–14—ANNUAL SCC VALUES FROM 2010 INTERAGENCY REPORT, 2010–2050

[In 2007 dollars per metric ton CO_2]

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

The SCC values used for today's final rule were generated using the most recent versions of the three integrated assessment models that have been published in the peer-reviewed literature.[48] Table IV–15 shows the updated sets of SCC estimates in five-year increments from 2010 to 2050. Appendix 14–B of the final rule TSD provides the full set of values. The central value that emerges is the average SCC across models at a 3-percent discount rate. However, for purposes of capturing the uncertainties involved in regulatory impact analysis, the interagency group emphasizes the importance of including all four sets of SCC values.

TABLE IV–15—ANNUAL SCC VALUES FROM 2013 INTERAGENCY UPDATE, 2010–2050

[In 2007 dollars per metric ton CO_2]

Year	Discount rate %			
	5	3	2.5	3
	Average	Average	Average	95th Percentile
2010	11	32	51	89
2015	11	37	57	109
2020	12	43	64	128
2025	14	47	69	143
2030	16	52	75	159
2035	19	56	80	175

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

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

TABLE IV–15—ANNUAL SCC VALUES FROM 2013 INTERAGENCY UPDATE, 2010–2050—Continued

[In 2007 dollars per metric ton CO_2]

Year	Discount rate %			
	5	3	2.5	3
	Average	Average	Average	95th Percentile
2040	21	61	86	191
2045	24	66	92	206
2050	26	71	97	220

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

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

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

2. Valuation of Other Emissions Reductions

DOE investigated the potential monetary benefit of reduced NO_X emissions from the TSLs it considered. As noted above, DOE has taken into account how new and amended energy conservation standards would reduce NOx emissions in those 22 states not affected by the CAIR. DOE estimated the monetized value of NO_X emissions reductions resulting from each of the TSLs considered for today's final rule based on estimates found in the relevant scientific literature. Available estimates suggest a very wide range of monetary values per ton of NOx from stationary sources, ranging from $468 to $4,809 per ton (in 2012$).[49] DOE calculated monetary benefits using a medium value for NO_X emissions of $2,639 per short ton (in 2012$), and real discount rates of 3 percent and 7 percent.

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

The California Investor-Owned Utilities and ECOVA asked that DOE take into account the decreased cost of complying with sulfur dioxide emission regulations as a result of standards. (CA IOUs, No. 138 at p. 19; ECOVA, Pub. Mtg. Transcript, No. 104 at pp. 292–293) As discussed in section IV.L, under the MATS, SO_2 emissions are expected to be far below the cap established by CSAPR. Thus, it is unlikely that the reduction in electricity demand resulting from energy efficiency standards would have any impact on the cost of complying with the regulations.

For the final rule, DOE retained the same approach as in the NOPR for monetizing the emissions reductions from new and amended standards.

M. Utility Impact Analysis

The utility impact analysis estimates several effects on the power generation industry that would result from the adoption of new and amended energy conservation standards. In the utility impact analysis, DOE analyzes the changes in electric installed capacity and generation that result for each trial standard level. The utility impact analysis uses a variant of NEMS,[50] which is a public domain, multi-sectored, partial equilibrium model of the U.S. energy sector. DOE uses a variant of this model, referred to as NEMS–BT,[51] to account for selected utility impacts of new and amended energy conservation standards. DOE's analysis consists of a comparison between model results for the most recent *AEO* Reference Case and for cases in which energy use is decremented to reflect the impact of potential standards. The energy savings inputs associated with each TSL come from the NIA. For today's final rule, DOE did not receive any comments on this section of the analysis and retained the same approach as in the NOPR. Chapter 15 of the TSD describes the utility impact analysis in further detail.

N. Employment Impact Analysis

Employment impacts from new and amended energy conservation standards include direct and indirect impacts. Direct employment impacts are any changes in the number of employees of manufacturers of the equipment subject to standards; the MIA addresses those impacts. Indirect employment impacts are changes in national employment that occur due to the shift in expenditures and capital investment caused by the purchase and operation of more efficient equipment. Indirect employment impacts from standards consist of the jobs created or eliminated

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[49] 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.

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

[51] DOE/EIA approves use of the name NEMS to describe only an official version of the model without any modification to code or data. Because this analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on DOE/EIA assumptions, DOE refers to it by the name ''NEMS–BT'' (''BT'' is DOE's Building Technologies Program, under whose aegis this work has been performed).

in the national economy, other than in the manufacturing sector being regulated, due to: (1) Reduced spending by end users on energy; (2) reduced spending on new energy supply by the utility industry; (3) increased consumer spending on the purchase of new equipment; and (4) the effects of those three factors throughout the economy.

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

For the standard levels considered in the final rule, DOE estimated indirect national employment impacts using an input/output model of the U.S. economy called Impact of Sector Energy Technologies version 3.1.1 (ImSET). ImSET is a special-purpose version of the ''U.S. Benchmark National Input-Output'' (I–O) model, which was designed to estimate the national employment and income effects of energy-saving technologies. The ImSET software includes a computer-based I–O model having structural coefficients that characterize economic flows among the 187 sectors. ImSET's national economic I–O structure is based on a 2002 U.S. benchmark table, specially aggregated to the 187 sectors most relevant to industrial, commercial, and residential building energy use. DOE notes that ImSET is not a general equilibrium forecasting model, and understands the uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis. Because ImSET does not incorporate price changes, the employment effects predicted by ImSET may over-estimate actual job impacts over the long run. For the final rule, DOE used ImSET only to estimate short-term employment impacts.

The California Energy Commission disagreed with DOE's NOPR employment impact analysis, which shows that increasing energy efficiency causes U.S. job losses. (California Energy Commission, No. 117 at p. 33) The California Energy Commission's argument was based on an assumed ratio of jobs in the consumer goods sector versus the utility sector. The California Energy Commission, however, did not provide independent data sources or references to support the assumption. As a result, DOE is maintaining its current methodology to estimate employment impacts.

DOE's employment impact analysis is designed to estimate indirect national job creation or elimination resulting from possible standards, due to reallocation of the associated expenditures for purchasing and operating EPSs. There are two cost changes to consider: reduction in energy costs from use of the product due to efficiency increase, and change in manufacturing cost to improve product energy efficiency.

Energy cost savings bring a reduction in spending on energy, which has a negative impact on employment in electric utilities and directly related sectors. Energy cost savings are assumed to be redirected according to average U.S. spending patterns; this increase in spending on all other goods and services leads to an increase in employment in all other sectors. As electric utilities are generally capital-intensive compared to the average of all sectors, the aggregate employment impact of energy cost savings is positive.

In contrast, with increased manufacturing costs, which lead to higher purchase prices, funds will be diverted from general spending, increasing spending in product manufacturing and directly related sectors. In the case of EPSs, almost all manufacturing takes place in other countries, so money flows from general spending (reducing employment across all U.S. sectors) to pay for these imported products. However, a portion of the money spent on imports returns to the U.S. when U.S. exports are sold. Because U.S. exports tend to be less labor-intensive than the average of general spending on goods and services, the aggregate impact of increased manufacturing cost is expected to be a decrease in U.S. employment.

The employment analysis in the NOPR TSD only presented impacts in the short run (2015 and 2020). In the short run, the effect from increased cost is larger than the effect from energy cost savings, which accrue over time. For this reason, DOE kept the same approach when developing the employment impact analysis for the final rule. Although DOE does not currently quantify long-run employment impacts due to modeling uncertainty, DOE anticipates that net labor market impacts will in general be negligible over time.

O. Marking Requirements

Under 42 U.S.C. 6294(a)(5), Congress granted DOE with the authority to establish labeling or marking requirements for a number of consumer products, including EPSs. DOE notes that EISA 2007 set standards for Class A EPSs and required that all Class A EPSs shall be clearly and permanently marked in accordance with the ''International Efficiency Marking Protocol for External Power Supplies'' (the ''Marking Protocol'').[52] (42 U.S.C. 6295(u)(3)(C))

The Marking Protocol, developed by the EPA in consultation with stakeholders both within and outside the United States, was originally designed in 2005 and updated in 2008 to meet the needs of those voluntary and regulatory programs in place at those times. In particular, the Marking Protocol defines efficiency mark ''IV'', which corresponds to the current Federal standard for Class A EPSs, and efficiency mark ''V'', which corresponds to ENERGY STAR version 2.0. (The ENERGY STAR program for EPSs ended on December 31, 2010.) In the 2008 version of the Marking Protocol, these marks apply only to single-voltage EPSs with nameplate output power less than 250 watts, but not to multiple-voltage or high-power EPSs. In the March 2012 NOPR, DOE indicated that it would work with the EPA and other stakeholder groups to update the Marking Protocol to accommodate any revised EPS standards it might adopt.

Brother, Panasonic, and ITI urged DOE to ensure that its marking requirements for EPSs align with the International Efficiency Marking Protocol. (Brother International, No. 111 at p. 3; ITI, No. 131 at p. 8; Panasonic, No. 120 at p. 4)

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[52] U.S. EPA, ''International Efficiency Marking Protocol for External Power Supplies,'' October 2008, available at Docket No. 62.

As noted above, EISA 2007 required all Class A EPSs to be clearly and permanently marked in accordance with the Marking Protocol—but without any reference to a particular version of that protocol.[53] In the absence of any definitive language pointing to the use of a particular version of the Marking Protocol, in DOE's view, the statute contemplated that the marking requirements would evolve over time as needed. This view is supported by the authority Congress gave to DOE in setting any necessary labeling requirements for EPSs. See 42 U.S.C. 6294(a)(5). Consistent with this authority, and the statutory foundation laid out by Congress, DOE proposed to revise the marking requirements for EPSs to accommodate the standards being adopted today. In particular, applying the already existing nomenclature pattern set out by the Marking Protocol, DOE proposed a new mark (Roman numeral VI) to denote compliance with the proposed standards. DOE has revised the Marking Protocol in collaboration with the EPA and those stakeholder groups around the world that contributed to earlier versions.

DOE received comments requesting that it not extend marking requirements to products for which such requirements do not already exist. AHAM opposed adding a marking requirement for EPSs that do not already have such requirements, noting that the usual purposes for markings—informing consumers, differentiating products in instances where there are two standards, and differentiating products that use a voluntary standard—are not served here. (AHAM, No. 124 at p. 8) AHAM and ITI commented that DOE can verify compliance with the standard by reviewing the certification and compliance statements manufacturers are already required to file with DOE, obviating the need for marking requirements, which impose additional cost and production burdens on manufacturers and result in marks that, ITI added, ''consumers are likely to ignore anyway.'' (Id.; ITI, No. 131 at p. 8) Panasonic and AHAM commented that efficiency marking requirements for battery chargers and EPSs are unnecessary and superfluous as the covered products must comply with standards as a condition of sale in the United States. (Panasonic, No. 120 at pp. 3, 4; AHAM, No. 124 at p. 8)

DOE acknowledges that manufacturers are required to certify compliance with standards using the Compliance Certification Management System (CCMS) [54] and that, in general, markings have limited effectiveness in ensuring compliance. At the same time, DOE recognizes that manufacturers and retailers could use efficiency markings or labels to help ensure that the end-use consumer products they sell comply with all applicable standards. However, DOE has not received requests from such parties requesting additional marking requirements for such purposes. As a result, with the exception of multiple-voltage and high-power EPSs, DOE is not extending marking requirements to additional products at this time.

DOE also received comments from several manufacturers and industry associations requesting that it permit any required marking to be placed on the product's package or within accompanying documentation in lieu of placing the marking on the product itself. Specific reasons cited included: (1) Limited space on battery chargers and EPSs for additional markings, as devices have become smaller in recent years and must already have certain existing markings; (2) wide array of products of different types and sizes; (3) package labeling is less costly than marking the product itself; (4) package labeling is more visible than product markings at point of sale and at customs; (5) manufacturers would prefer to have this flexibility for product design and branding reasons; (6) such flexibility would be consistent with recent government directives on regulatory reform; and (7) product markings consume additional energy and resources. (AHAM, No. 124 at p. 9; Apple, No. 177 at p. 1; CEA, No. 137 at pp. 7–8; California Energy Commission, No. 199 at p. 12; Motorola Mobility, No. 121 at p. 16; Panasonic, No. 120 at p. 4; Philips, No. 128 at p. 6; TIA, No. 127 at p. 9)

In today's final rule, DOE is amending its marking requirements to permit any required marking to be placed on the product's package or accompanying documentation in lieu of the product itself. DOE believes that the most compelling reason for permitting more flexibility in the placement of the label is that the efficiency of the EPS can still be ascertained at any point in the distribution chain by reviewing the packaging or accompanying documentation, while allowing manufacturers to choose where to place the marking.

Several interested parties commented on the proposed marking requirements for EPSs in product class N. ITI and Panasonic commented that they see no need to require a marking on products for which standards do not apply and for which there is no provision in the Marking Protocol, i.e., non-Class A EPSs in product class N. (ITI, No. 131 at p. 9; Panasonic, No. 120 at p. 4) Panasonic further expressed concern that requiring both a Roman numeral and the letter ''N'' on Class A EPSs in product class N would create confusion and recommended requiring only the Roman numeral [as required at present]. (Panasonic, No. 120 at p. 4) Lastly, AHAM, NRDC, Panasonic, and Wahl Clipper all suggested ways of simplifying the marking scheme DOE proposed for EPSs in product class N. (AHAM, No. 124 at p. 8; NRDC, No. 114 at p. 17; Panasonic, No. 120 at p. 4; Wahl Clipper, Pub. Mtg. Transcript, No. 104 at p. 265)

In light of these comments, including those requesting that DOE not extend marking requirements to products for which such requirements do not already exist, DOE is not establishing a special mark for EPSs for product class N in today's final rule. For those EPSs that are already subject to standards (Class A EPSs), the Roman numeral marking requirement continues in force. For those EPSs in product class N not subject to standards (non-Class A EPSs), no efficiency marking is required. However, to ensure consistency and avoid confusion, DOE is extending the efficiency marking requirement only to those non-Class A EPSs subject to the direct operation EPS standards being adopted today, *i.e.,* multiple-voltage and high-power EPSs and the EPSs for certain battery operated motorized applications. Thus, the marking will be required for all devices that are subject to EPS standards and not required for any devices that are not subject to EPS standards.

