DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE-2020-BT-STD-0006]

RIN 1904-AD87

Energy Conservation Program: Energy Conservation Standards for External Power Supplies

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

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

SUMMARY: The Energy Policy and Conservation Act, as amended ("EPCA"), prescribes energy conservation standards for various consumer products and certain commercial and industrial equipment, including external power supplies ("EPSs"). EPCA also requires the U.S. Department of Energy ("DOE") to periodically determine whether more-stringent, standards would be technologically feasible and economically justified, and would result in significant energy savings. In this notice of proposed rulemaking ("NOPR"), DOE proposes amended energy conservation standards for EPSs, and also announces a public meeting to receive comment on these proposed standards and associated analyses and results.

DATES: *Meeting*: DOE will hold a public meeting via webinar on Wednesday, March 1, 2023, from 1:00 p.m. to 4:00 p.m. See section VII, "Public Participation," for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

Comments: DOE will accept comments, data, and information regarding this NOPR no later than [**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***]. Comments regarding the likely competitive impact of the proposed standard should be sent to the Department of Justice contact listed in the **ADDRESSES** section on or before [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***].

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov,* under docket number EERE–2020–BT–STD-0006. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2020–BT–STD-0006, by any of the following methods:

Email: EPS2020STD006@ee.doe.gov. Include the docket number EERE-2020-BT-STD-0006 in the subject line of the message.

Postal Mail: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc ("CD"), in which case it is not necessary to include printed copies.

Hand Delivery/Courier: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., 6th Floor, Washington, DC, 20024. Telephone: (202) 287-1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimiles ("faxes") will be accepted. For detailed instructions on submitting comments and additional information on this process, see section VII of this document.

Docket: The docket for this activity, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *www.regulations.gov*. All documents in the docket are listed in the *www.regulations.gov* index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

The docket web page can be found at *www.regulations.gov/docket/EERE-2020-BT-STD-0006*. The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section VII of this document for information on how to submit comments through *www.regulations.gov*.

EPCA requires the Attorney General to provide DOE a written determination of whether the proposed standard is likely to lessen competition. The U.S. Department of Justice Antitrust Division invites input from market participants and other interested persons with views on the likely competitive impact of the proposed standard. Interested persons may contact the Division at *energy.standards@usdoj.gov* on or before the date specified in the **DATES** section. Please indicate in the "Subject" line of your email the title and Docket Number of this proposed rule.

FOR FURTHER INFORMATION CONTACT:

Mr. Jeremy Dommu, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-9870. Email: *ApplianceStandardsQuestions@ee.doe.gov*.

Mr. Nolan Brickwood, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (202) 586–4498. E-mail: *Nolan.Brickwood@hq.doe.gov.*

For further information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov*.

SUPPLEMENTARY INFORMATION:

DOE proposes to incorporate by reference the following industry standard in part 430:

International Efficiency Marking Protocol for External Power Supplies, Version 4.0, January, 2023.

The above referenced document has been added to the docket for this rulemaking and can be downloaded from Docket EERE-2020-BT-STD-0006 on *Regulations.gov.*

For a further discussion of this standard, see section VI.M of this document.

Table of Contents

I. Synopsis of the Proposed Rule

Title III, Part B[1] of EPCA,[2] established the Energy Conservation Program for Consumer Products Other Than Automobiles. (42 U.S.C. 6291–6309) These products include external power supplies ("EPSs"), the subject of this rulemaking.

Pursuant to EPCA, any new or amended energy conservation standard must 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 or amended standard must result in a significant conservation of energy. (42 U.S.C. 6295(o)(3)(B)) EPCA also provides that not later than 6 years after issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a notice of proposed rulemaking including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m))

In accordance with these and other statutory provisions discussed in this document, DOE proposes amended energy conservation standards for EPSs. The proposed standards, which are expressed in percentage and Watts ("W"), are shown in Table I.1. These proposed standards, if adopted, would apply to all EPSs listed in Table I.1 manufactured in, or imported into, the United States starting on the date 2 years after the publication of the final rule for this rulemaking.

[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 Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A-1 of EPCA.

Table I.1 Proposed Energy Conservation Standards for External Power Supplies

Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (*expressed as a decimal)*	Maximum Power in No-Load Mode [W]
Single-Voltage External AC-DC Power Supply, Basic-Voltage		
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.071 \times \ln(P_{out}) - 0.00115 \times P_{out} + 0.67$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.890	≤ 0.150
$P_{out} > 250$ W	≥ 0.890	≤ 0.150
Single-Voltage External AC-DC Power Supply, Low-Voltage		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0011 \times P_{out} + 0.609$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.150
$P_{out} > 250$ W	≥ 0.880	≤ 0.150
Single-Voltage External AC-AC Power Supply, Basic-Voltage		
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0582 \times \ln(P_{out}) - 0.00104 \times P_{out} + 0.727$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.902	≤ 0.075
$P_{out} > 250$ W	≥ 0.902	≤ 0.200
Single-Voltage External AC-AC Power Supply, Low-Voltage		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.072
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0011 \times P_{out} + 0.609$	≤ 0.072
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.185
$P_{out} > 250$ W	≥ 0.880	≤ 0.500
Multiple-Voltage External Power Supply		
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0782 \times \ln(P_{out}) - 0.0013 \times P_{out} + 0.643$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.885	≤ 0.125
$P_{out} > 250$ W	≥ 0.885	≤ 0.125

A. Benefits and Costs to Consumers

Table I.2 presents DOE's evaluation of the economic impacts of the proposed standards on consumers of EPSs, as measured by the average life-cycle cost ("LCC") savings and the simple payback period ("PBP").[3] The average LCC savings are positive or nearly zero for all product classes and the PBP is similar to or less than the average lifetime of EPSs, which is estimated to range from 4.2 to 6.2 years (see section IV.G of this document).

Table I.2 Impacts of Proposed Energy Conservation Standards on Consumers of External Power Supplies

Product Class	Average LCC Savings *[2021 Dollars]*	Simple Payback Period *years*
AC-DC, Basic-Voltage	-$0.03	5.0
AC-DC, Low-Voltage	$0.01	3.2
AC-AC, Basic-Voltage	$0.52	4.1
Multiple-Voltage	$0.24	7.0

DOE's analysis of the impacts of the proposed standards on consumers is described in section IV.G of this document.

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 (2022–2056). Using a real discount rate of 7.1 percent, DOE estimates that the INPV for manufacturers of EPSs in the case without amended standards is $847.5 million in 2021 dollars. Under the proposed standards, the change in INPV is estimated to range from a decrease of 1.4 percent to a decrease of 0.9 percent, which corresponds to decreases of approximately $11.6 million and $7.9 million. In order to bring products into compliance with amended standards, it is estimated that the industry would incur total conversion costs of $17.4 million.

[3] The average LCC savings refer to consumers that are affected by a standard and are measured relative to the efficiency distribution in the no-new-standards case, which depicts the market in the compliance year in the absence of new or amended standards. The simple PBP, which is designed to compare specific efficiency levels, is measured relative to the baseline product (see section IV.G of this document).

DOE's analysis of the impacts of the proposed standards on manufacturers is described in section IV.K of this document. The analytic results of the manufacturer impact analysis ("MIA") are presented in section V.B.2 of this document.

C. National Benefits and Costs[4]

DOE's analyses indicate that the proposed energy conservation standards for EPSs would save a significant amount of energy. Relative to the case without amended standards, the lifetime energy savings for EPSs purchased in the 30-year period that begins in the anticipated year of compliance with the amended standards (2027-2056) amount to 0.11 quadrillion British thermal units ("Btu"), or quads.[5] This represents a savings of 2.9 percent relative to the energy use of these products in the case without amended standards (referred to as the "no-new-standards case").

The cumulative net present value ("NPV") of total consumer benefits of the proposed standards for EPSs ranges from $0.17 billion (at a 7-percent discount rate) to $0.45 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 EPSs purchased in 2027-2056.

In addition, the proposed standards for EPSs are projected to yield significant environmental benefits. DOE estimates that the proposed standards would result in cumulative emission reductions (over the same period as for energy savings) of 3.9 million metric tons ("Mt")[6] of carbon dioxide ("CO_2"), 26.3 thousand tons of methane

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[4] All monetary values in this document are expressed in 2021 dollars.
[5] The quantity refers to full-fuel-cycle ("FFC") energy savings. FFC energy savings includes the energy consumed in extracting, processing, and transporting primary fuels (*i.e.*, coal, natural gas, petroleum fuels), and, thus, presents a more complete picture of the impacts of energy efficiency standards. For more information on the FFC metric, see section IV.I of this document.
[6] A metric ton is equivalent to 1.1 short tons. Results for emissions other than CO_2 are presented in short tons.

("CH_4"), 0.04 thousand tons of nitrous oxide ("N_2O"), 6.0 thousand tons of nitrogen oxides ("NO_X"), 1.7 thousand tons of sulfur dioxide ("SO_2"), and 0.01 tons of mercury ("Hg").[7]

DOE estimates climate benefits from a reduction in greenhouse gases ("GHG") using four different estimates of the social cost of CO_2 ("SC-CO_2"), the social cost of methane ("SC-CH_4"), and the social cost of nitrous oxide ("SC-N_2O"). Together these represent the social cost of GHG ("SC-GHG").[8] DOE used interim SC-GHG values developed by an Interagency Working Group on the Social Cost of Greenhouse Gases (IWG),[9] as discussed in section IV.M of this document. For presentational purposes, the climate benefits associated with the average SC-GHG at a 3-percent discount rate are $0.20 billion. DOE does not have a single central SC-GHG point estimate, and it emphasizes the importance and value of considering the benefits calculated using all four SC-GHG estimates.

DOE also estimates health benefits from SO_2 and NO_X emissions reductions.[10] DOE estimates the present value of the health benefits would be $0.16 billion using a 7-

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[7] DOE calculated emissions reductions relative to the no-new-standards case, which reflects key assumptions in the *Annual Energy Outlook 2022* ("*AEO2022*"). *AEO2022* represents current federal and state legislation and final implementation of regulations as of the time of its preparation. See section IV.L of this document for further discussion of *AEO2022* assumptions that effect air pollutant emissions.

[8] On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22–30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana* v. *Biden,* No. 21–cv–1074–JDC–KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from ''adopting, employing, treating as binding, or relying upon'' the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits where appropriate and permissible under law.