Congress amended EPCA to exclude EPSs for certain security and life safety equipment from the no-load mode efficiency standards. Public Law 111–360 (Jan. 4, 2011) (codified at 42 U.S.C. 6295(u)(3)). The exclusion applies to AC–AC EPSs manufactured before July 1, 2017, that have (1) nameplate output

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[53] ''Marking.— Any class A external power supply manufactured on or after the later of July 1, 2008 or December 19, 2007, shall be clearly and permanently marked in accordance with the External Power Supply International Efficiency Marking Protocol, as referenced in the 'Energy Star Program Requirements for Single Voltage External AC–DC and AC–AC Power Supplies, version 1.1' published by the Environmental Protection Agency.'' 42 U.S.C. 6295(u)(3)(C). The ENERGY STAR Program Requirements v. 1.1 were announced March 1, 2006. The initial version of the International Efficiency Marking Protocol for EPSs was in effect at that time.

[54] The CCMS is an online system that permits manufacturers and third party representatives to create, submit, and track certification reports using product-specific templates. See *https://www.regulations.doe.gov/ccms.*

of 20 watts or more and (2) are certified as being designed to be connected to a security or life safety alarm or surveillance system component (as defined in the law). The provision also requires that once an EPS International Efficiency Marking Protocol is established to identify these types of EPSs, they should be permanently labeled with the appropriate mark. 42 U.S.C. 6295(u)(3)(E). Currently, no such distinguishing mark exists within the Marking Protocol. Once this mark is established, an EPS would have to be so marked to qualify for the exemption.[55]

The CEC commented that ''DOE should not add EPS security marking to the international marking protocol,'' adding that efficiency markings are intended to identify ''holistically'' efficient products, covering all modes of operation. The CEC continued, ''If DOE decides to adopt a marking for these products, the Energy Commission recommends using an ''S'' in a circle with a sunset date of July 1, 2017. This requirement should be added only to 10 CFR 430 and not to the international marking protocol.'' (California Energy Commission, No. 117 at p. 30) NRDC recommended that DOE adopt a marking for these products that consists of the letter ''S'' followed by a hyphen and the appropriate Roman numeral marking, e.g., ''S–VI''. (NRDC, No. 114 at p. 17)

In light of the exemption's limited scope and duration, the uncertainty about which mark to use, concerns over requiring the mark, and the irrelevance of a DOE marking requirement to determining eligibility for the exemption, DOE has decided not to adopt a special marking for the EPSs in question.

Table IV–16 summarizes the EPS marking requirements. The revised Marking Protocol (version 3.0) has been added to the docket for this rulemaking and can be downloaded from Docket EERE–2008–BT–STD–0005 on Regulations.gov.

TABLE IV–16 EPS MARKING REQUIREMENTS BY PRODUCT CLASS*

Class ID	Product class	Marking requirement
B	Direct Operation, AC–DC, Basic-Voltage	Roman numeral VI.
C	Direct Operation, AC–DC, Low-Voltage (except those with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charge the battery of a product that is fully or primarily motor operated).	Roman numeral VI.
C-1	Direct Operation, AC–DC, Low-Voltage with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps and charges the battery of a product that is fully or primarily motor operated.	No marking requirement.
D	Direct Operation, AC–AC, Basic-Voltage	Roman numeral VI.
E	Direct Operation, AC–AC, Low-Voltage	Roman numeral VI.
X	Direct Operation, Multiple-Voltage	Roman numeral VI.
H	Direct Operation, High-Power	Roman numeral VI.
N	Indirect Operation	Class A: Roman numeral IV or higher. Non-Class A: No marking requirement.

* An EPS not subject to standards need not be marked.

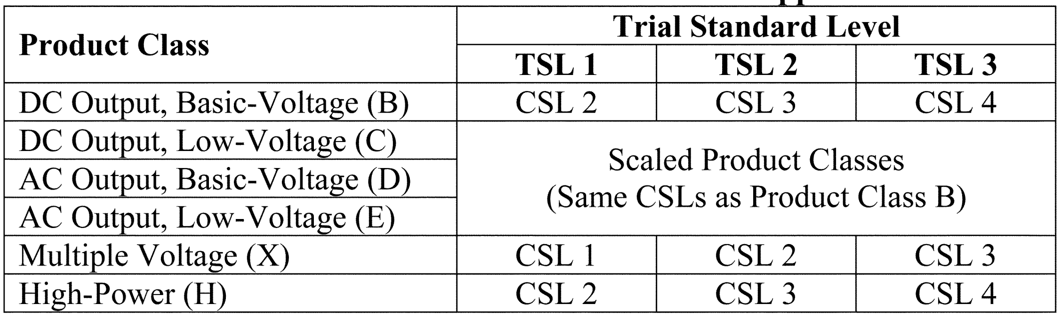
V. Analytical Results

A. Trial Standards Levels

DOE analyzed the benefits and burdens of multiple TSLs for the products that are the subject of today's rule. A description of each TSL DOE analyzed is provided below. DOE attempted to limit the number of TSLs considered for the NOPR by excluding efficiency levels that do not exhibit significantly different economic and/or engineering characteristics from the efficiency levels already selected as a TSL. While the NOPR presents only the results for those efficiency levels in TSL combinations, the TSD contains a fuller discussion and includes results for all efficiency levels that DOE examined.

Table V–1 presents the TSLs for EPSs and the corresponding efficiency levels. DOE chose to analyze product class B directly and scale the results from the engineering analysis to product classes C, D, and E. As a result, the TSLs for these three product classes correspond to the TSLs for product class B. DOE created separate TSLs for the multiple-voltage (product class X) and high-power (product class H) EPSs to determine their standards.

Table V-1 Trial Standard Levels for External Power Supplies



Product Class	Trial Standard Level		
	TSL 1	TSL 2	TSL 3
DC Output, Basic-Voltage (B)	CSL 2	CSL 3	CSL 4
DC Output, Low-Voltage (C)	Scaled Product Classes (Same CSLs as Product Class B)		
AC Output, Basic-Voltage (D)			
AC Output, Low-Voltage (E)			
Multiple Voltage (X)	CSL 1	CSL 2	CSL 3
High-Power (H)	CSL 2	CSL 3	CSL 4

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[55] Note that the failure to add such a mark to the Marking Protocol or create a DOE requirement for such a mark has no bearing on the ability of such products to qualify for the exemption.

For product class B, DOE examined three TSLs corresponding to each candidate standard level of efficiency developed in the engineering analysis. TSL 1 is an intermediate level of performance above ENERGY STAR, which offers the greatest consumer NPV. TSL 2 is equivalent to the best-in-market CSL and represents an incremental rise in energy savings over TSL 1. TSL 3 is the max-tech level and corresponds to the greatest NES.

For product class X, DOE examined three TSLs above the baseline. TSL 1 is an intermediate level of performance above the baseline. TSL 2 is equivalent to the best-in-market CSL and corresponds to the maximum consumer NPV. TSL 3 is the max-tech level and corresponds to the greatest NES.

For product class H, DOE examined three TSLs above the baseline. TSL 1 corresponds to an intermediate level of efficiency. TSL 2 is the scaled best-in-market CSL and corresponds to the maximum consumer NPV. TSL 3 is the scaled max-tech level, which provides the highest NES.

B. Economic Justification and Energy Savings

1. Economic Impacts on Individual Consumers

For individual consumers, measures of economic impact include the changes in LCC and the PBP associated with new and amended standards. The LCC, which is also separately specified as one of the seven factors to be considered in determining the economic justification for a new and amended standard (42 U.S.C. 6295(o)(2)(B)(i)(II)), is discussed in the following section. For consumers in the aggregate, DOE also calculates the net present value from a national perspective of the economic impacts on consumers over the forecast period used in a particular rulemaking.

a. Life-Cycle Cost and Payback Period

As in the NOPR phase, DOE calculated the average LCC savings relative to the base case market efficiency distribution for each representative unit and product class. DOE's projections indicate that a new standard would affect different EPS consumers differently, depending on the market segment to which they belong and their usage characteristics. Section IV.F discusses the inputs used for calculating the LCC and PBP. Inputs used for calculating the LCC include total installed costs, annual energy savings, electricity rates, electricity price trends, product lifetime, and discount rates.

The key outputs of the LCC analysis are average LCC savings for each product class for each considered efficiency level, relative to the base case, as well as a probability distribution of LCC reduction or increase. The LCC analysis also estimates, for each product class or representative unit, the fraction of consumers for which the LCC will either decrease (net benefit), or increase (net cost), or exhibit no change (no impact) relative to the base case forecast. No impacts occur when the product efficiencies of the base case forecast already equal or exceed the considered efficiency level. EPSs are used in applications that can have a wide range of operating hours. EPSs that are used more frequently will tend to have a larger net LCC benefit than those that are used less frequently because of the greater operating cost savings.

Another key output of the LCC analysis is the median payback period at each TSL. DOE presents the median payback period rather than the mean payback period because it is more robust in the presence of outliers in the data.[56] These outliers skew the mean payback period calculation but have little effect on the median payback period calculation. A small change in operating costs, which derive the denominator of the payback period calculation, can sometimes result in a very large payback period, which skews the mean payback period calculation. For example, consider a sample of PBPs of 2, 2, 2, and 20 years, where 20 years is an outlier. The mean PBP would return a value of 6.5 years, whereas the median PBP would return a value of 2 years. Therefore, DOE considers the median payback period, which is not skewed by occasional outliers. Table V–2 shows the results for the representative units and product classes analyzed for EPSs. Additional detail for these results, including frequency plots of the distributions of life-cycle costs and payback periods, are available in chapter 8 of the TSD.

Table V-2 LCC Savings and Payback Period for EPSs

	Weighted Average LCC Savings [2012$]			Median Payback Period [yrs]		
Rep. Unit	**TSL 1**	**TSL 2**	**TSL 3**	**TSL 1**	**TSL 2**	**TSL 3**
203W Multiple Voltage	2.33	2.38	(2.45)	0.4	4.0	11.3
345W High-Power	137.00	142.18	107.67	0.0	0.0	0.8
2.5W AC-DC, Basic V	0.21	0.17	0.17	3.0	3.7	3.7
18W AC-DC, Basic V	0.74	0.81	(0.91)	1.1	2.9	8.1
60W AC-DC, Basic V	0.57	0.90	0.60	0.9	1.3	3.1
120W AC-DC, Basic V	0.74	0.79	(4.95)	1.3	1.7	8.0

For EPS product class B (basic-voltage, AC–DC, direct operation EPSs), each representative unit has a unique value for LCC savings and median PBP. The 2.5W and 60W representative units both have positive LCC savings at all TSLs considered. The 18W and 120W representative units have positive LCC savings through TSL 2, but turn negative at TSL 3.

The non-Class A EPSs have varying LCC results at each TSL. The 203W multiple-voltage unit (product class X) has positive LCC savings through TSL 2. DOE notes that for this product class, the LCC savings remain largely the same for TSL 1 and 2 because the difference in LCC is approximately $0.01, and 95 percent of this market consists of purchased products that are already at TSL 1. Therefore, the effects are largely from the movement of the 5 percent of the market up from the baseline. The 345W high-power unit (product class H) has positive LCC savings for each TSL. This projection is largely attributable to

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[56] DOE notes that it uses the median payback period to reduce the effect of outliers on the data. This method, however, does not eliminate the outliers from the data.

the installed price of the baseline unit, a linear switching device, which is more costly than higher efficiency switch-mode power devices, so as consumers move to higher efficiencies, the purchase price actually decreases, resulting in savings.

b. Consumer Subgroup Analysis

Certain consumer subgroups may be disproportionately affected by standards. DOE performed LCC subgroup analyses in this final rule for low-income consumers, small businesses, top tier marginal electricity price consumers, and consumers of specific applications. See section IV.F of this final rule for a review of the inputs to the LCC analysis. The following discussion presents the most significant results from the LCC subgroup analysis.

Low-Income Consumers

For low-income consumers, the LCC impacts and payback periods are different than for the general population. This subgroup considers only the residential sector, and uses an adjusted electricity price from the reference case scenario. DOE found that low-income consumers below the poverty line typically paid electricity prices that were 0.2 cents per kWh lower than the general population. To account for this difference, DOE adjusted electricity prices by a factor of 0.9814 to derive electricity prices for this subgroup. Table V–3 shows the LCC impacts and payback periods for low-income consumers purchasing EPSs.

The LCC savings and PBPs of low-income consumers is similar to that of the total population of consumers. In general, low-income consumers experience slightly reduced LCC savings, particularly in product classes dominated by residential applications. However, product classes with a large proportion of commercial applications experience less of an effect under the low-income consumer scenario, which is specific to the residential sector, and sometimes have greater LCC savings than the reference case results. None of the changes in LCC savings move a TSL from positive to negative LCC savings, or vice versa.

Table V-3 EPS LCC Results: Low-Income Consumer Subgroup

	Weighted Average LCC Savings [2012$]			Median Payback Period [yrs]		
Rep. Unit	**TSL 1**	**TSL 2**	**TSL 3**	**TSL 1**	**TSL 2**	**TSL 3**
203W Multiple Voltage	2.28	2.32	(2.57)	0.4	4.1	11.5
345W High-Power	134.59	139.58	104.79	0.0	0.0	0.8
2.5W AC-DC, Basic V	0.20	0.16	0.16	3.0	3.7	3.7
18W AC-DC, Basic V	0.76	0.83	(0.90)	1.1	3.0	8.9
60W AC-DC, Basic V	0.65	1.04	0.82	0.8	1.3	3.0
120W AC-DC, Basic V	0.77	0.82	(4.88)	1.2	1.6	7.8

Small Businesses

For small business consumers, the LCC impacts and payback periods are different than for the general population. This subgroup considers only the commercial sector, and uses an adjusted discount rate from the reference case scenario. DOE found that small businesses typically have a cost of capital that is 4.36 percent higher than the industry average, which was applied to the discount rate for the small business consumer subgroup.