[9] See Interagency Working Group on Social Cost of Greenhouse Gases, Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide. Interim Estimates Under Executive Order 13990, Washington, D.C., February 2021 ("February 2021 SC-GHG TSD"*). /www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.*

[10] DOE estimated the monetized value of SO_2 and NO_X emissions reductions associated with electricity savings using benefit per ton estimates from the scientific literature. See section IV.M of this document for further discussion.

percent discount rate, and \$0.36 billion using a 3-percent discount rate.[11] DOE is currently monetizing only $PM_{2.5}$ precursor health benefits for SO_2 and NO_X and ozone precursor health benefits for NO_X, but will continue to assess the ability to monetize other effects, such as health benefits from reductions in direct $PM_{2.5}$ emissions. If any such additional health benefits were monetized, they would only further increase the total benefits of the proposed rule.

Table I.3 summarizes the economic benefits and costs expected to result from the proposed standards for EPSs. In the table, total benefits for both the 3-percent and 7-percent cases are presented using the average GHG social costs with 3-percent discount rate, but the Department emphasizes the importance and value of considering the benefits calculated using all four SC-GHG cases. The estimated total net benefits using each of the four cases are presented in section IV.M of this document.

[11] DOE estimates the economic value of these emissions reductions resulting from the considered TSLs for the purpose of complying with the requirements of Executive Order 12866.

Table I.3 Summary of Economic Benefits and Costs of Proposed Energy Conservation Standards for External Power Supplies (TSL 4)

	Billion 2020 Dollars
3% discount rate	
Consumer Operating Cost Savings	0.82
Climate Benefits*	0.20
Health Benefits**	0.36
Total Benefits†	1.38
Consumer Incremental Product Costs	0.37
Net Benefits	1.01
7% discount rate	
Consumer Operating Cost Savings	0.40
Climate Benefits* (3% discount rate)	0.20
Health Benefits**	0.16
Total Benefits†	0.76
Consumer Incremental Product Costs	0.23
Net Benefits	0.53

Note: This table presents the costs and benefits associated with EPSs shipped in 2027−2056. These results include benefits to consumers which accrue after 2056 from the products shipped in 2027−2056.
* Climate benefits are calculated using four different estimates of the SC-GHG (see section IV.M of this proposed rule). For presentational purposes of this table, the climate benefits associated with the average SC-GHG at a 3-percent discount rate are shown, but the Department does not have a single central SC-GHG point estimate. On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22-30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana v. Biden*, No. 21-cv-1074-JDC-KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from "adopting, employing, treating as binding, or relying upon" the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits where appropriate and permissible under law
** Health benefits are calculated using benefit-per-ton values for NO_X and SO_2. DOE is currently only monetizing (for SO_2 and NO_X) $PM_{2.5}$ precursor health benefits and (for NO_X) ozone precursor health benefits, but will continue to assess the ability to monetize other effects such as health benefits from reductions in direct $PM_{2.5}$ emissions. The health benefits are presented at real discount rates of 3 and 7 percent. See section IV.M of this document for more details.
† Total and net benefits include consumer, climate, and health benefits. For presentation purposes, total and net benefits for both the 3-percent and 7-percent cases are presented using the average SC-GHG with 3-percent discount rate, but the Department does not have a single central SC-GHG point estimate. DOE emphasizes the importance and value of considering the benefits calculated using all four SC-GHG estimates. See Table V.24for net benefits using all four SC-GHG estimates.

The benefits and costs of the proposed standards can also be expressed in terms of annualized values. The monetary values for the total annualized net benefits are (1) the reduced consumer operating costs, minus (2) the increase in product purchase prices and installation costs, plus (3) the value of the benefits of GHG and NO_X and SO_2 emission reductions, all annualized.[12] The national operating savings are domestic private U.S. consumer monetary savings that occur as a result of purchasing the covered products and are measured for the lifetime of EPSs shipped in 2027-2056. The benefits associated with reduced emissions achieved as a result of the proposed standards are also calculated based on the lifetime of EPSs shipped in 2027-2056.

Estimates of annualized benefits and costs of the proposed standards are shown in

Table I.4. The results under the primary estimate are as follows.

Using a 7-percent discount rate for consumer benefits and costs and health benefits from reduced NOx and SO_2 emissions, and the 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated cost of the standards proposed in this rule is $24.3 million per year in increased equipment costs, while the estimated annual benefits are $42.7 million in reduced equipment operating costs, $11.5 million in climate benefits, and $16.7 million in health benefits. The net benefit would amount to $46.6 per year.

[12] To convert the time-series of costs and benefits into annualized values, DOE calculated a present value in 2021, the year used for discounting the NPV of total consumer costs and savings. For the benefits, DOE calculated a present value associated with each year's shipments in the year in which the shipments occur (*e.g.*, 2030), and then discounted the present value from each year to 2022. Using the present value, DOE then calculated the fixed annual payment over a 30-year period, starting in the compliance year, that yields the same present value.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards is $21.4 per year in increased equipment costs, while the estimated annual benefits are $47.3 in reduced operating costs, $11.5 million in climate benefits, and $20.4 million in health benefits. In this case, the net benefit would amount to $57.8 million per year.

Table I.4 Annualized Benefits and Costs of Proposed Energy Conservation Standards for External Power Supplies (TSL 4)

	Million 2021 Dollars/year		
	Primary Estimate	**Low-Net-Benefits Estimate**	**High-Net-Benefits Estimate**
3% discount rate			
Consumer Operating Cost Savings	47.3	46.1	48.8
Climate Benefits*	11.5	11.5	11.5
Health Benefits**	20.4	20.4	20.4
Total Benefits†	79.2	78.0	80.7
Consumer Incremental Product Costs	21.4	23.4	19.3
Net Benefits	57.8	54.6	61.3
7% discount rate			
Consumer Operating Cost Savings	42.7	41.8	43.9
Climate Benefits* (3% discount rate)	11.5	11.5	11.5
Health Benefits**	16.7	16.7	16.7
Total Benefits†	70.9	70.0	72.1
Consumer Incremental Product Costs	24.3	26.1	22.4
Net Benefits	46.6	43.9	49.6

Note: This table presents the costs and benefits associated with EPSs shipped in 2027-2056. These results include benefits to consumers which accrue after 2056 from the products shipped in 2027-2056.
* Climate benefits are calculated using four different estimates of the global SC-GHG (see section IV.M of this proposed rule). For presentational purposes of this table, the climate benefits associated with the average SC-GHG at a 3 percent discount rate are shown, but the Department does not have a single central SC-GHG point estimate. On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22-30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana v. Biden*, No. 21-cv-1074-JDC-KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from "adopting, employing, treating as binding, or relying

upon" the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits where appropriate and permissible under law.
** Health benefits are calculated using benefit-per-ton values for NO_X and SO_2. DOE is currently only monetizing (for SO_2 and NO_X) $PM_{2.5}$ precursor health benefits and (for NO_X) ozone precursor health benefits, but will continue to assess the ability to monetize other effects such as health benefits from reductions in direct $PM_{2.5}$ emissions. The health benefits are presented at real discount rates of 3 and 7 percent. See section IV.M of this document for more details.
† Total and net benefits include consumer, climate, and health benefits. For presentation purposes, total and net benefits for both the 3-percent and 7-percent cases are presented using the average SC-GHG with 3-percent discount rate, but the Department does not have a single central SC-GHG point estimate. DOE emphasizes the importance and value of considering the benefits calculated using all four SC-GHG estimates. See Table V.24for net benefits using all four SC-GHG estimates.

DOE's analysis of the national impacts of the proposed standards is described in sections IV.I, IV.L and IV.M of this document.

D. Conclusion

DOE has tentatively concluded that the proposed standards represent the maximum improvement in energy efficiency that is technologically feasible and economically justified, and that they would result in the significant conservation of energy. Regarding technological feasibility, products achieving these standard levels are already commercially available for all product classes covered by this proposal. Considering economic justification, DOE's analysis shows that the benefits of the proposed standard greatly exceed the burdens of the proposed standards. Using a 7-percent discount rate for consumer benefits and costs and NOx and SO_2 reduction benefits, and a 3-percent discount rate case for GHG social costs, the estimated cost of the proposed standards for EPSs is $24.3 million per year in increased EPS costs, while the estimated annual benefits are $42.7 million in reduced EPS operating costs, $11.5 million in climate benefits and $16.7 million in health benefits. The net benefit amounts to $46.6 million per year.

The significance of energy savings is evaluated by DOE on a case-by-case basis considering the specific circumstances surrounding a specific rulemaking. The standards are projected to result in estimated national energy savings of 0.11 quads. Based on the amount of FFC savings, the corresponding reduction in GHG emissions, and the need to confront the global climate crisis DOE has initially determined the energy savings that would result from the proposed standard levels are "significant" within the meaning of 42 U.S.C. 6295(o)(3)(B). A more detailed discussion of the basis for these tentative conclusions is contained in the remainder of this document and the accompanying TSD.

DOE also considered more-stringent energy efficiency levels as potential standards, and is still considering them in this rulemaking. However, DOE has tentatively concluded that the potential burdens of the more-stringent energy efficiency levels would outweigh the projected benefits.

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

II. Introduction

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

A. Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part B of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles. These products include EPSs, the subject of this document. (42 U.S.C. 6295(u)) EPCA prescribed the initial energy conservation standards for these products (42 U.S.C. 6295(u)(3)), and directed DOE to conduct several future rulemakings to determine whether to amend these initial standards. (42 U.S.C. 6295(u)(1)(E)(i)(I) and 42 U.S.C. 6295(u)(3)(D)) EPCA further provides that, not later than 6 years after the issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a NOPR including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) the establishment of Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and 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 EPCA. (*See* 42 U.S.C. 6297(d))

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. 6295(o)(3)(A) and 42 U.S.C. 6295(r)) 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 42 U.S.C. 6295(s)) Similarly, DOE must use these test procedures to determine whether the products comply with standards adopted pursuant to EPCA. (42 U.S.C. 6295(s)) The DOE test procedures for EPSs appear at title 10 of the Code of Federal Regulations ("CFR") part 430, subpart B, appendix Z ("Appendix Z").