The small business consumer subgroup LCC results are not directly comparable to the reference case LCC results because this subgroup only considers commercial applications. In the reference case scenario, the LCC results are strongly influenced by the presence of residential applications, which typically comprise the majority of application shipments. For product class B, the LCC savings become negative at TSL 2 and TSL 3 for the 2.5W representative unit under the small business scenario, and at TSL3 for the 60W unit. None of the savings for other representative units change from positive to negative, or vice versa. This observation indicates that small business consumers would experience similar LCC impacts as the general population.

Table V–4 shows the LCC impacts and payback periods for small businesses purchasing EPSs. DOE did not identify any commercial applications for non-Class A EPSs, and, consequently, did not evaluate these products as part of the small business consumer subgroup analysis.

Table V-4 EPS LCC Results: Small Business Consumer Subgroup

	Weighted Average LCC Savings [2012$]			Median Payback Period [yrs]		
Rep. Unit	**TSL 1**	**TSL 2**	**TSL 3**	**TSL 1**	**TSL 2**	**TSL 3**
2.5W AC-DC, Basic V	0.05	(0.01)	(0.05)	4.0	4.3	4.4
18W AC-DC, Basic V	0.48	0.38	(1.68)	1.0	2.4	6.1
60W AC-DC, Basic V	0.32	0.44	(0.22)	1.0	1.6	3.5
120W AC-DC, Basic V	0.52	0.52	(5.75)	1.3	1.8	8.6

Top Tier Marginal Electricity Price Consumers

For top tier marginal electricity price consumers, the LCC impacts and payback periods are different than for the general population. The analysis for this subgroup considers a weighted-average of the residential and commercial sectors and uses an adjusted electricity price from the reference case scenario. DOE used an upper tier inclined marginal block rate for the electricity price in the residential and commercial sectors, resulting in a price of $0.326 and $0.236 per kWh, respectively.

Table V–5 shows the LCC impacts and payback periods for top tier marginal electricity price consumers purchasing EPSs.

Consumers in the top tier marginal electricity price bracket experience greater LCC savings than those in the reference case scenario. This result occurs because these consumers pay more for their electricity than other consumers, and, therefore, experience greater savings when using products that are more energy efficient. This subgroup analysis increased the LCC savings of most of the representative units significantly. For the 203W multiple-voltage representative unit, the LCC savings at TSL 3 flipped from negative to positive. In product class B, for the 60W and 120W representative units, the savings also flipped from negative to positive. All other savings remained positive.

Table V-5 EPS LCC Results: Top Tier Marginal Electricity Price Consumer Subgroup

	Weighted Average LCC Savings [2012$]			Median Payback Period [yrs]		
Rep. Unit	**TSL 1**	**TSL 2**	**TSL 3**	**TSL 1**	**TSL 2**	**TSL 3**
203W Multiple Voltage	6.47	7.13	7.25	0.1	1.4	4.0
345W High-Power	331.80	351.59	340.39	0.0	0.0	0.2
2.5W AC-DC, Basic V	1.09	1.26	1.41	1.0	1.3	1.3
18W AC-DC, Basic V	2.19	3.31	3.87	0.5	1.3	3.1
60W AC-DC, Basic V	1.66	2.91	4.54	0.3	0.5	1.1
120W AC-DC, Basic V	2.29	2.68	0.62	0.5	0.6	3.5

Consumers of Specific Applications

DOE performed an LCC and PBP analysis on every application within each representative unit and product class. This subgroup analysis used the application's specific inputs for lifetime, markups, base case market efficiency distribution, and UEC. Many applications in each representative unit or product class experienced LCC impacts and payback periods that were different from the average results across the representative unit or product class. Because of the large number of applications considered in the analysis, some of which span multiple representative units or product classes, DOE did not present application-specific LCC results here. Detailed results on each application are available in chapter 11 of the TSD.

For product class B, the application-specific LCC results indicate that most applications will experience similar levels of LCC savings as the representative unit's average LCC savings. The 2.5W representative unit has positive LCC savings for each TSL, but specific applications, such as wireless headphones (among others), experience negative LCC savings. Similarly, DOE's projections for the 18W representative unit has projected positive LCC savings at TSL 1 and TSL 2, but other applications using EPSs, such as portable DVD players and camcorders, have negative savings. For the 60W representative unit, all applications follow the shipment-weighted average trends, except for at TSL 3, where two applications have negative LCC savings. For the 120W representative unit, all applications follow the shipment-weighted averages. See chapter 11 of the TSD for further detail.

c. Rebuttable Presumption Payback

As discussed in section IV.F.15, EPCA provides a rebuttable presumption that a given standard is economically justified if the increased purchase cost for a product that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. However, DOE routinely conducts a full economic analysis that considers the full range of impacts, including those to the customer, manufacturer, Nation, and environment, as required under 42 U.S.C. 6295(o)(2)(B)(i) and 42 U.S.C. 6316(e)(1). The results of this analysis serve as the basis for DOE to evaluate definitively the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification). Therefore, if the rebuttable presumption is not met, DOE may justify its standard on another basis.

For EPSs, energy savings calculations in the LCC and PBP analyses used both the relevant test procedures as well as the relevant usage profiles. Because DOE calculated payback periods using a methodology consistent with the rebuttable presumption test for EPSs in the LCC and payback period analyses, DOE did not perform a stand-alone rebuttable presumption analysis, as it was already embodied in the LCC and PBP analyses.

2. Economic Impact on Manufacturers

For the MIA in the March 2012 NOPR, DOE used changes in INPV to compare the direct financial impacts of different TSLs on manufacturers. DOE used the GRIM to compare the INPV of the base case (no new and amended energy conservation standards) to that of each TSL. The INPV is the sum of all net cash flows discounted by the industry's cost of capital (discount rate) to the base year. The difference in INPV between the base case and the standards case estimates the economic impact of implementing that standard on the entire EPS industry. For today's final rule, DOE continues to use the methodology presented in the NOPR and in section IV.J of the final rule.

a. Industry Cash Flow Analysis Results

DOE modeled three different markup scenarios using a different set of markup assumptions for each scenario after an energy conservation standard goes into effect. These assumptions produce the bounds of a range of market responses that DOE anticipates could occur in the standards case. Each markup scenario results in a unique set of cash flows and corresponding INPV at each TSL.

The first scenario DOE modeled is a flat markup scenario, or a preservation of gross margin markup scenario. The flat markup scenario assumes that in the standards case manufacturers would be able to pass the higher production costs required to manufacture more efficient products on to their customers. DOE also modeled the return on invested capital markup scenario. In this markup scenario, manufacturers maintain a similar level of profitability from the investments required by new and amended energy conservation standards as they do from their current business operations. To assess the higher (more severe) end of the range of potential impacts, DOE modeled the preservation of operating profit markup scenario. In this scenario, markups in the standards case are lowered such that manufacturers are only able to maintain their total base case operating profit in absolute dollars, despite higher product costs and investment. DOE used the main NIA shipment scenario for all MIA scenarios that were used to characterize the potential INPV impacts.

Product Classes B, C, D, and E

Table V–6 through Table V–8 present the projected results for product classes B, C, D, and E under the flat, return on invested capital, and preservation of operating profit markup scenarios. DOE examined four representative units in product class B and scaled the results to product classes C, D, and E using the most appropriate representative unit for each product class.

Table V-6 Manufacturer Impact Analysis for Product Class B, C, D, and E EPSs – Flat Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	229.1	211.2	217.5	269.1
Change in INPV	(2012$ millions)		(17.9)	(11.6)	40.0
	(%)		-7.8%	-5.1%	17.4%
Product Conversion Costs	(2012$ millions)		14.6	17.1	18.0
Capital Conversion Costs	(2012$ millions)		16.1	18.9	19.9
Total Conversion Costs	(2012$ millions)		30.7	36.1	37.9

Table V-7 Manufacturer Impact Analysis for Product Class B, C, D, and E EPSs – Return on Invested Capital Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	229.1	223.1	221.3	217.0
Change in INPV	(2012$ millions)		(6.1)	(7.8)	(12.2)
	(%)		-2.6%	-3.4%	-5.3%
Product Conversion Costs	(2012$ millions)		14.6	17.1	18.0
Capital Conversion Costs	(2012$ millions)		16.1	18.9	19.9
Total Conversion Costs	(2012$ millions)		30.7	36.1	37.9

Table V-8 Manufacturer Impact Analysis for Product Class B, C, D, and E EPSs – Preservation of Operating Profit Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	229.1	196.8	184.6	146.5
Change in INPV	(2012$ millions)		(32.3)	(44.5)	(82.7)
	(%)		-14.1%	-19.4%	-36.1%
Product Conversion Costs	(2012$ millions)		14.6	17.1	18.0
Capital Conversion Costs	(2012$ millions)		16.1	18.9	19.9
Total Conversion Costs	(2012$ millions)		30.7	36.1	37.9

At TSL 1, DOE estimates impacts on INPV to range from −$6.1 million to −$32.3 million, or a change in INPV of −2.6 percent to −14.1 percent. At this level, industry free cash flow is estimated to decrease by approximately 89.5 percent to $1.4 million, compared to the base case value of $13.6 million in the year leading up to when the amended energy conservation standards would need to be met.

At TSL 1, manufacturers of product class B, C, D, and E EPSs face a slight to moderate loss in INPV. For these product classes, the required efficiencies at TSL 1 correspond to an intermediate level above the ENERGY STAR 2.0 levels but below the best in market efficiencies. The conversion costs are a major contribution of the decrease in INPV because the vast majority of the product class B, C, D, and E EPS shipments fall below CSL 2.[57] Manufacturers will incur product and capital conversion costs of approximately $30.7 million at TSL 1. In 2015, approximately 84 percent of product class B, C, D, and E shipments are projected to fall below the proposed amended energy conservation standards. In addition, 94 percent of the products for the 2.5W representative unit are projected to fall below the proposed efficiency standard, and would likely require more substantial conversion costs because meeting the efficiency standard would require 2.5W representative units to switch from linear to switch mode technology. This change would increase the conversion costs for these 2.5W representative units, which account for approximately half of all the product class B, C, D, and E shipments.

At TSL 1, the MPC increases 45 percent for the 2.5W representative units (a representative unit for product class B and all shipments of product classes C and E), 5 percent for the 18 Watt representative units (a representative unit for product class B and all shipments of product class D), 2 percent for the 60W representative units, and 3 percent for the 120W representative units over the baseline. The conversion costs are significant enough to cause a slight negative industry impact even if manufacturers are able to maintain a similar return on their invested capital, as they do in the return on invest capital scenario. Impacts are more significant under the preservation of operating profit scenario because under this scenario manufacturers would be unable to pass on the full increase in the product cost to OEMs.

At TSL 2, DOE estimates impacts on INPV to range from −$7.8 million to −$44.5 million, or a change in INPV of −3.4 percent to −19.4 percent. At this level, industry free cash flow is estimated to decrease by approximately 105.2 percent to −$0.7 million, compared to the base case value of $13.6 million in the year before the compliance date.

TSL 2 represents the best-in-market efficiencies for product class B, C, D, and E EPSs. The increase in conversion costs and production costs at TSL 2 make the INPV impacts slightly worse than TSL 1. The product conversion costs increase by $2.5 million and the capital conversion costs increase by $2.8 million from TSL 1 because now even more products, 95 percent, fall below the efficiency requirements at TSL 2 than at TSL 1. Also, at TSL 2, the MPC increases 60 percent for the 2.5W representative units (a representative unit for product class B and all shipments of product classes C and E), 18 percent for the 18 Watt representative units (this is a representative unit for product class B and all shipments of product class D), 5 percent for the 60W representative units, and 4 percent for the 120W representative units over the baseline. However, the similar conversion costs and relatively minor additional incremental conversion costs make the industry impacts at TSL 2 similar to those at TSL 1.

At TSL 3, DOE estimates impacts on INPV to range from $40.0 million to −$82.7 million, or a change in INPV of 17.4 percent to −36.1 percent. At this level, industry free cash flow is estimated to decrease by approximately 110.5 percent to −$1.4 million, compared to the base case value of $13.6 million in the year before the compliance date.

TSL 3 represents the max-tech CSL for product class B, C, D, and E EPSs. At TSL 3, DOE modeled a wide range of industry impacts because the very large increases in per-unit production costs lead to a wide range of potential impacts depending on who captures the additional value in the distribution chain. No existing product meets the efficiency requirements at TSL 3. However, since most of the products at TSL 2 also fall below the standard level, there is only a slight difference between the conversion costs at TSL 2 and TSL 3. The different INPV impacts occur due to the large changes in incremental MPCs at the max-tech level. At TSL 3, the MPC increases 69 percent for the 2.5W representative unit (this is a representative unit for product class B and all shipments for product classes C and E), 80 percent for the 18 Watt representative units (this is a representative unit for product class B and all shipments for product class D), 24 percent for the 60W representative units, and 53 percent for the 120W representative units over the baseline. If manufacturers are able to fully pass on these costs to OEMs (the flat markup scenario), the increase in cash flow from operations is enough to overcome the conversion costs to meet the max-tech level and INPV increases moderately. However, if the manufacturers are unable to pass on these costs and only maintain the current operating profit (the preservation of operating profit markup scenario), there is a significant negative impact on INPV, because substantial increases in working capital drain operating cash flow. The conversion costs associated with switching the entire market, the large increase in incremental MPCs, and the extreme pressure from OEMs to keep product prices down make it more likely that ODMs will not be able to fully pass on these costs to OEMs and the ODMs would face a substantial loss instead of a moderate gain in INPV at TSL 3.

Product Class X

Table V–9 through Table V–11 present the projected results for product class X under the flat, return on invested capital, and preservation of operating profit markup scenarios.

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[57] For a mapping of CSLs to TSLs, please see Table V–1.

Table V-9 Manufacturer Impact Analysis for Product Class X EPSs – Flat Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	44.8	44.7	39.0	46.5
Change in INPV	(2012$ millions)		(0.1)	(5.8)	1.7
	(%)		-0.3%	-13.0%	3.8%
Product Conversion Costs	(2012$ millions)		0.2	3.5	3.5
Capital Conversion Costs	(2012$ millions)		0.2	3.8	3.8
Total Conversion Costs	(2012$ millions)		0.4	7.3	7.3

Table V-10 Manufacturer Impact Analysis for Product Class X EPSs – Return on Invested Capital Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	44.8	44.7	43.5	42.9
Change in INPV	(2012$ millions)		(0.1)	(1.3)	(1.9)
	(%)		-0.2%	-3.0%	-4.2%
Product Conversion Costs	(2012$ millions)		0.2	3.5	3.5
Capital Conversion Costs	(2012$ millions)		0.2	3.8	3.8
Total Conversion Costs	(2012$ millions)		0.4	7.3	7.3

Table V-11 Manufacturer Impact Analysis for Product Class X EPSs – Preservation of Operating Profit Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	44.8	44.4	38.2	33.0
Change in INPV	(2012$ millions)		(0.4)	(6.6)	(11.8)
	(%)		-1.0%	-14.8%	-26.4%
Product Conversion Costs	(2012$ millions)		0.2	3.5	3.5
Capital Conversion Costs	(2012$ millions)		0.2	3.8	3.8
Total Conversion Costs	(2012$ millions)		0.4	7.3	7.3

At TSL 1, DOE estimates impacts on INPV to range from −$0.1 million to −$0.4 million, or a change in INPV of −0.2 percent to −1.0 percent. At this level, industry free cash flow is estimated to decrease by approximately 5.5 percent to $2.5 million, compared to the base case value of $2.7 million in the year before the compliance date.

At TSL 1, manufacturers of product class X face a very slight decline in INPV because most of the market already meets TSL 1. The total conversion costs are approximately $0.4 million. Conversion costs are low because 95 percent of the products already meet the TSL 1 efficiency requirements.

At TSL 2, DOE estimates impacts on INPV to range from −$1.3 million to −$6.6 million, or a change in INPV of −3.0 percent to −14.8 percent. At this level, industry free cash flow is estimated to decrease by approximately 109.3 percent to −$0.3 million, compared to the base case value of $2.7 million in the year leading up to when the new energy conservation standards would need to be met.

At TSL 2, manufacturers range from a slight to moderate decrease in INPV. DOE estimates that manufacturers will incur total product and capital conversion costs of $7.3 million at TSL 2. The conversion costs increase at TSL 2 because the entire market falls below the efficiency requirements at TSL 2. Also, the total impacts are driven by the incremental MPCs at TSL 2. At TSL 2, the MPC increases 16 percent over the baseline.

At TSL 3, DOE estimates impacts on INPV to range from $1.7 million to −$11.8 million, or a change in INPV of 3.8 percent to −26.4 percent. At this level, industry free cash flow is estimated to decrease by approximately 109.3 percent to −$0.3 million, compared to the base case value of $2.7

million in the year before the compliance date.

TSL 3 impacts range from a slight increase to a moderate decrease in INPV. As with TSL 2, the entire market falls below the required efficiency at TSL 3 and total industry conversion costs are also $7.3 million. However, the main difference at TSL 3 is the increase in the MPC. At TSL 3, the MPC increases 46 percent over the baseline. If the ODMs can pass on the higher price of these products to the OEMs at TSL 3, the gains from the additional revenue are outweighed by conversion costs, so manufacturers experience a slight increase in INPV. However, if ODMs cannot pass on these higher MPCs to OEMs, manufacturer experience a moderate loss in INPV. The conversion costs associated with switching the entire market, the large increase in incremental MPCs, and the extreme pressure from OEMs to keep product prices down make it more likely that ODMs will not be able to fully pass on these costs to OEMs and the ODMs would face a moderate loss instead of a slight gain in INPV at TSL 3.

Product Class H

Table V–12 through Table V–14 present the projected results for product class H under the flat, return on invested capital, and preservation of operating profit markup scenarios.

Table V-12 Manufacturer Impact Analysis for Product Class H EPSs – Flat Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	0.11	0.08	0.08	0.10
Change in INPV	(2012$ millions)		(0.03)	(0.03)	(0.01)
	(%)		-26.4%	-24.9%	-5.2%
Product Conversion Costs	(2012$ millions)		0.01	0.01	0.01
Capital Conversion Costs	(2012$ millions)		0.01	0.01	0.01
Total Conversion Costs	(2012$ millions)		0.02	0.02	0.02

Table V-13 Manufacturer Impact Analysis for Product Class H EPSs – Return on Invested Capital Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	0.11	0.10	0.10	0.10
Change in INPV	(2012$ millions)		(0.00)	(0.00)	(0.01)
	(%)		-3.3%	-3.4%	-4.9%
Product Conversion Costs	(2012$ millions)		0.01	0.01	0.01
Capital Conversion Costs	(2012$ millions)		0.01	0.01	0.01
Total Conversion Costs	(2012$ millions)		0.02	0.02	0.02

Table V-14 Manufacturer Impact Analysis for Product Class H EPSs – Preservation of Operating Profit Markup Scenario

	Units	Base Case	Trial Standard Level		
			1	2	3
INPV	(2012$ millions)	0.11	0.09	0.09	0.08
Change in INPV	(2012$ millions)		(0.01)	(0.02)	(0.03)
	(%)		-13.6%	-14.6%	-28.2%
Product Conversion Costs	(2012$ millions)		0.01	0.01	0.01
Capital Conversion Costs	(2012$ millions)		0.01	0.01	0.01
Total Conversion Costs	(2012$ millions)		0.02	0.02	0.02

At TSL 1, DOE estimates impacts on INPV to range from less than −$10,000 to −$0.03 million, or a change in INPV of −3.3 percent to −26.4 percent. At this level, industry free cash flow is estimated to decrease by approximately

145.7 percent to less than −$10,000, compared to the base case value of $0.01 million in the year before the compliance date.

At TSL 1, manufacturers of product class H EPSs face a slight to significant loss in industry value. The base case industry value of $110,000 is low and since DOE estimates that total conversion costs at TSL 1 would be approximately $20,000, the conversion costs represent a substantial portion of total industry value. The conversion costs are high relative to the base case INPV because the entire market in 2015 is projected to fall below an efficiency standard set at TSL 1. This means that all products in product class H would have to be redesigned to meet the efficiency level at TSL 1, leading to total conversion costs that are large relative to the base case industry value. In addition, the MPC at TSL 1 declines by 21 percent compared to the baseline since the switching technology that would be required to meet this efficiency level is less costly to manufacture than improving the efficiency of baseline products that continue to use linear technology. This situation results in a lower MSP and lower revenues for manufacturers of baseline products, which exacerbates the impacts on INPV from new energy conservation standards for these products.

At TSL 2, DOE estimates impacts on INPV to range from less than −$10,000 to −$0.03 million, or a change in INPV of −3.4 percent to −24.9 percent. At this level, industry free cash flow is estimated to decrease by approximately 145.7 percent to less than −10,000, compared to the base case value of $0.01 million in the year before the compliance date.

The impacts on INPV at TSL 2 are similar to TSL 1. The conversion costs are the same since the entire market in 2015 would fall below the required efficiency at both TSL 1 and TSL 2. Also, the MPC is projected to decrease by 19 percent at TSL 2 compared to the baseline, which is similar to the 21 percent decrease at TSL 1. Overall, the similar conversion costs and lower industry revenue for the minimally compliant products make the INPV impacts at TSL 2 similar to TSL 1.

At TSL 3, DOE estimates impacts on INPV to range from −0.01 million to −$0.03 million, or a change in INPV of −4.9 percent to −28.2 percent. At this level, industry free cash flow is estimated to decrease by approximately 145.7 percent to less than −10,000, compared to the base case value of $0.01 million in the year leading up to when the new energy conservation standards would need to be met.

Impacts on INPV range from slightly to substantially negative at TSL 3. As with TSL 1 and TSL 2, the entire market falls below the required efficiency and the total industry conversion costs estimated by DOE remain at $20,000. However, the MPC increases 8 percent at TSL 3 relative to the estimated cost of the baseline unit and changes the possible impacts on INPV at TSL 3. If ODMs can maintain a similar return on invested capital in TSL 3 as in the base case, like manufacturers do in the return on invested capital scenario, the decline in INPV is only slightly negative. However, if the ODMs cannot fully pass on the higher MPCs to OEMs, as would occur in the preservation of operating profit, then the loss in INPV is much more substantial.

b. Impacts on Employment

As discussed in the March 2012 NOPR, as part of the direct employment impact analysis, DOE attempted to quantify the number of domestic workers involved in EPS manufacturing. Based on manufacturer interviews and DOE's research, DOE believes that all major EPS ODMs are foreign owned and operated. DOE did identify a few smaller niche EPS ODMs based in the U.S. and attempted to contact these companies. All of the companies DOE reached indicated their EPS manufacturing takes place abroad. During manufacturer interviews, large manufacturers also indicated the vast majority, if not all, EPS production takes place overseas. DOE also requested comment in the NOPR about the existence of any domestic EPS production and did not receive any comments. Because DOE was unable to identify any EPS ODMs with domestic manufacturing, DOE has concluded there are no EPSs currently manufactured domestically.

DOE also recognizes there are several OEMs or their domestic distributors that have employees in the U.S. that work on design, technical support, sales, training, certification, and other requirements. However, in interviews manufacturers generally did not expect any negative changes in the domestic employment of the design, technical support, or other departments of EPS OEMs located in the U.S. in response to new and amended energy conservation standards.

c. Impacts on Manufacturing Capacity

As discussed in the March 2012 NOPR, DOE does not anticipate the standards in today's final rule would adversely impact manufacturer capacity. EISA 2007 set a statutory compliance date for EPSs, and the EPS industry is characterized by rapid product development lifecycles. Therefore, DOE believes the compliance date in today's final rule provides sufficient time for manufacturers to ramp up capacity to meet the standards for EPSs.

d. Impacts on Manufacturer Subgroups

As discussed in the March 2012 NOPR, using average cost assumptions to develop an industry cash flow estimate is not adequate for assessing differential impacts among manufacturer subgroups. Small manufacturers, niche equipment manufacturers, and manufacturers exhibiting a cost structure substantially different from the industry average could be affected disproportionately. DOE did not identify any EPS manufacturer subgroups that would require a separate analysis in the MIA.

e. Cumulative Regulatory Burden

While any one regulation may not impose a significant burden on manufacturers, the combined effects of recent or impending regulations may have serious consequences for some manufacturers, groups of manufacturers, or an entire industry. Assessing the impact of a single regulation may overlook this cumulative regulatory burden. In addition to energy conservation standards, other regulations can significantly affect manufacturers' financial operations. Multiple regulations affecting the same manufacturer can strain profits and lead companies to abandon product lines or markets with lower expected future returns than competing products. For these reasons, DOE conducts an analysis of cumulative regulatory burden as part of its rulemakings pertaining to appliance efficiency.

During previous stages of this rulemaking, DOE identified a number of requirements, in addition to new and amended energy conservation standards for EPSs, that manufacturers of these products will face for products and equipment they manufacture within approximately three years prior to and after the anticipated compliance date of the new and amended standards. DOE discusses these and other requirements, including the energy conservation standards that take effect beginning in 2012, in its full cumulative regulatory burden analysis in chapter 12 of the TSD.

3. National Impact Analysis

a. Significance of Energy Savings

For each TSL, DOE projected energy savings for EPSs purchased in the 30-

year period that begins in the year of compliance with amended standards (2015–2044). The savings are measured over the entire lifetime of products purchased in the 30-year period. DOE quantified the energy savings attributable to each TSL as the difference in energy consumption between each standards case and the base case. Table V–15 presents the estimated energy savings for each considered TSL, and Table V–16 presents the estimated FFC energy savings for each considered TSL. The approach used is further described in section IV.G.[58]

Table V-15 Cumulative National Energy Savings for External Power Supply Trial Standard Levels for Units Sold in 2015–2044 (quads)

Product Class	Trial Standard Level		
	1	2	3
B	0.43	0.68	1.24
B,C,D, E	0.56	0.87	1.53
X	0.06	0.07	0.14
H	0.001	0.001	0.001
Total	0.62	0.94	1.67

Table V-16 Cumulative Full-Fuel-Cycle Energy Savings for External Power Supply Trial Standard Levels for Units Sold in 2015–2044 (quads)

Product Class	Trial Standard Level		
	1	2	3
B	0.438	0.693	1.261
B,C,D, E	0.564	0.881	1.546
X	0.062	0.071	0.145
H	0.0013	0.0014	0.0015
Total*	0.627	0.944	1.69

*Total may not add up to the sum due to rounding

Circular A–4 requires agencies to present analytical results, including separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs. Circular A–4 also directs agencies to consider the variability of key elements underlying the estimates of benefits and costs. For this rulemaking, DOE undertook a sensitivity analysis using nine rather than 30-years of product shipments. The choice of a 9-year period is a proxy for the timeline in EPCA for the review of energy conservation standards and represents DOE's standard practice. We would note that the review timeframe established in EPCA generally does not overlap with the product lifetime, product manufacturing cycles or other factors specific to EPSs. In particular, DOE notes that EPS standards may be further amended and require compliance within 9 years. However, this information is presented for informational purposes only and is not indicative of any change in DOE's analytical methodology for this rulemaking. The NES results based on a 9-year analytical period are presented in Table V–17. The impacts are counted over the lifetime of products purchased in 2015–2023.

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[58] Chapter 10 of the TSD presents tables that show the magnitude of the energy savings discounted at rates of 3 percent and 7 percent. Discounted energy savings represent a policy perspective in which energy savings realized farther in the future are less significant than energy savings realized in the nearer term.