DOE must follow specific statutory criteria for prescribing new or amended standards for covered products, including EPSs. Any new or amended standard for a covered product must 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)) Furthermore, DOE may not adopt a standard that DOE determines would not result in the significant conservation of energy. (42 U.S.C. 6295(o)(3)(B))

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 standard is not technologically feasible or economically justified. (42

U.S.C. 6295(o)(3)(A)–(B)) In deciding whether a proposed standard is economically justified, DOE must determine whether the benefits of the standard exceed its burdens. (42 U.S.C. 6295(o)(2)(B)(i)) DOE must make this determination after receiving comments on the proposed standard, and by considering, to the greatest extent practicable, the following seven statutory 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 standard;

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

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

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

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

(7) Other factors the Secretary of Energy (“Secretary”) considers relevant.

(42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII))

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

EPCA also contains what is known as an "anti-backsliding" provision, which prevents the Secretary from prescribing any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C. 6295(o)(1)) Also, the Secretary may not prescribe an amended or new standard if the Secretary finds that interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States in any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States. (42 U.S.C. 6295(o)(4))

Additionally, EPCA specifies requirements when promulgating an energy conservation standard for a covered product that has two or more subcategories. DOE must specify a different standard level for a type or class of product that has 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 the utility of the feature to the consumer 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))

Finally, pursuant to the amendments contained in the Energy Independence and Security Act of 2007 ("EISA 2007"), Pub. L. 110-140, any final rule for new or amended energy conservation standards promulgated after July 1, 2010, is 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 a single 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)) DOE's current test procedures for EPSs address standby mode energy use. In this rulemaking, DOE intends to incorporate such energy use into any amended energy conservation standards that it may adopt.

B. Background

1. Current Standards

In a final rule published on February 10, 2014 ("February 2014 Final Rule"), DOE prescribed the current energy conservation standards for EPSs manufactured on and after February 10, 2016. 79 FR 7846. These standards are set forth in DOE's regulations at 10 CFR 430.32(w) and are repeated in Table II.1.

Table II.1 Federal Energy Conservation Standards for External Power Supplies

Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (*expressed as a decimal)*	Maximum Power in No-Load Mode [W]
Single-Voltage External AC-DC Power Supply, Basic-Voltage		
$P_{out} \leq 1$ 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		
$P_{out} \leq 1$ 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		
$P_{out} \leq 1$ 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		
$P_{out} \leq 1$ 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	≥ 0.870	≤ 0.210
$P_{out} > 250$ W	≥ 0.875	≤ 0.500
Multiple-Voltage External Power Supply		
$P_{out} \leq 1$ 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

2. History of Standards Rulemaking for External Power Supplies

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 consist 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 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 (hereinafter referred to as "Level IV standards") that became effective on July 1, 2008, and directed DOE to conduct an energy conservation standards rulemaking to review those standards.

In the February 2014 Final Rule, DOE completed a rulemaking cycle by adopting amended performance standards for EPSs manufactured on or after February 10, 2016. 79 FR 7846. The final rule amended the Level IV standards prescribed by Congress and separated EPSs into two groups regardless of whether they met the Class A criteria—direct operation EPSs and indirect operation EPSs.[13] 79 FR 7846, 7865-7866. The February 2014 Final Rule set new standards that applied only to direct operation EPSs (hereafter referred to as "Level VI standards"), which increased the stringency of the average active-mode and no-load power consumption metrics over the Level IV

[13] An indirect operation EPS is an EPS that cannot power a consumer product (other than a battery charger) without the assistance of a battery. 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.

standards. 79 FR 7846, 7849. Under the February 2014 Final Rule, Class A EPSs that could directly power a consumer product (excluding battery chargers) became subject to the Level VI standards, whereas Class A EPSs that require the use of a battery to power a consumer product remained subject to the Level IV standards. (*Id.*) Likewise, non-Class A EPSs that could directly power a consumer product (excluding battery chargers) became subject to efficiency standards for the first time (Level VI standards)—non-Class A indirect operation EPSs continued to remain free from any efficiency requirements. 79 FR 7846, 7849, 7865.

As part of the current analysis, on May 20, 2020, DOE prepared a Request for Information ("May 2020 RFI"), which solicited information from the public to help DOE determine whether amended standards for EPSs would result in a significant amount of additional energy savings and whether those standards would be technologically feasible and economically justified. 85 FR 30636.

Comments received following the publication of the May 2020 RFI helped DOE identify and resolve issues related to the subsequent preliminary analysis.[14] DOE published a notice of public meeting and availability of the preliminary technical support document ("TSD") on February 25, 2022 ("February 2022 Preliminary Analysis"). 87 FR 10719.

DOE subsequently held a public meeting on March 24, 2022, to discuss and receive comments on the preliminary TSD. The preliminary TSD that presented the methodology and results of the preliminary analysis is available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*. DOE received

[14] Comments are available at *www.regulations.gov/document/EERE-2020-BT-STD-0006-0001/comment* and *www.regulations.gov/document/EERE-2020-BT-STD-0006-0008/comment*.

comments in response to the February 2022 Preliminary Analysis from the interested parties listed in Table II.2.

Table II.2 February 2022 Preliminary Analysis Written Comments

Commenter(s)	Abbreviation	Comment No. in the Docket	Commenter Type
Association of Home Appliance Manufacturers ("AHAM"), Consumer Technology Association ("CTA"), National Electrical Manufacturers Association ("NEMA"), Outdoor Power Equipment Institute ("OPEI"), Plumbing Manufacturers Institute (PMI), and Power Tool Institute ("PTI")	Joint Trade Associations	23	Trade Associations
Appliance Standards Awareness Project ("ASAP"), National Consumer Law Center ("NCLC"), Natural Resources Defense Council ("NRDC"), and New York State Energy Research and Development Authority ("NYSERDA")	Joint Efficiency Advocates	24	Efficiency Organizations
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison	CA IOUs	25	Utility Association
Information Technology Industry Council	ITI	20	Trade Association
Northwest Energy Efficiency Alliance	NEEA	21	Efficiency Organization
National Electrical Manufacturers Association	NEMA	22	Trade Association
Power Sources Manufacturers Association	PSMA	19	Trade Association

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[15]

3. Deviation from Appendix A

In accordance with section 3(a) of 10 CFR part 430, subpart C, appendix A ("appendix A"), DOE notes that it is deviating from the provision in appendix A

[15] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop energy conservation standards for EPSs. (Docket No. EERE-2020-BT-STD-0006, which is maintained at *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

regarding the pre-NOPR stages for an energy conservation standards rulemaking. Section 6(d)(2) of appendix A specifies that the length of the public comment period for a NOPR will vary depending upon the circumstances of the particular rulemaking, but will not be less than 75 calendar days. For this NOPR, DOE has opted to instead provide a 60-day comment period. DOE requested comment in the May 2020 RFI on the technical and economic analyses and provided stakeholders with a 47-day comment period. 85 FR 30636. Additionally, DOE reopened the comment period for the May 2020 RFI for an additional 32 days. 85 FR 44484. Furthermore, DOE requested comment on the February 2022 Preliminary Analysis for a period of 60 days. 87 FR 10719. DOE has relied on many of the same analytical assumptions and approaches as used in the preliminary assessment and has determined that a 60-day comment period in conjunction with the prior comment periods provides sufficient time for interested parties to review the proposed rule and develop comments.

Section 6(a)(2) of appendix A states that if the Department determines it is appropriate to proceed with a rulemaking, the preliminary stages of a rulemaking to issue or amend an energy conservation standard that DOE will undertake will be a framework document and preliminary analysis, or an advance notice of proposed rulemaking. DOE is opting to deviate from this step by publishing a NOPR following the preliminary analysis without a framework document. A framework document is intended to introduce and summarize the various analyses DOE conducts during the rulemaking process and requests initial feedback from interested parties. As discussed, prior to the preliminary analysis and this NOPR, DOE published the May 2020 RFI, in which DOE identified and sought comment on the technical and economic analyses to be conducted in determining whether amended energy conservation standards would be justified. Comments received following publication of the May 2020 RFI assisted DOE in identifying and resolving issues related to the preliminary analyses. As a result, publication of a framework document would be largely redundant with the published RFI and preliminary analysis. As such, DOE is deviating from the procedures provided in appendix A and is not publishing a framework document prior to the publication of this NOPR. The Department has determined that it is appropriate to proceed with this proposal due to the information obtained through the May 2020 RFI and the preliminary analysis.

III. General Discussion

DOE developed this proposal after considering oral and written comments, data, and information from interested parties that represent a variety of interests. The following discussion addresses issues raised by these commenters.

A. Product Classes and Scope of Coverage

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

EPSs are currently classified as direct operation and indirect operation EPSs. Direct operation EPSs are further divided into the following five single-voltage sub-product classes: AC-DC, Basic-Voltage; 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); 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); AC-AC, Basic-Voltage; AC-AC, Low-Voltage; and Multiple-Voltage.

The February 2014 Final Rule maintained the Level IV standards established by Congress for all Class A[16] EPSs, including indirect operation EPSs, and adopted more stringent Level VI standards applicable to all direct operation non-Class A EPSs. 79 FR 7846, 7849. A summary of the standards currently applicable to these different types of EPSs are shown in Table III.1.

Table III.1 Application of Energy Conservation Standards for External Power Supplies

	Class A EPS	**Non-Class A EPS**
Direct Operation EPS	Level VI	Level VI
Indirect Operation EPS	Level IV	No-standards

In this NOPR, DOE proposes more stringent Level VII standards that would be applicable to all EPSs, including direct and indirect operation Class A and non-Class A EPSs. This approach makes the distinction between these various types of EPSs redundant with respect to the applicability of energy conservation standards. See section IV.B.1 of this document for additional discussion on this point.

[16] A Class A EPS means a device that (i) Is designed to convert line voltage AC input into lower voltage AC or DC output; (ii) Is able to convert to only one AC or DC output voltage at a time; (iii) Is sold with, or intended to be used with, a separate end-use product that constitutes the primary load; (iv) Is contained in a separate physical enclosure from the end-use product; (v) Is connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring; and (vi) Has nameplate output power that is less than or equal to 250 watts; But, does not include any device that - (i) 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 (ii) Powers the charger of a detachable battery pack or charges the battery of a product that is fully or primarily motor operated. 42 USC 6291(36)(C)

B. Materials Incorporated by Reference

The current Level VI standards mandate the labeling of compliant EPSs in accordance with the International Efficiency Marking Protocol for External Power Supplies ("IEMP"), Version 3. *See* 10 CFR 430.3(s). DOE proposes to incorporate by reference version 4.0 of IEMP, which will outline the marking requirements for the proposed amendments to the energy conservation standards.