Table V-17 Cumulative National Energy Savings for External Power Supply Trial Standard Levels for Units Sold in 2015–2023 (quads)

Product Class	Trial Standard Level		
	1	2	3
B	0.122	0.192	0.350
B,C,D, E	0.156	0.244	0.429
X	0.017	0.020	0.040
H	0.000	0.000	0.000
Total	0.173	0.264	0.469

b. Net Present Value of Consumer Costs and Benefits

DOE estimated the cumulative NPV of the total costs and savings for consumers that would result from the TSLs considered for EPSs. In accordance with OMB's guidelines on regulatory analysis,[59] DOE calculated the NPV using both a 7-percent and a 3-percent real discount rate. The 7-percent rate is an estimate of the average before-tax rate of return on private capital in the U.S. economy, and reflects the returns on real estate and small business capital as well as corporate capital. This discount rate approximates the opportunity cost of capital in the private sector (OMB analysis has found the average rate of return on capital to be near this rate). The 3-percent rate reflects the potential effects of standards on private consumption (*e.g.,* through higher prices for products and reduced purchases of energy). This rate represents the rate at which society discounts future consumption flows to their present value. It can be approximated by the real rate of return on long-term government debt (*i.e.,* yield on United States Treasury notes), which has averaged about 3 percent for the past 30-years.

Table V–18 shows the consumer NPV results for each TSL considered for EPSs. In each case, the impacts cover the lifetime of products purchased in 2015–2044.

Table V-18 Net Present Value of Consumer Benefits for External Power Supply Trial Standard Levels for Units Sold in 2015–2044 (2012$ millions)

Product Class	Discount Rate (%)	Trial Standard Level		
		1	2	3
B	3	2,358	2,830	-714
	7	1,271	1,474	-816
B,C,D, E	3	2,756	3,341	-223
	7	1,450	1,692	-662
X	3	426	441	-323
	7	233	238	-245
H	3	10	11	9
	7	5	5	4
Total	3	3,192	3,793	-537
	7	1,688	1,935	-903

The NPV results based on this 9-year analytical period are presented in Table V–19. The impacts are counted over the lifetime of products purchased in 2015–2023. As mentioned previously, this information is presented for informational purposes only and is not indicative of any change in DOE's analytical methodology or decision criteria.

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

Table V-19 Net Present Value of Consumer Benefits for External Power Supplies Trial Standard Levels for Units Sold in 2015–2023 (2012$ millions)

Product Class	Discount Rate (%)	Trial Standard Level		
		1	2	3
B	3	831	979	-399
	7	612	699	-479
B,C,D, E	3	965	1,149	-247
	7	694	798	-417
X	3	152	157	-136
	7	113	115	-131
H	3	4	4	3
	7	3	3	2
Total	3	1,121	1,310	-380
	7	810	916	-546

c. Indirect Impact on Employment

From its analysis, DOE expects energy conservation standards for EPSs to reduce energy costs for consumers and the resulting net savings to be redirected to other forms of economic activity. Those shifts in spending and economic activity could affect the demand for labor. As described in section IV.N, DOE used an input/output model of the U.S. economy to estimate indirect employment impacts of the TSLs that DOE considered in this rulemaking. DOE understands that there are uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis. Therefore, DOE generated results for near-term time frames (2015–2044), where these uncertainties are reduced.

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

4. Impact on Utility and Performance of the Products

In establishing classes of products, and in evaluating design options and the impact of potential standard levels, DOE evaluates standards that would not lessen the utility or performance of the considered products. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) DOE examined several classes of EPSs in its engineering analysis and used the parameters of the screening analysis to determine whether the new and amended standards would impact the utility or performance of the end-use products. Based on the results gathered for each of the EPS product classes, DOE believes that the standards adopted in today's final rule will not reduce the utility or performance of the products under consideration in this rulemaking.

5. Impact on Any Lessening of Competition

EPCA directs DOE to consider any lessening of competition that is likely to result from standards. It also directs the Attorney General of the United States (Attorney General) to determine the impact, if any, of any lessening of competition likely to result from a proposed standard and to transmit such determination to the Secretary within 60 days of the publication of a direct final rule and simultaneously published proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(i)(V) and (B)(ii)) To assist the Attorney General in making a determination for EPS standards, DOE provided the Department of Justice (DOJ) with copies of the NOPR and the TSD for review. DOE received no adverse comments from DOJ regarding the proposal.

6. Need of the Nation To Conserve Energy

Enhanced energy efficiency, where economically justified, improves the Nation's energy security, strengthens the economy, and reduces the environmental impacts or costs of energy production. Reduced electricity demand due to energy conservation standards is also likely to reduce the cost of maintaining the reliability of the electricity system, particularly during peak-load periods. As a measure of this reduced demand, chapter 15 in the final rule TSD presents the estimated reduction in generating capacity in 2044 for the TSLs that DOE considered in this rulemaking.

Energy savings from standards for EPSs could also produce environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases associated with electricity production. Table V–20 to Table V–23 provide DOE's estimate of cumulative CO_2, SO_2, NO_X, and Hg emission reductions projected to result from the TSLs considered in this rulemaking. DOE reports annual CO_2, SO_2, NO_X, and Hg emission reductions for each TSL in chapter 13 of the final rule TSD.

Table V-20 Cumulative Emission Reductions for Units Sold in 2015–2044 Under External Power Supply Product Class B TSLs

	Trial Standard Level		
	1	2	3
CO_2 (million metric tons)	21.6	34.2	62.3
SO_2 (thousand tons)	37.4	59.1	108
NO_X (thousand tons)	6.94	11.0	20.0
Hg (tons)	0.043	0.068	0.123

Table V-21 Cumulative Emission Reductions for Units Sold in 2015–2044 Under External Power Supply Product Class B, C, D, and E TSLs

	Trial Standard Level		
	1	2	3
CO_2 (million metric tons)	27.8	43.4	76.1
SO_2 (thousand tons)	48.4	75.5	132
NO_X (thousand tons)	8.91	13.9	24.4
Hg (tons)	0.055	0.086	0.151

Table V-22 Cumulative Emission Reductions for Units Sold in 2015–2044 Under External Power Supply Product Class X TSLs

	Trial Standard Level		
	1	2	3
CO_2 (million metric tons)	3.04	3.49	7.15
SO_2 (thousand tons)	5.30	6.09	12.5
NO_X (thousand tons)	0.975	1.12	2.29
Hg (tons)	0.006	0.007	0.014

Table V-23 Cumulative Emission Reductions for Units Sold in 2015–2044 Under External Power Supply Product Class H TSLs

	Trial Standard Level		
	1	2	3
CO_2 (million metric tons)	0.060	0.065	0.072
SO_2 (thousand tons)	0.112	0.120	0.134
NO_X (thousand tons)	0.019	0.021	0.023
Hg (tons)	0.000	0.000	0.000

As part of the analysis for this rule, DOE estimated monetary benefits likely to result from the reduced emissions of CO_2 and NO_X that DOE estimated for each of the TSLs considered. As discussed in section IV.M, DOE used values for the SCC developed by an interagency process. The four sets of SCC values resulting from that process (expressed in 2012$) are represented by $11.8/metric ton (the average value from a distribution that uses a 5-percent discount rate), $39.7/metric ton (the average value from a distribution that uses a 3-percent discount rate), $61.2/metric ton (the average value from a distribution that uses a 2.5-percent discount rate), and $117/metric ton (the 95th-percentile value from a distribution that uses a 3-percent discount rate). These values correspond to the value of emission reductions in 2015; the values for later years are higher due to increasing damages as the projected magnitude of climate change increases.

Table V–24 to Table V–27 present the global value of CO_2 emission reductions at each TSL for EPSs. DOE calculated a present value of the stream of annual values using the same discount rate as was used in the studies upon which the dollar-per-ton values are based. DOE calculated domestic values as a range from 7 percent to 23 percent of the global values, and these results are presented in chapter 14 of the final rule TSD.

Table V-24 External Power Supply Product Class B: Estimates of Global Present Value of CO_2 Emission Reductions Under TSLs

TSL	SCC Case*			
	5% discount rate, average*	3% discount rate, average*	2.5% discount rate, average*	3% discount rate, 95th percentile*
	Million 2012$			
1	165	715	1,128	2,193
2	261	1,131	1,783	3,467
3	476	2,060	3,248	6,316

* For each of the four cases, the corresponding SCC value for emissions in 2015 is $11.8, $39.7, $61.2, and $117.0 per metric ton (2012$).

Table V-25 External Power Supply Product Classes B, C, D, and E: Estimates of Global Present Value of CO_2 Emission Reductions Under TSLs

TSL	SCC Case*			
	5% discount rate, average*	3% discount rate, average*	2.5% discount rate, average*	3% discount rate, 95th percentile*
	Million 2012$			
1	211	915	1,443	2,807
2	330	1,430	2,256	4,387
3	578	2,509	3,958	7,696

* For each of the four cases, the corresponding SCC value for emissions in 2015 is $11.8, $39.7, $61.2, and $117.0 per metric ton (2012$).

Table V-26 External Power Supply Product Class X: Estimates of Global Present Value of CO_2 Emission Reductions Under TSLs

TSL	SCC Case*			
	5% discount rate, average*	3% discount rate, average*	2.5% discount rate, average*	3% discount rate, 95th percentile*
	Million 2012$			
1	23.0	100	158	307
2	26.4	115	181	353
3	54.2	235	371	722

* For each of the four cases, the corresponding SCC value for emissions in 2015 is $11.8, $39.7, $61.2, and $117.0 per metric ton (2012$).

Table V-27 External Power Supply Product Class H: Estimates of Global Present Value of CO_2 Emission Reductions Under TSLs

TSL	SCC Case*			
	5% discount rate, average*	3% discount rate, average*	2.5% discount rate, average*	3% discount rate, 95th percentile*
	Million 2012$			
1	0.432	1.93	3.05	5.93
2	0.464	2.07	3.28	6.38
3	0.516	2.30	3.65	7.09

* For each of the four cases, the corresponding SCC value for emissions in 2015 is $11.8, $39.7, $61.2, and $117.0 per metric ton (2012$).

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

DOE also estimated a range for the cumulative monetary value of the economic benefits associated with NO_X emissions reductions anticipated to result from amended standards for EPSs. The value that DOE used is discussed in section IV.L. Table V–28 to Table V–31 present the cumulative present values for each TSL calculated using seven-percent and three-percent discount rates.

Table V-28 External Power Supply Product Class B: Estimates of Present Value of NO_X Emission Reductions Under External Power Supply TSLs

TSL	3% discount rate	7% discount rate
	Million 2012$	
1	11.2	6.6
2	17.8	10.4
3	32.4	19.0

Table V-29 External Power Supply Product Classes B, C, D, and E: Estimates of Present Value of NO_X Emission Reductions Under External Power Supply TSLs

TSL	3% discount rate	7% discount rate
	Million 2012$	
1	14.3	8.3
2	22.4	13.0
3	39.3	22.8

Table V-30 External Power Supply Product Class X: Estimates of Present Value of NO_X Emission Reductions Under External Power Supply TSLs

TSL	3% discount rate	7% discount rate
	Million 2012$	
1	1.56	0.91
2	1.80	1.04
3	3.68	2.13

Table V-31 External Power Supply Product Class H: Estimates of Present Value of NO_X Emission Reductions Under External Power Supply TSLs

TSL	3% discount rate	7% discount rate
	Million 2012$	
1	0.029	0.015
2	0.031	0.017
3	0.035	0.018

7. Other Factors

The Secretary of Energy, in determining whether a standard is economically justified, may consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6295(o)(2)(B)(i)(VI)). DOE has not considered other factors in development of the standards in this final rule.

8. Summary of National Economic Impacts

The NPV of the monetized benefits associated with emissions reductions can be viewed as a complement to the NPV of the consumer savings calculated for each TSL considered in this rulemaking. Table V–32 presents the NPV values that result from adding the estimates of the potential economic benefits resulting from reduced CO_2 and NO_X emissions in each of four valuation scenarios to the NPV of consumer savings calculated for each TSL considered for EPSs, at both a three-percent and seven-percent discount rate. The CO_2 values used in the columns of each table correspond to the four sets of SCC values discussed above.

Table V-32 External Power Supplies: Net Present Value of Consumer Savings (at 7% Discount Rate) Combined with Net Present Value of Monetized Benefits from CO_2 and NO_X Emissions Reductions

Product Class	TSL	Consumer NPV at 3% Discount Rate added with (billion 2012\$):			
		SCC Case \$11.8/metric ton CO_2* and NO_X	SCC Case \$39.7/metric ton CO_2* and NO_X	SCC Case \$61.2/metric ton CO_2* and NO_X	SCC Case \$117.0/metric ton CO_2* and NO_X
B,	1	2.5	3.1	3.5	4.6
	2	3.1	4.0	4.6	6.3
	3	-0.2	1.4	2.6	5.7
B, C, D, and E	1	3.0	3.7	4.2	5.6
	2	3.7	4.8	5.7	7.8
	3	0.4	2.4	3.8	7.6
X	1	0.5	0.5	0.6	0.7
	2	0.5	0.6	0.6	0.8
	3	-0.3	-0.1	0.1	0.4
H	1	0.01	0.01	0.01	0.02
	2	0.01	0.01	0.01	0.02
	3	0.01	0.01	0.01	0.02
Product Class	**TSL**	**Consumer NPV at 7% Discount Rate added with (billion 2012\$):**			
		SCC Case \$11.8/metric ton CO_2* and NO_X	**SCC Case \$39.7/metric ton CO_2* and NO_X**	**SCC Case \$61.2/metric ton CO_2* and NO_X**	**SCC Case \$117.0/metric ton CO_2* and NO_X**
B	1	1.4	2.0	2.4	3.5
	2	1.7	2.6	3.3	5.0
	3	-0.3	1.3	2.5	5.5
B, C, D, and E	1	1.7	2.4	2.9	4.3
	2	2.0	3.2	4.0	6.1
	3	-0.1	1.9	3.4	7.1
X	1	0.3	0.3	0.4	0.5
	2	0.3	0.4	0.4	0.6
	3	-0.2	0.0	0.1	0.5
H	1	0.01	0.01	0.01	0.01
	2	0.01	0.01	0.01	0.01
	3	0.00	0.01	0.01	0.01

* These label values represent the global SCC in 2015, in 2012\$.