DOE requests comment on its proposal to incorporate by reference version 4.0 of IEMP for this proposed rulemaking.

C. Test Procedure

EPCA sets forth generally applicable criteria and procedures for DOE's adoption and amendment of test procedures. (42 U.S.C. 6293) Manufacturers of covered products must use these test procedures to certify to DOE that their product complies with energy conservation standards and to quantify the efficiency of their product. DOE published a test procedure final rule for EPSs on August 19, 2022 ("August 2022 TP Final Rule"), which amended appendix Z by clarifying the scope of the test procedure more explicitly, providing more specific instructions for testing single-voltage EPSs with multiple-output busses and EPSs shipped without an output cord, providing instructions allowing for functionality unrelated to the external power supply circuit to be disconnected during testing so long as the disconnection does not impact the functionality of the EPS itself, and specifying test requirements for adaptive EPSs. 87 FR 51200. Except where specifically noted, changes from the August 2022 TP Final Rule were incorporated into the methodology used to test EPSs for this NOPR analysis.

D. Technological Feasibility

1. General

In each energy conservation 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. Sections 6(b)(3)(i) and 7(b)(1) of appendix A to 10 CFR part 430 subpart C ("Appendix A").

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, and service; (2) adverse impacts on product utility or availability; (3) adverse impacts on health or safety, and (4) unique-pathway proprietary technologies. Sections 6(b)(3)(ii)–(v) and 7(b)(2)–(5) of appendix A. Section IV.C of this document 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 standards considered in this rulemaking. For further details on the screening analysis for this rulemaking, see chapter 4 of the NOPR TSD.

2. Maximum Technologically Feasible Levels

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

E. Energy Savings

1. Determination of Savings

For each trial standard level ("TSL"), DOE projected energy savings from application of the TSL to EPSs purchased in the 30-year period that begins in the year of compliance with the proposed standards ([2027–2056]).[17] The savings are measured over the entire lifetime of EPSs purchased in the previous 30-year period. DOE quantified the energy savings attributable to each TSL as the difference in energy consumption between each standards case and the no-new-standards case. The no-new-standards case represents a projection of energy consumption that reflects how the market for a product would likely evolve in the absence of amended energy conservation standards.

DOE used its national impact analysis ("NIA") spreadsheet model to estimate national energy savings ("NES") from potential amended or new standards for EPSs. The NIA spreadsheet model (described in section IV.I of this document) calculates energy savings in terms of 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 primary energy savings, which is the savings in the energy that

[17] Each TSL is composed of specific efficiency levels for each product class. The TSLs considered for this NOPR are described in section V.A of this document. DOE conducted a sensitivity analysis that considers impacts for products shipped in a 30-year period.

is used to generate and transmit the site electricity. DOE also calculates NES in terms of FFC energy savings. The FFC metric includes the energy consumed in extracting, processing, and transporting primary fuels (*i.e.*, coal, natural gas, petroleum fuels), and thus presents a more complete picture of the impacts of energy conservation standards.[18] DOE's approach is based on the calculation of an FFC multiplier for each of the energy types used by covered products or equipment. For more information on FFC energy savings, see section IV.I of this document.

2. Significance of Savings

To adopt any new or amended standards for a covered product, DOE must determine that such action would result in significant energy savings. (42 U.S.C. 6295(o)(3)(B))

The significance of energy savings offered by a new or amended energy conservation standard cannot be determined without knowledge of the specific circumstances surrounding a given rulemaking.[19] For example, some covered products and equipment have most of their energy consumption occur during periods of peak energy demand. The impacts of these products on the energy infrastructure can be more pronounced than products with relatively constant demand. In evaluating the significance of energy savings, DOE considers differences in primary energy and FFC effects for different covered products and equipment when determining whether energy savings are significant. Primary energy and FFC effects include the energy consumed in electricity production (depending on load shape), in distribution and transmission, and in extracting,

[18] The FFC metric is discussed in DOE's statement of policy and notice of policy amendment. 76 FR 51282 (Aug. 18, 2011), as amended at 77 FR 49701 (Aug. 17, 2012).
[19]The numeric threshold for determining the significance of energy savings established in a final rule published on February 14, 2020 (85 FR 8626, 8670), was subsequently eliminated in a final rule published on December 13, 2021 (86 FR 70892).

processing, and transporting primary fuels (*i.e.*, coal, natural gas, petroleum fuels), and thus present a more complete picture of the impacts of energy conservation standards.

Accordingly, DOE evaluates the significance of energy savings on a case-by-case basis, taking into account the significance of cumulative FFC national energy savings, the cumulative FFC emissions reductions, and the need to confront the global climate crisis, among other factors. DOE has initially determined the energy savings from the proposed standard levels are "significant" within the meaning of 42 U.S.C. 6295(o)(3)(B).

F. Economic Justification

1. Specific Criteria

EPCA provides seven factors to be evaluated in determining whether a potential energy conservation standard is economically justified. (42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII)) The following sections discuss each of those seven factors in this proposed rulemaking.

a. Economic Impact on Manufacturers and Consumers

EPCA requires DOE to consider the economic impact of the standard on manufacturers and consumers of the product that would be subject to the standard. (42 USC 6295(o)(2)(B)(i)(I). In determining the impacts of a potential amended standard on manufacturers, DOE conducts an MIA, as discussed in section IV.K of this document. First, DOE uses an annual cash-flow approach to determine the quantitative impacts. This step includes both a short-term assessment—based on the cost and capital requirements during the period between when a regulation is issued and when entities must comply with the regulation—and a long-term assessment over a 30-year period. The industry-wide impacts analyzed include (1) INPV, which values the industry on the basis of expected future cash flows, (2) cash flows by year, (3) changes in revenue and income, and (4) other measures of impact, as appropriate. Second, DOE analyzes and reports the impacts on different types of manufacturers, including impacts on small manufacturers. Third, DOE considers the impact of standards on domestic manufacturer employment and manufacturing capacity, as well as the potential for standards to result in plant closures and loss of capital investment. Finally, DOE takes into account cumulative impacts of various DOE regulations and other regulatory requirements on manufacturers.

For individual consumers, measures of economic impact include the changes in LCC and PBP associated with new or amended standards. These measures are discussed further in the section IV. For consumers in the aggregate, DOE also calculates the national net present value of the consumer costs and benefits expected to result from particular standards. DOE also evaluates the impacts of potential standards on identifiable subgroups of consumers that may be affected disproportionately by a standard.

b. Savings in Operating Costs Compared to Increase in Price (LCC and PBP)

EPCA requires DOE to consider the savings in operating costs throughout the estimated average life of the covered product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered product that are likely to result from a standard. (42 U.S.C. 6295(o)(2)(B)(i)(II)) DOE conducts this comparison in its LCC and PBP analysis.

The LCC is the sum of the purchase price of a product (including its installation) and the operating expense (including energy, maintenance, and repair expenditures) discounted over the lifetime of the product. The LCC analysis requires a variety of inputs, such as product prices, product energy consumption, energy prices, maintenance and repair costs, product lifetime, and discount rates appropriate for consumers. 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.

The PBP is the estimated amount of time (in years) it takes consumers to recover the increased purchase cost (including installation) of a more-efficient product through lower operating costs. DOE calculates the PBP by dividing the change in purchase cost due to a more-stringent standard by the change in annual operating cost for the year that standards are assumed to take effect.

For its LCC and PBP analysis, DOE assumes that consumers will purchase the covered products in the first year of compliance with new or amended standards. The LCC savings for the considered efficiency levels are calculated relative to the case that reflects projected market trends in the absence of new or amended standards. DOE's LCC and PBP analysis is discussed in further detail in section IV.G of this document.

c. Energy Savings

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

d. Lessening of Utility or Performance of Products

EPCA requires that DOE evaluate whether potential standards would lessen the utility or performance of the considered products. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) DOE considers this evaluation in establishing product classes and considering design options and the impact of potential standard levels. Based on data available to DOE, the standards proposed in this document would not reduce the utility or performance of the products under consideration in this proposed 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 a proposed standard. (42 U.S.C. 6295(o)(2)(B)(i)(V)) It also directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a proposed standard and to transmit such determination to the Secretary within 60 days of the publication of a proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(ii)) DOE will transmit a copy of this proposed rule to the Attorney General with a request that the Department of Justice ("DOJ") provide its determination on this issue. DOE will publish and respond to the Attorney General's determination in the final rule. DOE invites comment from the public regarding the competitive impacts that are likely to result from this proposed rule. In addition, stakeholders may also provide comments separately to DOJ regarding these potential impacts. See the **ADDRESSES** section for information to send comments to DOJ.

f. Need for National Energy Conservation

DOE is required to consider the need for national energy and water conservation in determining whether a new or amended standard is economically justified. (42 U.S.C.

6295(o)(2)(B)(i)(VI)) The energy savings from the proposed standards are likely to improve 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, as discussed in section IV.N of this document.

DOE maintains that environmental and public health benefits associated with the more efficient use of energy are important to take into account when considering the need for national energy conservation. The proposed standards are likely to result in environmental benefits in the form of reduced emissions of air pollutants and GHGs associated with energy production and use. DOE conducts an emissions analysis to estimate how potential standards may affect these emissions, as discussed in section IV.L of this document; the estimated emissions impacts are reported in section IV.L of this document. DOE also estimates the economic value of emissions reductions resulting from the considered TSLs, as discussed in section V.B of this document.

g. Other Factors

In determining whether an energy conservation standard is economically justified, DOE may consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6295(o)(2)(B)(i)(VII)) To the extent DOE identifies any relevant information regarding economic justification that does not fit into the other categories described previously, DOE could consider such information under "other factors." In this proposed rulemaking, DOE has not identified or considered any other factors for determining whether the proposed standard is economically justified.

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 effects that proposed energy conservation standards would have on the payback period for consumers. These analyses include, but are not limited to, the 3-year payback period contemplated under the rebuttable-presumption test. In addition, DOE conducts an economic analysis that considers the full range of impacts to consumers, manufacturers, the nation, and the environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this analysis serve as the basis for DOE's evaluation of the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification). The rebuttable presumption payback calculation is discussed in section V.B of this document.

IV. Methodology and Discussion of Related Comments

This section addresses the analyses DOE has performed for this rulemaking with regard to EPSs. Separate subsections address each component of DOE's analyses.

DOE used several analytical tools to estimate the impact of the standards proposed in this document. The first tool is a spreadsheet that calculates the LCC savings and PBP of potential amended or new energy conservation standards. The national impacts analysis uses a second spreadsheet set that provides shipments projections and calculates national energy savings and net present value of total consumer costs and savings expected to result from potential energy conservation standards. DOE uses the third spreadsheet tool, the Government Regulatory Impact Model ("GRIM"), to assess manufacturer impacts of potential standards. These three spreadsheet tools are available on the DOE website for this rulemaking: *www.regulations.gov/docket/EERE-2020-BT-STD-0006*. Additionally, DOE used output from the latest version of the Energy Information Administration's ("EIA's") *Annual Energy Outlook* ("*AEO*"), a widely known energy projection for the United States, for the emissions and utility impact analyses.

A. General Comments and Responses

In response to the February 2022 Preliminary Analysis, the Joint Trade Associations and ITI commented that DOE's preliminary analysis clearly demonstrated that amended energy conservation standards for EPSs were not economically justified and instead made a strong case for no new standards. (Joint Trade Associations, No. 23 at pp. 1–3; ITI, No. 20 at p. 2) The Joint Trade Associations noted that for all of the product classes DOE analyzed, the payback periods significantly exceeded the average useful life of the products and that consumers would therefore not recoup the additional cost of the more efficient products over its lifetime, and that this alone could justify not amending standards for EPSs. (Joint Trade Associations, No. 23 at pp. 2–3)

DOE notes that the costs and benefits of amended standards presented in the February 2022 Preliminary Analysis were incomplete and the notice primarily served to provide stakeholders with a preview of the methodology undertaken in evaluating whether amended standards are justified. The preliminary analysis stage of the rulemaking also allows stakeholders an opportunity to help refine the analysis prior to

NOPR. The results presented in the preliminary analysis should therefore not be relied upon in determining whether amended standards are economically justified.

In addition, PSMA urged DOE to publish a roadmap of energy conservation standards over the next 3–5 years, to assist the industry in adapting to any higher tiers of energy conservation standards. (PSMA, No. 19 at p. 3) DOE notes that it is required by EPCA to conduct two cycles of rulemakings to determine whether to amend existing standards for EPSs. (42 U.S.C. 6295(u)(3)(D)) DOE completed the first of the two rulemaking cycles in 2014 by adopting amended performance standards in the February 2014 Final Rule for EPSs manufactured on or after February 10, 2016. 79 FR 7846. DOE is publishing this NOPR to satisfy its obligation to conduct a second rulemaking cycle under EPCA.

EISA 2007 directed DOE to publish an updated final rule for EPSs by July 1, 2021, and further stipulated that any amended standards would apply to products manufactured on or after July 1, 2023, two years later. (42 U.S.C. 6295(u)(3)(D)(ii)) 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. Consistent with this two-year lead time provided by EISA 2007, DOE will provide manufacturers with a lead-time of the same two-year duration as prescribed by statute to comply with any amended standards after the publication of a final rule in the *Federal Register.* This aligns with DOE's approach in the February 2014 Final Rule. 79 FR 7846, 7859. The Joint Trade Associations stated that DOE's process decreases the value of early stakeholder engagement. They stated that it would have been more effective and efficient for DOE to use the completed, amended test procedure rather than the currently applicable test procedure to conduct the preliminary analysis. They further commented that DOE provided a shortened 60-day comment period on the preliminary analysis, which significantly overlapped with other comment periods relevant to many of the same stakeholders. (Joint Trade Associations, No. 23 at pp. 4-)

As stated above, the preliminary analysis is primarily intended to provide stakeholders with an opportunity to comment on the various methodologies DOE intends to use in the NOPR. DOE again notes that the preliminary analysis results should not be relied upon to assess whether amended standards for EPSs are justified. DOE weighed the arguments for and against delaying the preliminary analysis until after the test procedure final rule had been published and concluded that the contemplated differences between the two test procedures, as it applies to the development of amended standards, were minor. DOE further determined that the benefits of using the revised test procedure did not outweigh the benefits of publishing the preliminary analysis on time. Moreover, as the EPS test procedure had not been finalized at the time the preliminary analysis was published, any analysis based on proposed changes to the test procedure would itself have been subject to change; DOE therefore chose to proceed using its then-current finalized test procedure. Additionally, unless otherwise noted, test results used in support of this NOPR were obtained using the test procedure as finalized in the August 2022 TP Final Rule.

With regards to a shortened comment period, DOE believes the length of time provided to have been sufficient because of extensive stakeholder engagement in prior rulemaking cycles as well as the lengthy 79-day comment period provided for stakeholders to comment on the May 2020 RFI.

ITI commented that given the long payback periods and limited energy savings, DOE must consider the opportunity costs of amended standards. ITI stated that work to increase the efficiency of EPSs with little energy savings would divert original equipment manufacturer ("OEM") resources away from other significant technological developments that could have a bigger impact on society. (ITI, No. 20 at p. 9) DOE considers multiple factors in its analysis when considering amended energy conservation standards, as explained in sections III.D and III.E of this document, including the significance of national energy savings and manufacturer impacts.

B. Market and Technology Assessment

DOE develops information in the market and technology assessment that provides an overall picture of the market for the products concerned, including the purpose of the products, the industry structure, manufacturers, market characteristics, and technologies used in the products. 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 (1) a determination of the scope of the rulemaking and product classes, (2) manufacturers and industry structure, (3) existing efficiency programs, (4) shipments information, (5) market and industry trends; and (6) technologies or design options that could improve the energy efficiency of EPSs. The key findings of DOE's market assessment are summarized in the following sections. See chapter 3 of the NOPR TSD for further discussion of the market and technology assessment.

1. Scope of Coverage and Product Classes

In the February 2022 Preliminary Analysis, DOE did not identify any potential changes to the existing scope of coverage for EPSs. 87 FR 10719, 10723. In the August 2022 TP Final Rule, DOE clarified that the EPS test procedure did not apply to commercial and industrial power supplies and devices that provide power conversion as an auxiliary function. DOE additionally provided a definition of commercial and industrial power supplies, and noted that commercial and industrial power supplies are not covered unless distributed in commerce for use with a consumer product. 87 FR 51200, 51206-51207.

NEMA commented in response to the February 2022 Preliminary Analysis that hard-wired AC-outlets traditionally found in residential environments can now be purchased with built-in Universal Serial Bus ("USB") ports that provide USB services as a secondary function. NEMA stated that such outlets correctly have been omitted from previous DOE analyses for EPSs and recommended that DOE exempt duplex receptacles until such time as a thorough analysis and LCC benefit examination is completed, because the installation of duplex receptacles requires certified professionals and results in a non-negligible cost to the consumer. (NEMA, No. 22 at pp. 1–2An EPS is defined to be 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. 10 CFR 430.2. In the August 2022 TP Final Rule, DOE specified that devices for which the primary load of the *converted* voltage within the device is not delivered to a separate end-use product are not subject to the test procedure. 87 FR 51200, 51207-51208. For the EPS test procedure to be applicable to a power supply, the intended primary load of the converted voltage must be to a separate end-use product. *Id.* DOE believes this to be the case for the hard-wired AC receptacles with USB ports described by NEMA. In these products, the USB ports provide converted power with the intention of delivering that converted power to a separate end-use product. DOE tentatively determines that it would not be appropriate to include the installation costs of these products in its LCC estimates because there are no higher installation costs above the baseline. Because a consumer is willing to accept the installation cost at the baseline, this cost doesn't factor into the determination of LCC savings.

The CA IOUs urged DOE to consider including certain AC-input "combination" products that incorporate convenient charging ports within the scope of this regulation, as the CA IOUs had described in response to the EPS November 2021 test procedure supplementary notice of proposed rulemaking .[20] (CA IOUs, No. 25 at pp. 6-7)

DOE addressed the CA IOUs comment in the August 2022 TP Final Rule. 87 FR 51200, 51208. As in that final rule, DOE here maintains that devices for which the primary load of the converted voltage within the device is not a separate end-use product are not subject to the test procedure. As such, only those combination products that meet this criterion would be in scope. As an example, a bedside table lamp with an LED bulb and a USB port may be in scope of EPS regulations if the power provided to a separate end-use load by the USB port constitutes the main load of the converted power inside the lamp. Such a product however would not be in scope if the LED bulb, which is internal to the product, is the primary load.

In the preliminary analysis, DOE tentatively determined that evaluation of separate standards for indirect operation and direct operation product classes would not be warranted. The Joint Efficiency Advocates, the CA IOUs, and NEEA supported DOE's decision to evaluate direct and indirect power supplies together, as these commenters believe the distinction is unnecessary, confusing, and leaves achievable energy savings untapped. (Joint Efficiency Advocates, No. 24 at pp. 1–2; CA IOUs, No.

[20] DOE responded to CA IOUs comment on the November 2021 TP SNOPR seeking clarification for combination products that internally convert power to supply another product via a "convenience charging port" (for example, lamps and furniture with USB ports). 87 FR 51200, 51208.