Although adding the value of consumer savings to the values of emission reductions provides a valuable perspective, two issues should be considered. First, the national operating cost savings are domestic U.S. consumer monetary savings that occur as a result of market transactions, while the value of CO_2 reductions is based on a global value. Second, the assessments of operating cost savings and the SCC are performed with different methods that use quite different time frames for analysis. The national operating cost savings is measured for the lifetime of products shipped in 2015–2044. The SCC values, on the other hand, reflect the present value of future climate-related impacts resulting from the emission of one metric ton of CO_2 in each year. These impacts continue well beyond 2100.

C. Conclusions

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

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

To aid the reader in understanding the benefits and/or burdens of each TSL, tables in this section summarize the quantitative analytical results for each TSL, based on the assumptions and methodology discussed herein. The efficiency levels contained in each TSL are described in section V.A. In addition to the quantitative results presented in the tables below, DOE also considers other burdens and benefits that affect economic justification. These include the impacts on identifiable subgroups of consumers who may be disproportionately affected by a national standard, and impacts on employment. Section V.B.1.b presents the estimated impacts of each TSL for the considered subgroups. DOE discusses the impacts on employment in external power supply manufacturing in section V.B.2.b and discusses the indirect employment impacts in section V.B.3.c.

1. Benefits and Burdens of Trial Standard Levels Considered for EPS Product Class B

Table V–33 and Table V–34 summarize the quantitative impacts estimated for each TSL for product class B. As explained in section IV.C.5, DOE is extending the TSLs for product class B to product classes C, D, and E because product class B was the only one directly analyzed and interested parties supported this approach because of the technical similarities among these products. The efficiency levels contained in each TSL are described in section V.A.

Table V-33 Summary of Analytical Results for EPS Product Class B: National Impacts

Category	TSL 1	TSL 2	TSL 3
National Energy Savings quads			
	0.4	0.7	1.2
NPV of Consumer Benefits 2012$ billion			
3% discount rate	2.4	2.8	-0.7
7% discount rate	1.3	1.5	-0.8
Cumulative Emissions Reduction			
CO_2 million metric tons	21.6	34.2	62.3
SO_2 thousand tons	37.4	59.1	108
NO_X thousand tons	6.94	11.0	20.0
Hg tons	0.043	0.068	0.123
Value of Emissions Reduction			
CO_2 2012$ million*	165 to 2,193	261 to 3,467	476 to 6,316
NO_X – 3% discount rate 2012$ million	11.2	17.8	32.4
NO_X – 7% discount rate 2012$ million	6.6	10.4	19.0

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

Table V-34 Summary of Analytical Results for EPS Product Class B: Manufacturer and Consumer Impacts

Category	TSL 1	TSL 2	TSL 3
Manufacturer Impacts*			
Industry NPV 2012$ million	223.1 - 196.8	221.3 - 184.6	269.1 - 146.5
Industry NPV % change	(2.6) - (14.1)	(3.4) - (19.4)	17.4 - (36.1)
Consumer Mean LCC Savings 2012$			
Representative Unit 1 (2.5W)	0.21	0.17	0.17
Representative Unit 2 (18W)	0.74	0.81	(0.91)
Representative Unit 3 (60W)	0.57	0.90	0.60
Representative Unit 4 (120W)	0.74	0.79	(4.95)
Consumer Median PBP years			
Representative Unit 1 (2.5W)	3.0	3.7	3.7
Representative Unit 2 (18W)	1.1	2.9	8.1
Representative Unit 3 (60W)	0.9	1.3	3.1
Representative Unit 4 (120W)	1.3	1.7	8.0
Representative Unit 1 (2.5W)			
Net Cost %	31.2	42.8	44.8

Category	TSL 1	TSL 2	TSL 3
Net Benefit %	61.9	55.3	55.2
No Impact %	6.8	1.9	0.0
Representative Unit 2 (18W)			
Net Cost %	16.4	35.3	70.8
Net Benefit %	54.0	53.6	29.2
No Impact %	29.6	11.1	0.0
Representative Unit 3 (60W)			
Net Cost (%)	0.0	0.0	34.7
Net Benefit (%)	81.3	98.6	65.4
No Impact (%)	18.7	1.4	0.0
Representative Unit 4 (120W)			
Net Cost (%)	0.0	2.2	100.0
Net Benefit (%)	78.5	94.9	0.0
No Impact (%)	21.5	2.9	0.0

* The manufacturer impacts presented in this table and referenced in the text below are for product classes B, C, D, and E while the consumer impacts are for product class B alone.

DOE first considered TSL 3, which represents the max-tech efficiency level. TSL 3 would save 1.2 quads of energy, an amount DOE considers significant. Under TSL 3, the NPV of consumer benefits would be \$−0.8 billion, using a discount rate of 7 percent, and \$−0.7 billion, using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 3 are 62.3 million metric tons of CO_2, 20.0 thousand tons of NO_X, 108 thousand tons of SO_2, and 0.1 tons of Hg. The estimated monetary value of the cumulative CO_2 emissions reductions at TSL 3 ranges from \$476 million to \$6,316 million.

At TSL 3, the average LCC impact is a gain (consumer savings) of \$0.17 for the 2.5W unit, and \$0.60 for the 60W unit and a loss (LCC savings decrease) of \$0.91 for the 18W unit, and \$4.95 for the 120W unit. The median payback period is 3.7 years for the 2.5W unit, 8.1 years for the 18W unit, 3.1 years for the 60W unit, and 8.0 years for the 120W unit. The fraction of consumers experiencing an LCC benefit is 55.2 percent for the 2.5W unit, 29.2 percent for the 18W unit, 65.4 percent for the 60W unit, and 0.0 percent for the 120W unit. The fraction of consumers experiencing an LCC cost is 44.8 percent for the 2.5W unit, 70.8 percent for the 18W unit, 34.7 percent for the 60W unit, and 100 percent for the 120W unit.

At TSL 3, the projected change in INPV for direct operation product classes B, C, D, and E as a group ranges from a decrease of \$82.7 million to an increase of \$40.0 million. At TSL 3, DOE recognizes the risk of very large negative impacts if manufacturers' expectations concerning reduced profit margins are realized. If the high end of the range of impacts is reached, as DOE expects, TSL 3 could result in a net loss of 36.1 percent in INPV to manufacturers of EPSs in these product classes. However, as DOE has not identified any domestic manufacturers of direct operation EPSs, it does not project any immediate negative impacts on direct domestic jobs.

The Secretary concludes that at TSL 3 for EPSs in product class B, the negative NPV of consumer benefits, the economic burden on a significant fraction of consumers due to the large increases in product cost, and the capital conversion costs and profit margin impacts that could result in a very large reduction in INPV outweigh the benefits of energy savings, emission reductions, and the estimated monetary value of the CO_2 emissions reductions. Consequently, the Secretary has concluded that TSL 3 is not economically justified.

DOE then considered TSL 2. TSL 2 would save 0.7 quads of energy, an amount DOE considers significant. Under TSL 2, the NPV of consumer benefits would be \$1.5 billion, using a discount rate of 7 percent, and \$2.8 billion, using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 2 are 34.2 million metric tons of CO_2, 11.0 thousand tons of NO_X, 59.1 thousand tons of SO_2, and 0.1 tons of Hg. The estimated monetary value of the cumulative CO_2 emissions reductions at TSL 2 ranges from \$261 million to \$3,467 million.

At TSL 2, the average LCC impact is a gain (consumer savings) of \$0.17 for the 2.5W unit, \$0.81 for the 18W unit, \$0.90 for the 60W unit, and \$0.79 for the 120W unit. The median payback period is 3.7 years for the 2.5W unit, 2.9 years for the 18W unit, 1.3 years for the 60W unit, and 1.7 years for the 120W unit. The fraction of consumers experiencing an LCC benefit is 55.3 percent for the 2.5W unit, 53.6 percent for the 18W unit, 98.6 percent for the 60W unit, and 94.9 percent for the 120W unit. The fraction of consumers experiencing an LCC cost is 42.8 percent for the 2.5W unit, 35.3 percent for the 18W unit, 0.0 percent for the 60W unit, and 2.2 percent for the 120W unit.

At TSL 2, the projected change in INPV for product classes B, C, D, and E as a group ranges from a decrease of \$44.5 million to a decrease of \$7.8 million. DOE recognizes the risk of large negative impacts if manufacturers' expectations concerning reduced profit margins are realized. If the high end of the range of impacts is reached, as DOE expects, TSL 2 could result in a net loss of 19.4 percent in INPV to manufacturers of EPSs in these product classes.

The Secretary concludes that at TSL 2 for EPSs in product class B, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the CO_2 emissions reductions outweigh the economic burden on a significant fraction of consumers due to the increases in product cost and the capital conversion costs and profit margin impacts that could result in a reduction in INPV to manufacturers.

After considering the analysis, public comments on the NOPR, and the benefits and burdens of TSL 2, the Secretary concludes that this TSL will offer the maximum improvement in efficiency that is technologically feasible and economically justified and will result in the significant conservation of energy. Therefore, DOE today is adopting standards at TSL 2 for EPSs in product class B and, by extension, for EPSs in product classes C, D, and E. The new and amended energy conservation standards for these EPSs, expressed as equations for minimum average active-mode efficiency and maximum no-load input power, are shown in Table V–35.

Table V-35 Standards for EPSs in Product Classes B, C, D, and E

Direct Operation External Power Supplies – Product Class B: AC-DC, Basic-Voltage		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 * P_{out} + 0.16$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.071 * \ln(P_{out}) - 0.0014 * P_{out} + 0.67$	≤ 0.100
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.210
Direct Operation External Power Supplies – Product Class C: AC-DC, Low-Voltage*		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 * P_{out} + 0.087$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 * \ln(P_{out}) - 0.0014 * P_{out} + 0.609$	≤ 0.100
49 W $< P_{out} \leq 250$ W	≥ 0.870	≤ 0.210
Direct Operation External Power Supplies – Product Class D: AC-AC, Basic-Voltage		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode**
$P_{out} \leq 1$ W	$\geq 0.5 * P_{out} + 0.16$	≤ 0.210
1 W $< P_{out} \leq 49$ W	$\geq 0.071 * \ln(P_{out}) - 0.0014 * P_{out} + 0.67$	≤ 0.210
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.210
Direct Operation External Power Supplies – Product Class E: AC-AC, Low-Voltage		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode**
$P_{out} \leq 1$ W	$\geq 0.517 * P_{out} + 0.087$	≤ 0.210
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 * \ln(P_{out}) - 0.0014 * P_{out} + 0.609$	≤ 0.210
49 W $< P_{out} \leq 250$ W	≥ 0.870	≤ 0.210

* Excludes any EPS with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charges the battery of a product that is fully or primarily motor operated.

2. Benefits and Burdens of Trial Standard Levels Considered for EPS Product Class X

Table V–36 and Table V–37 present a summary of the quantitative impacts estimated for each TSL for multiple-voltage EPSs. The efficiency levels contained in each TSL are described in section V.A.

Table V-36 Summary of Analytical Results for EPS Product Class X: National Impacts

Category	**TSL 1**	**TSL 2**	**TSL 3**
National Energy Savings quads			
	0.06	0.07	0.14
NPV of Consumer Benefits 2012$ billion			
3% discount rate	0.43	0.44	-0.32
7% discount rate	0.23	0.24	-0.25
Cumulative Emissions Reduction			
CO_2 million metric tons	3.04	3.49	7.15
SO_2 thousand tons	5.30	6.09	12.5
NO_X thousand tons	0.975	1.12	2.29
Hg tons	0.006	0.007	0.014
Value of Emissions Reduction			
CO_2 2012$ million*	23.0 to 307	26.4 to 353	54.2 to 722
NO_X – 3% discount rate 2012$ million	1.56	1.8	3.68
NO_X – 7% discount rate 2012$ million	0.91	1.04	2.13

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

Table V-37 Summary of Analytical Results for EPS Product Class X: Manufacturer and Consumer Impacts

Category	**TSL 1**	**TSL 2**	**TSL 3**
Manufacturer Impacts			
Industry NPV 2012$ million	44.7 - 44.4	43.5 - 38.2	46.5 - 33.0
Industry NPV % change	(0.2) - (1.0)	(3.0) - (14.8)	3.8 - (26.4)
Consumer Mean LCC Savings 2012$			
Representative Unit 1	2.33	2.88	(2.45)
Consumer Median PBP years			
Representative Unit 1	0.4	4.0	11.3
Representative Unit 1			
Net Cost %	0.0	25.5	95.0
Net Benefit %	5.0	74.6	5.0
No Impact %	95.0	0.0	0.0

DOE first considered TSL 3, which represents the max-tech efficiency level. TSL 3 would save 0.14 quads of energy, an amount DOE considers significant. Under TSL 3, the NPV of consumer benefits would be $−0.25 billion, using a discount rate of 7 percent, and $−0.32 billion, using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 3 are 7.2 million metric tons of CO_2, 2.3 thousand tons of NO_X, 12.5 thousand tons of SO_2, and 0.01 tons of Hg. The estimated monetary value of the cumulative CO_2 emissions reductions at TSL 3 ranges from $54.2 million to $722 million.

At TSL 3, the average LCC impact is a cost (LCC savings decrease) of $2.45. The median payback period is 11.3 years. The fraction of consumers experiencing an LCC benefit is 5.0 percent while the fraction of consumers experiencing an LCC cost is 95.0 percent.

At TSL 3, the projected change in INPV ranges from a decrease of $11.8 million to an increase of $1.7 million. At TSL 3, DOE recognizes the risk of very large negative impacts if manufacturers' expectations concerning reduced profit margins are realized. If the high range of impacts is reached, as DOE expects, TSL 3 could result in a net loss of 26.4 percent in INPV to manufacturers of multiple-voltage EPSs. However, as DOE has not identified any domestic manufacturers of multiple-voltage EPSs, it does not project any immediate negative impacts on direct domestic jobs.