25 at p. 6; NEEA, No. 21 at pp. 5-6) CA IOUs noted the distinction was not warranted based on technological differences and should be eliminated. (CA IOUs, No. 25 at p. 6)

The Joint Trade Associations commented that DOE should retain the current distinction in product classes, citing that there were good reasons for splitting them apart—the main reason being avoiding double-regulation—and nothing has changed to render this conclusion obsolete. (Joint Trade Associations, No. 23 at pp. 3–4) They conceded that indirect operation EPSs make up only .5 percent of certified EPSs, and that 71% of those indirect operation EPSs meet the Level IV and VI standards, but disagreed that this warranted terminating the differentiation. The Joint Trade Associations noted that indirect operation EPSs would be forced to meet both EPS and battery charger standards if subject to the EPS standards, and therefore DOE should retain the current distinction. (*Id.*)

Since the publication of the February 2014 Final Rule, DOE has received many questions regarding EPSs that provide direct operation with one end-use product but may also be used to provide indirect operation with a different consumer product containing batteries and or a battery charging system. In an August 25, 2015 final rule ("August 2015 TP Final Rule") amending the EPS test procedures, DOE clarified that if an EPS can operate any consumer product directly, that product would be treated as a direct operation EPS. 80 FR 51424, 51434. Of particular importance are EPSs with common output plugs that can be used with products made by different manufacturers. An example of this scenario are EPSs with standard USB connectors. These devices are often sold with end-use products containing batteries, such as a smartphone. Because these same EPSs are also capable of directly operating other end-use products that do not contain batteries (*e.g.*, small LED lamps, external speakers, *etc.*), they are not treated as indirect operation EPSs under DOE's regulations. As such, only a small percentage of EPSs are considered to be true indirect operation EPSs. DOE noted in section 2.3.1.2 of the preliminary TSD that indirect operation EPSs make up a small percentage of certified EPSs in the Compliance Certification Database ("CCD"). According to the CCD, indirect operation EPSs comprise 0.5 percent of all certified EPSs, and of those units, 71 percent meet DOE Level VI standards. Therefore, different standards would not be justified for indirect EPSs. Furthermore, since the February 2014 Final Rule, questions received by DOE enquiring how to effectively classify products into these categories demonstrates that the indirect/direct operation classification complicates the readability of regulations. This observation, coupled with limited prevalence of true indirect operation EPSs in the marketplace (*i.e.*, they do not become direct operation EPSs when used in another application) and their ability to meet Level VI standards with ease, suggests that continuing to treat these EPSs separately is unwarranted. As such, in this NOPR, DOE proposes to remove the distinction in the standards between direct and indirect operation EPSs, and to require indirect operation EPSs to meet the same standards as for their direct operation counterparts.

As noted in section II.B.2, the February 2014 Final Rule required direct operation EPSs, including Class A and non-Class A direct operation EPS, to be subject to the Level VI standards and maintained the Level IV standards established by EISA for indirect operation Class A EPSs. DOE retained the use of the term Class A to ensure that DOE's regulations reflected that indirect operation EPSs meeting the definition of a Class A EPS remained subject to the Level IV standards established by EISA. However, at this time, DOE notes that continued use of the terms Class A and non-Class A would not be necessary and may be confusing to maintain in the regulations if all EPSs became subject to standards that are more stringent than Level IV. In addition to removing the distinction between indirect and direction operation EPS, DOE therefore also proposes to remove use of the terms Class A and non-Class A in the amended standards for EPSs.

ITI recommended DOE create new product classes for adaptive EPSs, stating that it is harder to achieve a given efficiency level in an adaptive design than in a fixed voltage design, and that DOE should track different adaptive technologies within adaptive EPS classes to avoid stifling innovation. (ITI, No. 20 at pp. 2–3) In addition, ITI expressed that for USB-C adaptive EPSs rated above 65W, there is typically a regulatory requirement to provide power factor correction circuitry, which it commented can significantly decrease average efficiency for low-voltage outputs (3.3 volts (“V”) or 5V). ITI urged DOE to make a distinction between single output EPSs and adaptive EPSs, with adaptive EPSs having a less stringent efficiency limit for 3.3V and 5V outputs. (ITI, No. 20 at p. 7)

According to the CCD, over 85 percent of adaptive EPS models rated above 65W meet or exceed the first candidate standard level (“CSL”) above the baseline, CSL1, that DOE analyzed in the preliminary analysis, and over 60 percent of such models meet or exceed CSL2 analyzed in the preliminary analysis. This indicates that any added redesign burden or efficiency penalty from factoring in power factor correction is already accounted for with current adaptive EPS designs. Accordingly, DOE does not propose a new product class or separate standards for adaptive EPSs.

The CA IOUs commented that the four size bins (less than or equal to 1 W; greater than one to 49 W; greater than 49 to 250 W; and greater than 250 W) may limit DOE's ability to capture cost-effective savings. Therefore, the CA IOUs recommended using more granular wattage bins to capture cost-effective savings; more specifically, DOE should consider delineating the current wattage bin for the largest EPS products. (CA IOUs, No. 25 at pp. 3–4)

The equations representing the different efficiency levels analyzed in this rulemaking are presented in three groups simply for ease of readability and accuracy. In the preliminary TSD as well as this NOPR TSD, DOE describes in detail the derivation of these equations, noting that the process considers far more granular output wattage “bins” than the 0 to 1W, 1W to 49W, and greater than 49W bins described by the CA IOUs. While the multiple regression analysis can be used to generate any number of equations spanning the entire output power range, DOE settled on three groups because doing so allowed the equations to be expressed in the same “a*ln(P) + b*P + c” format found in DOE’s current standards at 10 CFR 430.32(w). Therefore, the number of bins used to present the proposed active mode efficiency equations did not limit DOE’s ability to capture cost-effective savings.

ITI stated that it was unclear how DOE determined market share and noted that EPSs are sold both bundled and unbundled, but that DOE does not explain how this is accounted for in its analysis. In addition, ITI encouraged DOE to start collecting data on cable length and gauge to assist the analyses, as well as require reporting in the CCD the type of adaptive technologies used in adaptive EPSs. (ITI, No. 20 at pp. 1–2)

DOE estimates market share by using model counts for products registered in the CCD as a proxy. For example, DOE observed that many models were clustered around 24W in the AC-DC Basic-Voltage product class, which DOE estimated was indicative of 24W EPSs having a significant market share of the AC-DC Basic-Voltage product class. DOE clarifies that its analysis is agnostic regarding bundling and unbundling, as the cost of the EPS carries through to the consumer regardless. With regards to collecting data on adaptive EPS topologies, DOE notes that it typically requires reporting of only those product characteristics that would be necessary to determine the applicable energy conservation standards. Given that the information about the topologies employed is not required for either of these determinations, DOE is not proposing to require such a reporting requirement in this NOPR.

2. Existing Efficiency Programs

When evaluating the potential for amended energy conservation standards, DOE considers other relevant efficiency programs. Most notably for EPSs, DOE has established one of its CSLs based on the proposed, but never implemented, European Union Code of Conduct Version 5 Tier 2 standards ("EU CoC"). A more detailed description of this program can be found in chapter 3 of the NOPR TSD.

ITI commented that DOE should consider international harmonization and consider that testing with a 115V input (U.S. requirement) will yield different results than testing with a 230V input (EU/United Kingdom "UK" requirement). Because EPSs are designed for the global market, ITI stated most models would have less margin if tested at 230V input. Furthermore, ITI requested that DOE obtain more details on EU/UK green initiatives with regards to adaptive EPSs and how efficiency would be impacted. (ITI, No. 20 at pp. 7–8)

Switched-mode power supplies ("SMPSs") designed to operate on 115V AC input will typically demonstrate marginally lower active mode efficiency when compared to those designed to operate on 230VAC. Nonetheless, DOE's analysis indicates that nearly 75 percent of all EPSs currently certified to DOE can meet CSL1, the EU CoC Tier 2 equivalent in DOE's analysis. It should also be noted that CSL1 was evaluated as part of TSL 3 using the full cost-benefit analysis, ensuring that, if adopted, amended standards at that level would be technologically feasible and economically justified in the United States.

3. Technology Options

In the preliminary market analysis and technology assessment, DOE identified 11 technology options that would be expected to improve the efficiency of EPSs, as measured by the DOE test procedure:

Table IV.1: Preliminary Analysis Technology Options for External Power Supplies

Improved Transformers
Switched-Mode Power Supplies
Low-Power Integrated Circuits
Diodes with Low Forward Voltage and Synchronous Rectification
X-Capacitor Discharge Control
Improved Shunt Regulators in Flyback SMPSs that use Optocouplers
Low-Loss Transistors
Resonant Switching
Resonant ("Lossless") Snubbers
Active and Bridgeless Power Factor Correction ("PFC")
Use of Emerging Semiconductor Technologies

DOE did not receive any comments regarding the inclusion or exclusion of any technology options presented in the preliminary analysis, and evaluated the same set of technology options for this NOPR.

C. Screening Analysis

DOE uses the following five screening criteria to determine which technology options are suitable for further consideration in an energy conservation standards rulemaking:

(1) Technological feasibility. Technologies that are not incorporated in commercial products or in working prototypes will not be considered further.

(2) Practicability to manufacture, install, and service. If it is determined that mass production and reliable installation and servicing of a technology in commercial products could not be achieved on the scale necessary to serve the relevant market at the time of the projected compliance date of the standard, then that technology will not be considered further.

(3) Impacts on product utility or product availability. If it is determined that a technology would have a significant adverse impact on the utility of the product for 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 be considered further.

(4) Adverse impacts on health or safety. If it is determined that a technology would have significant adverse impacts on health or safety, it will not be considered further.

(5) Unique-Pathway Proprietary Technologies. If a design option utilizes proprietary technology that represents a unique pathway to achieving a given efficiency level, that technology will not be considered further due to the potential for monopolistic concerns.

Sections 6(b)(3) and 7(b) of appendix A.

If DOE determines that a technology, or a combination of technologies, fails to meet one or more of the listed five criteria, it will be excluded from further consideration in the engineering analysis.

1. Screened-Out Technologies

DOE did not screen out any of the technology options identified for EPSs based on the five criteria listed in section IV.B.3 of this document.

2. Remaining Technologies

Through a review of each technology, DOE tentatively concludes that all of the other identified technologies listed in section IV.B.3 of this document met all five screening criteria to be examined further as design options in DOE's NOPR analysis. In summary, DOE did not screen out the following technology options:

Table IV.2 NOPR Technology Options for External Power Supplies

Improved Transformers
Switched-Mode Power Supplies
Low-Power Integrated Circuits
Diodes with Low Forward Voltage and Synchronous Rectification
X-Capacitor Discharge Control
Improved Shunt Regulators in Flyback SMPSs that use Optocouplers

Low-Loss Transistors
Resonant Switching
Resonant (“Lossless”) Snubbers
Active and Bridgeless Power Factor Correction (“PFC”)
Use of Emerging Semiconductor Technologies

DOE has initially determined that these technology options are technologically feasible because they are being used or have previously been used in commercially-available products or working prototypes. DOE also finds that all of the remaining technology options meet the other screening criteria (*i.e.*, practicable to manufacture, install, and service and do not result in adverse impacts on consumer utility, product availability, health, or safety, unique-pathway proprietary technologies). For additional details, see chapter 4 of the NOPR TSD.

D. Engineering Analysis

The purpose of the engineering analysis is to establish the relationship between the efficiency and the cost of EPSs. There are two elements to consider in the engineering analysis; the selection of efficiency levels to analyze (*i.e.*, the “efficiency analysis”) and the determination of product cost at each efficiency level (*i.e.*, the “cost analysis”). In determining the performance of higher-efficiency products, DOE considers technologies and design option combinations not eliminated by the screening analysis. For each product class, DOE estimates the baseline cost, as well as the incremental cost for the product at efficiency levels above the baseline. The output of the engineering analysis is a set of cost-efficiency “curves” that are used in downstream analyses (*i.e.*, the LCC and PBP analyses and the NIA).

1. Efficiency Analysis

DOE typically uses one of two approaches to develop energy efficiency levels for the engineering analysis: (1) relying on observed efficiency levels in the market (*i.e.*, the efficiency-level approach), or (2) determining the incremental efficiency improvements associated with incorporating specific design options to a baseline model (*i.e.*, the design-option approach). Using the efficiency-level approach, the efficiency levels established for the analysis are determined based on the market distribution of existing products (in other words, based on the range of efficiencies and efficiency level "clusters" that already exist on the market). Using the design option approach, the efficiency levels established for the analysis are determined through detailed engineering calculations and/or computer simulations of the efficiency improvements from implementing specific design options that have been identified in the technology assessment. DOE may also rely on a combination of these two approaches. For example, the efficiency-level approach (based on actual products on the market) may be extended using the design option approach to "gap fill" levels (to bridge large gaps between other identified efficiency levels) and/or to extrapolate to the max-tech level (particularly in cases where the max-tech level exceeds the maximum efficiency level currently available on the market).

DOE currently measures active-mode efficiency by averaging the efficiencies at the 100, 75, 50, and 25-percent loading conditions. Section 5(a)(1)(vi) and Section 5(b)(1)(vi) of appendix Z. In their comments responding to the February 2022 Preliminary Analysis, PSMA, NEEA, Joint Efficiency Advocates, and the CA IOUs urged DOE to incorporate a 10-percent loading condition in the EPS test procedure and energy conservation standards, stating that such a loading condition would be more representative of real-world use. (PSMA, No. 19 at p. 2-3; CA IOUs, No. 25 at p. 7; NEEA, No. 21 at pp. 4–5; Joint Efficiency Advocates, No. 24 at p. 3) NEEA noted that

10% is a unique loading condition and that the higher mode efficiencies may not guarantee that the lower loading points between 0% and 25% in actual use would also be efficient, and therefore the 10% loading condition was justified. (NEEA, No. 21 at p. 5) NEEA and the CA IOUs also noted that the EU Code of Conduct used an efficiency measurement and efficiency target at the 10% loading level, and that efficiency gains at the 10% level were possible. ((NEEA, No. 21 at p. 5; (CA IOUs, No. 25 at p. 7) The CA IOUs claimed that a separate 10-percent loading condition standard would be most effective in producing energy savings and would add no additional burden to manufacturers who sell EPSs in the EU. (CA IOUs, No. 25 at p. 7) NEEA and Joint Efficiency Advocates encouraged DOE to incorporate the 10-percent loading condition in the active-mode efficiency metric. (NEEA, No. 21 at pp. 4–5; Joint Efficiency Advocates, No. 24 at p. 3) While PSMA encouraged a separate 10-percent loading condition standard to assist in harmonizing with EU Ecodesign requirements, PSMA recommended incorporation of the 10-percent loading condition into the active-mode efficiency metric if a separate standard is not possible. (PSMA, No. 19 at pp. 2–3)

In the August 2015 TP Final Rule, DOE concluded that a voluntary or optional reporting of a 10-percent loading condition would result in very few certifications at that loading condition. 80 FR 51424, 51433. EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results that measure energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use, and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) As such, DOE must weigh the representativeness of test results with the associated test burden in evaluating any amendments to its test procedures. Regarding representativeness, the commenters have not provided specific data, nor is DOE aware of any specific data, demonstrating how a

10-percent loading condition improve representativeness of test results for EPSs. In addition, DOE's test procedure does not differentiate between specific end-use applications; as such, load profiles specific to certain applications (*e.g.*, charging a smartphone versus powering an LED lamp) may not be representative of overall average use of EPSs across all end-use applications. If DOE were to consider a 10-percent load condition, DOE is not aware of any data to suggest what corresponding weighting factor should be used to combine this loading condition with the other defined loading conditions comprising the overall efficiency metric. Consequently, DOE is tentatively proposing not to modify the specified loading conditions to include a measurement at 10-percent load.

a. Baseline Efficiency

For each product/equipment class, DOE generally selects a baseline model as a reference point for each class, and measures changes resulting from potential energy conservation standards against the baseline. The baseline model in each product/equipment class represents the characteristics of a product/equipment typical of that class (e.g., capacity, physical size). Generally, a baseline model is one that just meets current energy conservation standards, or, if no standards are in place, the baseline is typically the most common or least efficient unit on the market.

In its preliminary analysis, DOE evaluated the current energy conservation standards as baseline efficiency level for all product classes.[21] DOE did not receive any

[21] See Chapter 5 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: www.regulations.gov/document/EERE-2020-BT-STD-0006-0012) (last accessed Sept. 12, 2022).

comments regarding the baseline levels in response to the February 2022 Preliminary Analysis, and DOE evaluated the same baseline levels for this NOPR's analysis.

b. Higher Efficiency Levels

DOE defined several higher efficiency levels at which to evaluate manufacturer production costs ("MPCs") for this NOPR. The first level, Efficiency Level 1 ("EL1"), corresponds to the proposed EU CoC Tier 2 standards. Higher efficiency levels were defined using an analysis of active-mode efficiencies and no-load power draws reported in the CCD. For the AC-DC Basic- and Low-Voltage product classes, EL2 and EL3 were defined on the basis of pass rates of 50 percent and 10–20 percent (termed "best in market"), respectively. As part of DOE's analysis, the maximum available efficiency level is the highest efficiency unit currently available on the market. DOE defined the "max-tech" efficiency level, EL4, as the efficiency and no-load power draw which result in a 5 percent pass rate of all AC-DC Basic-Voltage EPS models on the market. For the AC-AC product classes, DOE did not derive separate ELs based on pass rates. DOE maintained the same active mode efficiency equations as their AC-DC counterparts, with a slightly higher no-load allowance to account for the higher typical no-load consumption seen in AC-AC power supplies.

DOE notes that there are no EU COC Tier 2 equivalent standards for multiple-voltage EPSs. Therefore, DOE defined EL1 for this product class on the basis of a 70 percent pass rate. This pass rate aligns with the EL1 pass rate of 72% for AC-DC basic voltage products. EL2, EL3 and EL4 were subsequently defined based on a 40 percent, 10 percent, and 1 percent pass rate.

In summary, DOE analyzed the following efficiency levels for this proposal:

Table IV.3 Efficiency Levels for AC-DC, Basic-Voltage External Power Supplies

EL0: Current Standards		
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
EL1: EU CoC Tier 2 Standards		
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075
1 W < $P_{out} \leq 49$ W	$\geq 0.071 \times \ln(P_{out}) - 0.00115 \times P_{out} + 0.67$	≤ 0.075
49 W < $P_{out} \leq 250$ W	≥ 0.890	≤ 0.150
$P_{out} > 250$ W	≥ 0.890	≤ 0.150
EL2: Top 50 Percent		
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.065
1 W < $P_{out} \leq 49$ W	$\geq 0.0617 \times \ln(P_{out}) - 0.00105 \times P_{out} + 0.704$	≤ 0.065
49 W < $P_{out} \leq 250$ W	≥ 0.895	≤ 0.130
$P_{out} > 250$ W	≥ 0.900	≤ 0.130
EL3: Best In Market		
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.050
1 W < $P_{out} \leq 49$ W	$\geq 0.0582 \times \ln(P_{out}) - 0.00104 \times P_{out} + 0.727$	≤ 0.050
49 W < $P_{out} \leq 250$ W	≥ 0.902	≤ 0.110
$P_{out} > 250$ W	≥ 0.907	≤ 0.110
EL4: Max-Tech		
$P_{out} \leq 1$ W	$\geq 0.52 \times P_{out} + 0.170$	≤ 0.039
1 W < $P_{out} \leq 49$ W	$\geq 0.0654 \times \ln(P_{out}) - 0.00149 \times P_{out} + 0.732$	≤ 0.039
49 W < $P_{out} \leq 250$ W	≥ 0.916	≤ 0.089
$P_{out} > 250$ W	≥ 0.916	≤ 0.120

Table IV.4 Efficiency Levels for AC-DC, Low-Voltage External Power Supplies

EL0: Current Standards

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
EL1: EU CoC Tier 2 Standards		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0011 \times P_{out} + 0.609$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.150
$P_{out} > 250$ W	≥ 0.880	≤ 0.150
EL2: Top 50 Percent		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.065
1 W $< P_{out} \leq 49$ W	$\geq 0.0741 \times \ln(P_{out}) - 0.00105 \times P_{out} + 0.643$	≤ 0.065
49 W $< P_{out} \leq 250$ W	≥ 0.885	≤ 0.130
$P_{out} > 250$ W	≥ 0.900	≤ 0.150
EL3: Best In Market		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.050
1 W $< P_{out} \leq 49$ W	$\geq 0.0706 \times \ln(P_{out}) - 0.00104 \times P_{out} + 0.666$	≤ 0.050
49 W $< P_{out} \leq 250$ W	≥ 0.892	≤ 0.110
$P_{out} > 250$ W	≥ 0.907	≤ 0.130
EL4: Max-Tech		
$P_{out} \leq 1$ W	$\geq 0.537 \times P_{out} + 0.097$	≤ 0.039
1 W $< P_{out} \leq 49$ W	$\geq 0.0778 \times \ln(P_{out}) - 0.00149 \times P_{out} + 0.671$	≤ 0.039
49 W $< P_{out} \leq 250$ W	≥ 0.906	≤ 0.089
$P_{out} > 250$ W	≥ 0.916	≤ 0.120