The Secretary concludes that at TSL 3 for multiple-voltage EPSs, the negative NPV of consumer benefits, the economic burden on a significant fraction of consumers due to the large increases in product cost, and the capital conversion costs and profit margin impacts that could result in a very large reduction in INPV outweigh the benefits of energy savings, emission reductions, and the estimated monetary value of the CO_2 emissions reductions. Consequently, the Secretary has concluded that TSL 3 is not economically justified.

DOE then considered TSL 2. TSL 2 would save 0.07 quads of energy, an amount DOE considers significant. Under TSL 2, the NPV of consumer benefits would be $0.24 billion, using a discount rate of 7 percent, and $0.44 billion, using a discount rate of 3 percent.

At TSL 2, the average LCC impact is a gain (consumer savings) of $2.88. The median payback period is 4.0 years. The fraction of consumers experiencing an LCC benefit is 74.6 percent while the fraction of consumers experiencing an LCC cost is 25.5 percent.

The cumulative emissions reductions at TSL 2 are 3.5 million metric tons of CO_2, 1.1 thousand tons of NO_X, 6.1 thousand tons of SO_2, and less than 0.01 tons of Hg. The estimated monetary value of the cumulative CO_2 emissions reductions at TSL 2 ranges from $26.4 million to $353 million.

At TSL 2, the projected change in INPV ranges from a decrease of $6.6 million to a decrease of $1.3 million. At TSL 2, DOE recognizes the risk of large negative impacts if manufacturers' expectations concerning reduced profit margins are realized. If the high end of the range of impacts is reached, as DOE expects, TSL 2 could result in a net loss of 14.8 percent in INPV to manufacturers of multiple-voltage EPSs.

The Secretary concludes that at TSL 2 for multiple-voltage EPSs, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the CO_2 emissions reductions outweigh the economic burden on a significant fraction of consumers due to the increases in product cost and the capital conversion costs and profit margin impacts that could result in a reduction in INPV for manufacturers.

After considering the analysis, public comments on the NOPR, and the benefits and burdens of TSL 2, the Secretary concludes that this TSL will offer the maximum improvement in efficiency that is technologically feasible and economically justified and will result in the significant conservation of energy. Therefore, DOE today is adopting standards at TSL 2 for multiple-voltage EPSs. The new energy conservation standards for these EPSs, expressed as equations for minimum average active-mode efficiency and maximum no-load input power, are shown in Table V–38.

Table V-38 Standards for External Power Supplies in Product Class X

Direct Operation External Power Supplies – Product Class X: Multiple Voltage		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.497 * P_{out} + 0.067$	≤ 0.300
1 W $< P_{out} \leq 49$ W	$\geq 0.075 * \ln(P_{out}) + 0.561$	≤ 0.300
$P_{out} > 49$ W	≥ 0.860	≤ 0.300

3. Benefits and Burdens of Trial Standard Levels Considered for EPS Product Class H

Table V–39 and Table V–40 present a summary of the quantitative impacts estimated for each TSL for high-power EPSs. The efficiency levels contained in each TSL are described in section V.A.

Table V-39 Summary of Analytical Results for EPS Product Class H: National Impacts

Category	TSL 1	TSL 2	TSL 3
National Energy Savings quads			
	0.0012	0.0013	0.0015
NPV of Consumer Benefits 2012$ billion			
3% discount rate	0.010	0.011	0.009
7% discount rate	0.005	0.005	0.004
Cumulative Emissions Reduction			
CO_2 million metric tons	0.060	0.065	0.072
SO_2 thousand tons	0.112	0.120	0.134
NO_X thousand tons	0.019	0.021	0.023
Hg tons	0.000	0.000	0.000
Value of Emissions Reduction			
CO_2 2012$ million*	0.432 to 5.93	0.464 to 6.38	0.516 to 7.09
NO_X – 3% discount rate 2012$ million	0.029	0.031	0.035
NO_X – 7% discount rate 2012$ million	0.015	0.017	0.018

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

Table V-40 Summary of Analytical Results for EPS Product Class H: Manufacturer and Consumer Impacts

Category	TSL 1	TSL 2	TSL 3
Manufacturer Impacts			
Industry NPV 2012$ million	0.10 - 0.08	0.10 - 0.08	0.10 - 0.08
Industry NPV % change	(3.3) - (26.4)	(3.4) - (24.9)	(4.9) - (28.2)
Consumer Mean LCC Savings 2012$			
Representative Unit 1	137.00	142.18	107.67
Consumer Median PBP years			
Representative Unit 1	0.0	0.0	0.8
Representative Unit 1			
Net Cost %	0.0	0.0	9.7
Net Benefit %	100.0	100.0	90.3
No Impact %	0.0	0.0	0.0

DOE first considered TSL 3, which represents the max-tech efficiency level. TSL 3 would save 0.0015 quads of energy, an amount DOE considers significant. Under TSL 3, the NPV of consumer benefits would be $0.004 billion, using a discount rate of 7 percent, and $0.009 billion, using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 3 are 0.07 million metric tons of CO_2, 0.02 thousand tons of NO_X, 0.1 thousand tons of SO_2, and less than 0.001 tons of Hg. The estimated monetary value of the cumulative CO_2 emissions reductions at TSL 3 ranges from less than $0.52 to $7.09 million.

At TSL 3, the average LCC impact is a gain (consumer savings) of $107.67. The median payback period is 0.8 years. The fraction of consumers experiencing an LCC benefit is 90.3 percent while the fraction of consumers experiencing an LCC cost is 9.7 percent.

At TSL 3, the projected change in INPV ranges from a decrease of $0.03 million to a decrease of $0.01 million. At TSL 3, DOE recognizes the risk of very large negative impacts if manufacturers' expectations concerning reduced profit margins are realized. If the high end of the range of impacts is reached, as DOE expects, TSL 3 could result in a net loss of 28.2 percent in INPV to manufacturers of high-power EPSs. However, as DOE has not identified any domestic manufacturers of high-power EPSs, it does not project any immediate negative impacts on direct domestic jobs.

The Secretary concludes that at TSL 3 for high-power EPSs, the additional considerations of the potential negative impacts of a standard at this max-tech TSL outweigh the benefits of energy savings, emission reductions, and the estimated monetary value of the CO_2 emissions reductions. DOE notes that it scaled results from product class B to estimate the cost and efficiency of this max-tech CSL. Consequently, DOE is unaware of any product that can achieve this efficiency level in either product class B or H. Thus, although DOE's analysis indicates that the max-tech efficiency level is achievable, there is a risk that unforeseen obstacles remain to creating an EPS at this efficiency level.

Additionally, setting a standard at TSL 3 would create a discontinuity in the active mode efficiency standards for EPSs. For product class B devices, the active mode efficiency standard is constant for nameplate output power ratings greater than 49 watts up to 250 watts. At 250 watts, where product class H begins, the active mode efficiency standard would increase by 4 percentage points if DOE set standards for this product class at the max-tech CSL. This discontinuity in efficiency between the two product classes would be the result of the standards for product class B being equivalent to the best-in-market CSL equation while the standards for product class H would be equivalent to the max-tech CSL equation for high-power EPSs.

In contrast, by applying the same level of stringency, scaled for the representative unit voltage, to all EPSs with output power greater than 250 watts, the achievable efficiency in EPS designs that have an output power above 49 watts remains nearly constant. This result occurs because the switching and conduction losses associated with the EPS remain proportionally the same with the increase in output power, which creates a relatively flat achievable efficiency above 49 watts. If DOE were to adopt a level that created a discontinuity in the efficiency levels, it would ignore this trend and set a higher efficiency standard between two product classes despite numerous technical similarities. Consequently, the Secretary has concluded that TSL 3 is not justified.

DOE then considered TSL 2. TSL 2 would save 0.0013 quads of energy an amount DOE considers significant. Under TSL 2, the NPV of consumer benefits would be $0.005 billion, using a discount rate of 7 percent, and $0.0011 billion, using a discount rate of 3 percent.

At TSL 2, the average LCC impact is a gain (consumer savings) of $142.18. The median payback period is 0.0 years. The fraction of consumers experiencing an LCC benefit is 100.0 percent while the fraction of consumers experiencing an LCC cost is 0.0 percent.

The cumulative emissions reductions at TSL 2 are 0.07 million metric tons of CO_2, 0.02 thousand tons of NO_X, 0.12 thousand tons of SO_2, and less than 0.001 tons of Hg. The estimated monetary value of the cumulative CO_2 emissions reductions at TSL 2 ranges from less than $0.46 to $6.38 million.

At TSL 2, the projected change in INPV ranges from a decrease of $0.03 million to a decrease of less than $10,000. At TSL 2, DOE recognizes the risk of large negative impacts if manufacturers' expectations concerning reduced profit margins are realized. If the high end of the range of impacts is reached, as DOE expects, TSL 2 could result in a net loss of 24.9 percent in INPV to manufacturers of high-power EPSs.

The Secretary concludes that at TSL 2 for high-power EPSs, the benefits of energy savings, positive NPV of consumer benefits, positive LCC savings for all consumers, emission reductions, and the estimated monetary value of the CO_2 emissions reductions outweigh the economic burden of the capital conversion costs and profit margin impacts that could result in a reduction in INPV for manufacturers.

After considering the analysis, public comments on the NOPR, and the benefits and burdens of TSL 2, the Secretary concludes that this TSL will offer the maximum improvement in efficiency that is technologically feasible and economically justified and will result in the significant conservation of energy. Therefore, DOE today is adopting standards at TSL 2 for EPSs in product class H. The new energy conservation standards for these EPSs, expressed as a minimum average active-mode efficiency value and a maximum no-load input power value, are shown in Table V–41.

Table V-41 Standards for High-Power External Power Supplies

Direct Operation External Power Supplies – Product Class H: High-Power		
Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

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

The benefits and costs of today's standards, for products sold in 2015–2044, can also be expressed in terms of annualized values. The annualized monetary values are the sum of (1) the annualized national economic value of the benefits from operating the product (consisting primarily of operating cost savings from using less energy, minus increases in equipment purchase and installation costs, which is another way of representing consumer NPV), plus (2) the annualized monetary value of the benefits of emission reductions, including CO_2 emission reductions.[60]

Although adding the value of consumer savings to the value of

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[60] DOE used a two-step calculation process to convert the time-series of costs and benefits into annualized values. First, DOE calculated a present value in 2013, the year used for discounting the NPV of total consumer costs and savings, for the time-series of costs and benefits using discount rates of three and seven percent for all costs and benefits except for the value of CO_2 reductions. For the latter, DOE used a range of discount rates, as shown in Table I.3. From the present value, DOE then calculated the fixed annual payment over a 30-year period (2015 through 2044) that yields the same present value. The fixed annual payment is the annualized value. Although DOE calculated annualized values, this does not imply that the time-series of cost and benefits from which the annualized values were determined is a steady stream of payments.

emission reductions provides a valuable perspective, two issues should be considered. First, the national operating cost savings are domestic U.S. consumer monetary savings that occur as a result of market transactions, while the value of CO_2 reductions is based on a global value. Second, the assessments of operating cost savings and CO_2 savings are performed with different methods that use different time frames for analysis. The national operating cost savings is measured for the lifetime of EPSs shipped in 2015–2044. The SCC values, on the other hand, reflect the present value of all future climate-related impacts resulting from the emission of one metric ton of carbon dioxide in each year. These impacts continue well beyond 2100.

Estimates of annualized benefits and costs of today's standards are shown in Table V–42. The results under the primary estimate are as follows. Using a 7-percent discount rate for benefits and costs other than CO_2 reduction, for which DOE used a 3-percent discount rate along with the average SCC series that uses a 3-percent discount rate, the cost of the standards in today's rule is $147 million per year in increased equipment costs, while the benefits are $293 million per year in reduced equipment operating costs, $77 million in CO_2 reductions, and $1.1 million in reduced NO_X emissions. In this case, the net benefit amounts to $223 million per year. Using a 3-percent discount rate for all benefits and costs and the average SCC series, the cost of the standards in today's rule is $162 million per year in increased equipment costs, while the benefits are $350 million per year in reduced operating costs, $77 million in CO_2 reductions, and $1.2 million in reduced NO_X emissions. In this case, the net benefit amounts to $266 million per year.

Table V-42 Annualized Benefits and Costs of New and Amended Standards for EPSs, in Million 2012$

	Discount Rate	Primary Estimate*	Low Net Benefits Estimate*	High Net Benefits Estimate*
		million 2012$/year		
Benefits				
Consumer Operating Cost Savings	7%	293	292	298
	3%	350	347	356
CO_2 Reduction ($11.8/t case)**	5%	22	22	22
CO_2 Reduction ($39.7/t case)**	3%	77	77	77
CO_2 Reduction ($61.2/t case)**	2.5%	114	114	114
CO_2 Reduction ($117.0/t case)**	3%	235	235	235
NO_X Reduction at $2,639/ton**	7%	1.06	1.06	1.06
	3%	1.20	1.20	1.20
Total Benefits†	7% plus CO_2 range	316 to 529	315 to 528	321 to 534
	7%	371	369	375
	3% plus CO_2 range	373 to 586	370 to 583	379 to 592
	3%	428	425	434
Costs				
Consumer Incremental Product Costs	7%	147	147	94
	3%	162	162	96
Net Benefits				
Total†	7% plus CO_2 range	169 to 382	168 to 381	227 to 440
	7%	223	222	281
	3% plus CO_2 range	211 to 424	209 to 422	284 to 497
	3%	266	263	338

* This table presents the annualized costs and benefits associated with EPSs shipped in 2015 - 2044. These results include benefits to consumers which accrue after 2044 from EPSs purchased from 2015 - 2044. Costs incurred by manufacturers, some of which may be incurred prior to 2015 in preparation for the rule, are not directly included, but are indirectly included as part of incremental equipment costs. The Primary, Low Benefits, and High Benefits Estimates utilize projections of energy prices from the AEO 2013 Reference case, Low Estimate, and High Estimate, respectively. In addition, incremental product costs reflect a constant rate for projected product price trends in the Primary Estimate, a constant rate for projected product price trends in the Low Benefits Estimate, and a declining rate for projected product price trends in the High Benefits Estimate. The methods used to derive projected price trends are explained in section IV.F.1.

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

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

5. Stakeholder Comments on Alternatives to Standards

Cobra Electronics commented that the ENERGY STAR program is an effective means for encouraging the development of more efficient technologies. Furthermore, the use of a voluntary program would allow DOE to comply with Executive Order 13563, which directed federal agencies to ''identify and assess available alternatives to direct regulation.'' (Cobra Electronics, No. 130 at p. 8) Executive Order 13563 also states that regulations should be adopted ''only upon a reasoned determination that its benefits justify its costs.'' Because the selected standard levels are technologically feasible and economically justified, DOE has fulfilled its statutory obligations as well as the directives in Executive Order 13563. In addition, DOE considered the impacts of a voluntary program as part of the Regulatory Impact Analysis and found that such a program would save less energy than standards (see chapter 17 of the TSD).

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866 and 13563

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

(1) There are external benefits resulting from improved energy efficiency of EPSs that are not captured by the users of such equipment. These benefits include externalities related to environmental protection and energy security that are not reflected in energy prices, such as reduced emissions of greenhouse gases. DOE attempts to quantify some of the external benefits through use of Social Cost of Carbon values.

In addition, DOE has determined that today's regulatory action is an ''economically significant regulatory action'' under section 3(f)(1) of Executive Order 12866. Accordingly, section 6(a)(3) of the Executive Order requires that DOE prepare a regulatory impact analysis (RIA) on today's rule and that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB) review this rule. DOE presented to OIRA for review the draft rule and other documents prepared for this rulemaking, including the RIA, and has included these documents in the rulemaking record. The assessments prepared pursuant to Executive Order 12866 can be found in the technical support document for this rulemaking.

DOE has also reviewed this regulation pursuant to Executive Order 13563, issued on January 18, 2011 (76 FR 3281 (Jan. 21, 2011)). EO 13563 is supplemental to and explicitly reaffirms the principles, structures, and definitions governing regulatory review established in Executive Order 12866. To the extent permitted by law, agencies are required by Executive Order 13563 to: (1) Propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

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

B. Review Under the Regulatory Flexibility Act

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

For manufacturers of EPSs, the Small Business Administration (SBA) has set a size threshold, which defines those entities classified as ''small businesses'' for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. 65 FR 30836, 30848 (May 15, 2000), as amended at 65 FR 53533, 53544 (Sept. 5, 2000) and codified at 13 CFR part 121.The size standards are listed by North American Industry Classification System (NAICS) code and industry description and are available at *http://www.sba.gov/content/summary-size-standards-industry*. EPS manufacturing is classified under NAICS 335999, ''All Other Miscellaneous Electrical Equipment and Component Manufacturing.'' The SBA sets a threshold of 500 employees or less for an entity to be considered as a small business for this category.

As discussed in the March 2012 NOPR, DOE was unable to identify any EPS ODMs with domestic manufacturing. Information obtained from manufacturer interviews and DOE's research; indicate that all EPS manufacturing takes place abroad. DOE notes that it also sought comment on this issue. While DOE received comments from small businesses application manufacturers who import EPSs (see discussion in J.4), DOE did not receive any comments from any small business EPS ODMs or any comments challenging the view that all EPS manufacturing is conducted abroad. Since DOE was not able to find any small EPS ODMs, DOE certifies that today's final rule will not have a significant impact on a substantial number of small entities and that a regulatory flexibility analysis is not required.

C. Review Under the Paperwork Reduction Act

Manufacturers of EPSs must certify to DOE that their products comply with any applicable energy conservation standards. In certifying compliance, manufacturers must test their products according to the DOE test procedures for EPSs, including any amendments adopted for those test procedures (76 FR 12422 (March 7, 2011). DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including Class-A EPSs. (cite 429.37) DOE will modify the certification requirements specific to non-class A EPSs (multiple-voltage and high-voltage) in a separate certification rulemaking prior to the effective date for the standards prescribed in today's rule. The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910–1400. Public reporting burden for the certification is estimated to average 20 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

D. Review Under the National Environmental Policy Act of 1969

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

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism.'' 64 FR 43255 (Aug. 10, 1999) imposes certain requirements on Federal agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

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

DOE has concluded that this final rule would likely require expenditures of $100 million or more on the private sector. Such expenditures may include: (1) Investment in research and development and in capital expenditures by EPS manufacturers in the years between the final rule and the compliance date for the new standards, and (2) incremental additional expenditures by consumers to purchase higher-efficiency EPSs, starting at the compliance date for the applicable standard.

Section 202 of UMRA authorizes a Federal agency to respond to the content requirements of UMRA in any other statement or analysis that accompanies the final rule. 2 U.S.C. 1532(c). The content requirements of section 202(b) of UMRA relevant to a private sector mandate substantially overlap the economic analysis requirements that apply under section 325(o) of EPCA and Executive Order 12866. The **SUPPLEMENTARY INFORMATION** section of the notice of final rulemaking and the ''Regulatory Impact Analysis'' chapter of the final rule TSD respond to those requirements.

Under section 205 of UMRA, the Department is obligated to identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a written statement under section 202 is required. 2 U.S.C. 1535(a). DOE is required to select from those alternatives the most cost-effective and least burdensome alternative that achieves the objectives of the rule unless DOE publishes an explanation for doing otherwise, or the selection of such an alternative is inconsistent with law. As required by 42 U.S.C. 6295(d), (f), and (o), 6313(e), and 6316(a), today's final rule would establish energy conservation standards for EPSs that are designed to achieve the maximum improvement in energy efficiency that DOE has determined to be both technologically feasible and economically justified. A full discussion of the alternatives considered by DOE is presented in the ''Regulatory Impact Analysis'' chapter of the final rule TSD.

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

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

I. Review Under Executive Order 12630

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

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

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

K. Review Under Executive Order 13211

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

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

L. Review Under the Information Quality Bulletin for Peer Review

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

In response to OMB's Bulletin, DOE conducted formal in-progress peer reviews of the energy conservation standards development process and analyses and has prepared a Peer Review Report pertaining to the energy conservation standards rulemaking analyses. Generation of this report involved a rigorous, formal, and documented evaluation using objective criteria and qualified and independent reviewers to make a judgment as to the technical/scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of programs and/or projects. The ''Energy Conservation Standards Rulemaking Peer Review Report'' dated February 2007 has been disseminated and is available at the following Web site: *www1.eere.energy.gov/buildings/appliance_standards/peer_review.html.*

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule prior to its effective date. The report will state that it has been determined that the rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

VII. Approval of the Office of the Secretary

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

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, and Small businesses.

Issued in Washington, DC, on February 3, 2014.

David T. Danielson,

Assistant Secretary, Energy Efficiency and Renewable Energy.

For the reasons set forth in the preamble, DOE amends part 430 of chapter II, of title 10 of the Code of Federal Regulations, as set forth below:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

■ 1. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

■ 2. Section 430.2 is amended by:

■ a. Redesignating paragraphs (a), (b), and (c) in the definition for *Annual fuel utilization efficiency* as paragraphs (1), (2), and (3), respectively;

■ b. Adding in alphabetical order definitions for *Basic-voltage external power supply* and *Direct operation external power supply;*

■ c. Redesignating paragraphs (a), (b), (c), and (d) in the definition for *Furnace* as paragraphs (1), (2), (3), and (4), respectively;

■ d. Adding in alphabetical order definitions for *Indirect operation external power supply* and *Low-voltage external power supply;*

■ e. Redesignating paragraphs (a), (b), and (c) in the definition for *Water heater* as paragraphs (1), (2), and (3), respectively.

The additions read as follows:

§ 430.2 Definitions.

* * * * *

Basic-voltage external power supply means an external power supply that is not a low-voltage external power supply.

* * * * *

Direct operation external power supply means an external power supply that can operate a consumer product that is not a battery charger without the assistance of a battery.

* * * * *

Indirect operation external power supply means an external power supply that cannot operate a consumer product that is not a battery charger without the assistance of a battery as determined by the steps in paragraphs (1)(i) through (v) of this definition:

(1) If the external power supply (EPS) can be connected to an end-use consumer product and that consumer product can be operated using battery power, the method for determining whether that EPS is incapable of operating that consumer product directly is as follows:

(i) If the end-use product has a removable battery, remove it for the remainder of the test and proceed to the step in paragraph (1)(v) of this definition. If not, proceed to the step in paragraph (1)(ii).

(ii) Charge the battery in the application via the EPS such that the application can operate as intended before taking any additional steps.

(iii) Disconnect the EPS from the application. From an off mode state, turn on the application and record the time necessary for it to become operational to the nearest five second increment (5 sec, 10 sec, etc.).

(iv) Operate the application using power only from the battery until the application stops functioning due to the battery discharging.

(v) Connect the EPS first to mains and then to the application. Immediately attempt to operate the application. If the battery was removed for testing and the end-use product operates as intended, the EPS is not an indirect operation EPS and paragraph 2 of this definition does not apply. If the battery could not be removed for testing, record the time for the application to become operational to the nearest five second increment (5 seconds, 10 seconds, etc.).

(2) If the time recorded in paragraph (1)(v) of this definition is greater than the summation of the time recorded in paragraph (1)(iii) of this definition and five seconds, the EPS cannot operate the application directly and is an indirect operation EPS.

* * * * *

Low-voltage external power supply means an external power supply with a nameplate output voltage less than 6 volts and nameplate output current greater than or equal to 550 milliamps.

* * * * *

■ 3. Section 430.3 is amended by revising paragraph (p) introductory text and adding paragraph (p)(3) to read as follows:

* * * * *

§ 430.3 Materials incorporated by reference.

* * * * *

(p) *U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.* Resource Room of the Building Technologies Program, 950 L'Enfant Plaza SW., 6th Floor, Washington, DC 20024, 202–586–2945, (Energy Star materials are also found at *http://www.energystar.gov.*)

* * * * *

(3) International Efficiency Marking Protocol for External Power Supplies, Version 3.0, September 2013, IBR approved for § 430.32.

* * * * *

■ 4. Section 430.32 is amended by revising paragraph (w) to read as follows:

§ 430.32 Energy and water conservation standards and their compliance dates.

* * * * *

(w) *External power supplies.* (1)(i) Except as provided in paragraphs (w)(2) and (5) of this section, all Class A external power supplies manufactured on or after July 1, 2008, shall meet the following standards:

Active Mode

Nameplate output	Required efficiency (decimal equivalent of a percentage)
Less than 1 watt	0.5 times the Nameplate output.

Active Mode

Nameplate output	Required efficiency (decimal equivalent of a percentage)
From 1 watt to not more than 51 watts	The sum of 0.09 times the Natural Logarithm of the Nameplate Output and 0.5.
Greater than 51 watts	0.85.
Not more than 250 watts	0.5 watts.

(ii) Except as provided in paragraphs (w)(5), (w)(6), and (w)(7) of this section, all direct operation external power supplies manufactured on or after February 10, 2016, shall meet the following standards:

Single-Voltage External AC-DC Power Supply, Basic-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.100
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-DC Power Supply, Low-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.100
49 W $< P_{out} \leq 250$ W	≥ 0.870	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-AC Power Supply, Basic-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.210
1 W $< P_{out} \leq 49$ W	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.210
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500

Single-Voltage External AC-AC Power Supply, Low-Voltage

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.210
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.210

$49\text{ W} < P_{out} \leq 250\text{ W}$	≥ 0.870	≤ 0.210
$P_{out} > 250\text{ W}$	≥ 0.875	≤ 0.500

Multiple-Voltage External Power Supply

Nameplate Output Power (P_{out})	**Minimum Average Efficiency in Active Mode** *(expressed as a decimal)*	**Maximum Power in No-Load Mode [W]**
$P_{out} \leq 1\text{ W}$	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.300
$1\text{ W} < P_{out} \leq 49\text{ W}$	$\geq 0.075 \times \ln(P_{out}) + 0.561$	≤ 0.300
$P_{out} > 49\text{ W}$	≥ 0.860	≤ 0.300

(2) A Class A external power supply shall not be subject to the standards in paragraph (w)(1)(i) of this section if the Class A external power supply is—

(i) Manufactured during the period beginning on July 1, 2008, and ending on June 30, 2015, and

(ii) Made available by the manufacturer as a service part or a spare part for an end-use product—

(A) That constitutes the primary load; and

(B) Was manufactured before July 1, 2008.

(3) The standards described in paragraph (w)(1) of this section shall not constitute an energy conservation standard for the separate end-use product to which the external power supply is connected.

(4) Any external power supply subject to the standards in paragraph (w)(1) of this section shall be clearly and permanently marked in accordance with the International Efficiency Marking Protocol for External Power Supplies (incorporated by reference; see § 430.3), published by the U.S. Department of Energy.

(5) *Non-application of no-load mode requirements.* The no-load mode energy efficiency standards established in paragraph (w)(1) of this section shall not apply to an external power supply manufactured before July 1, 2017, that—

(i) Is an AC-to-AC external power supply;

(ii) Has a nameplate output of 20 watts or more;

(iii) Is certified to the Secretary as being designed to be connected to a security or life safety alarm or surveillance system component; and

(iv) On establishment within the External Power Supply International Efficiency Marking Protocol, as referenced in the ''Energy Star Program Requirements for Single Voltage External Ac-Dc and Ac-Ac Power Supplies'' (incorporated by reference, see § 430.3), published by the Environmental Protection Agency, of a distinguishing mark for products described in this clause, is permanently marked with the distinguishing mark.

(6) An external power supply shall not be subject to the standards in paragraph (w)(1) of this section if it is a device that requires Federal Food and Drug Administration (FDA) listing and approval as a medical device in accordance with section 513 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360(c)).

(7) A direct operation, AC–DC external power supply with nameplate output voltage less than 3 volts and nameplate output current greater than or equal to 1,000 milliamps that charges the battery of a product that is fully or primarily motor operated shall not be subject to the standards in paragraph (w)(1)(ii) of this section.

* * * * *

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