Table IV.5 Efficiency Levels for AC-AC, Basic-Voltage External Power Supplies

EL0: Current Standards		
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

$1\ W < P_{out} \leq 49\ W$	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.670$	≤ 0.210
$49\ W < P_{out} \leq 250\ W$	≥ 0.880	≤ 0.210
$P_{out} > 250\ W$	≥ 0.875	≤ 0.500
EL1: EU CoC Tier 2 Standards		
$P_{out} \leq 1\ W$	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.185
$1\ W < P_{out} \leq 49\ W$	$\geq 0.071 \times \ln(P_{out}) - 0.00115 \times P_{out} + 0.670$	≤ 0.185
$49\ W < P_{out} \leq 250\ W$	≥ 0.890	≤ 0.185
$P_{out} > 250\ W$	≥ 0.890	≤ 0.500
EL2		
$P_{out} \leq 1\ W$	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.150
$1\ W < P_{out} \leq 49\ W$	$\geq 0.0617 \times \ln(P_{out}) - 0.00105 \times P_{out} + 0.704$	≤ 0.150
$49\ W < P_{out} \leq 250\ W$	≥ 0.895	≤ 0.150
$P_{out} > 250\ W$	≥ 0.895	≤ 0.300
EL3: Best In Market		
$P_{out} \leq 1\ W$	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075
$1\ W < P_{out} \leq 49\ W$	$\geq 0.0582 \times \ln(P_{out}) - 0.00104 \times P_{out} + 0.727$	≤ 0.075
$49\ W < P_{out} \leq 250\ W$	≥ 0.902	≤ 0.075
$P_{out} > 250\ W$	≥ 0.902	≤ 0.200
EL4: Max-Tech		
$P_{out} \leq 1\ W$	$\geq 0.520 \times P_{out} + 0.170$	≤ 0.039
$1\ W < P_{out} \leq 49\ W$	$\geq 0.0654 \times \ln(P_{out}) - 0.00149 \times P_{out} + 0.732$	≤ 0.039
$49\ W < P_{out} \leq 250\ W$	≥ 0.916	≤ 0.089
$P_{out} > 250\ W$	≥ 0.916	≤ 0.100

Table IV.6 Efficiency Levels for AC-AC, Low-Voltage External Power Supplies

EL0: Current Standards		
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
$49\ W < P_{out} \leq 250\ W$	≥ 0.870	≤ 0.210
$P_{out} > 250\ W$	≥ 0.875	≤ 0.500

EL1: EU CoC Tier 2 Standards		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.072
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0011 \times P_{out} + 0.609$	≤ 0.072
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.185
$P_{out} > 250$ W	≥ 0.880	≤ 0.500
EL2		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.060
1 W $< P_{out} \leq 49$ W	$\geq 0.0741 \times \ln(P_{out}) - 0.00105 \times P_{out} + 0.643$	≤ 0.060
49 W $< P_{out} \leq 250$ W	≥ 0.885	≤ 0.150
$P_{out} > 250$ W	≥ 0.900	≤ 0.300
EL3: Best In Market		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.050
1 W $< P_{out} \leq 49$ W	$\geq 0.0706 \times \ln(P_{out}) - 0.00104 \times P_{out} + 0.666$	≤ 0.050
49 W $< P_{out} \leq 250$ W	≥ 0.892	≤ 0.075
$P_{out} > 250$ W	≥ 0.907	≤ 0.200
EL4: Max-Tech		
$P_{out} \leq 1$ W	$\geq 0.537 \times P_{out} + 0.097$	≤ 0.039
1 W $< P_{out} \leq 49$ W	$\geq 0.0778 \times \ln(P_{out}) - 0.00149 \times P_{out} + 0.671$	≤ 0.039
49 W $< P_{out} \leq 250$ W	≥ 0.906	≤ 0.089
$P_{out} > 250$ W	≥ 0.916	≤ 0.100

Table IV.7 Efficiency Levels for Multiple-Voltage External Power Supplies

EL0: Current Standards		
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
EL1: Top 65 Percent		
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.100
1 W $< P_{out} \leq 49$ W	$\geq 0.0703 \times \ln(P_{out}) - 0.000406 \times P_{out} + 0.628$	≤ 0.100

$P_{out} > 49$ W	≥ 0.880	≤ 0.150
EL2: Top 40 Percent		
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0782 \times \ln(P_{out}) - 0.0013 \times P_{out} + 0.643$	≤ 0.075
$P_{out} > 49$ W	≥ 0.885	≤ 0.125
EL3: Best In Market		
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.050
1 W $< P_{out} \leq 49$ W	$\geq 0.0861 \times \ln(P_{out}) - 0.00169 \times P_{out} + 0.642$	≤ 0.050
$P_{out} > 49$ W	≥ 0.895	≤ 0.075
EL4: Max-Tech		
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.030
1 W $< P_{out} \leq 49$ W	$\geq 0.0758 \times \ln(P_{out}) - 0.00132 \times P_{out} + 0.674$	≤ 0.030
$P_{out} > 49$ W	≥ 0.905	≤ 0.050

2. Cost Analysis

The cost analysis portion of the engineering analysis is conducted using one or a combination of cost approaches. The selection of cost approach depends on a suite of factors, including the availability and reliability of public information, characteristics of the regulated product, the availability and timeliness of purchasing the product on the market. The cost approaches are summarized as follows:

- Physical teardowns: Under this approach, DOE physically dismantles a commercially available product, component-by-component, to develop a detailed bill of materials for the product.

- Catalog teardowns: In lieu of physically deconstructing a product, DOE identifies each component using parts diagrams (available from manufacturer websites or appliance repair websites, for example) to develop the bill of materials for the product.

- Price surveys: If neither a physical nor catalog teardown is feasible (for example, for tightly integrated products such as fluorescent lamps, which are infeasible to disassemble and for which parts diagrams are unavailable) or cost-prohibitive and otherwise impractical (e.g., large commercial boilers), DOE conducts price surveys using publicly available pricing data published on major online retailer websites and/or by soliciting prices from distributors and other commercial channels.

In this NOPR, DOE conducted the analysis using all three methods of analysis (physical teardowns, catalog teardowns, and price surveys) to determine manufacturing costs relating to the efficiency of a power supply. Representative units for teardown were selected from the CCD based on reported active mode efficiency and no-load power. Several units were selected as representative units for each EL. In addition to units from the CCD, DOE purchased evaluation boards from semiconductor manufacturers to evaluate generic designs likely to be used in a wide variety of power supplies on the market. DOE received additional cost data from manufacturer interviews and from stakeholder feedback, which were incorporated in the cost modeling.

Prior to testing and teardown of CCD units and evaluation boards, test units were prepared to reduce application-specific variables present in some units that might skew test results. Preparation included removal of circuitry not related to EPS functionality and installation of new, standardized cables. Prepared units were tested in accordance with DOE test procedures.

After testing, DOE performed physical teardowns of CCD units and catalog teardowns of evaluation boards. DOE developed estimates of MPCs for each unit in the teardown sample to develop a set of MPCs at each efficiency level. DOE selected most of its units from the AC-DC Basic-Voltage product class, as a significant number of models and shipments of EPSs belong to this class. Additional units belonging to the AC-DC Low-Voltage and Multiple-Voltage product classes were also torn down. Further, price survey data was collected in manufacturer interviews and from stakeholder feedback for units at each efficiency level. Data was combined to generate cost/efficiency relationships at each evaluated power level, to which exponential curve fits were applied. Finally, incremental MPCs were calculated at each efficiency level using the fit equations. A further discussion of the cost analysis can be found at chapter 5 of the NOPR TSD.

DOE received several comments about the cost analysis performed during the February 2022 Preliminary Analysis.

ITI expressed concern about the broad amount of extrapolation used during the preliminary analysis, and encouraged DOE to study more representative models in each product class. (ITI, No. 20 at p. 2) Additionally, ITI encouraged DOE to use less extrapolation and more representative units when estimating MPCs. (ITI, No. 20 at p. 3) NEEA encouraged DOE to conduct detailed teardowns of the AC-DC low-voltage product class, citing the prevalence of such EPSs in the market and the potential for differing technology options among them. (NEEA, No. 21 at pp. 3–4)

The Joint Efficiency Advocates and the CA IOUs urged DOE to conduct additional product testing and teardowns on representative units for AC-DC Basic-Voltage and Low-Voltage product classes. The Joint Efficiency Advocates acknowledged

DOE's method of extrapolating and interpolating from known AC-DC basic-voltage units but stated concerns about the accuracy of the methods. (Joint Efficiency Advocates, No. 24 at p. 2) Furthermore, the Joint Efficiency Advocates and the CA IOUs stated that DOE should test and teardown more AC-DC low-voltage EPSs because these are estimated to have greater shipments than AC-DC basic-voltage EPSs. (Joint Efficiency Advocates, No. 24 at p. 2; CA IOUs, No. 25 at pp. 4–5) The CA IOUs urged DOE to expand the current analysis scope to analyze potential savings of updated standards levels more thoroughly. In addition to products with high shipments, the CA IOUs commented that "high-energy-impact products" should be further examined, such as those with Power over Ethernet ("PoE") technology. (CA IOUs, No. 25 at pp. 4–5)

DOE agreed that an increased number of teardowns from the February 2022 Preliminary Analysis would improve its analysis. As such, DOE performed additional teardowns for this NOPR, including teardowns across other product classes (AC-DC Low-Voltage and Multiple-Voltage), to validate both the representative unit MPC values as well as those obtained using extrapolation methods. With regards to the CA IOUs' suggestion to evaluate "high-energy-impact products," DOE's analysis adequately captures all major applications of EPSs, especially high-energy-impact-products, and pairs each application with a usage profile to calculate total energy consumption with and without amended standards.

The Joint Efficiency Advocates, NEEA, and PSMA urged DOE to update its cost assumptions about the CSLs presented in the preliminary analysis, especially CSL4 (max-tech). PSMA also stated that certain technologies can deliver efficiencies higher than those listed for CSL4, and the incremental costs DOE cited in its Preliminary Analysis were greatly overstated compared to what PSMA observes in the marketplace, and in some cases were over twice the marketplace incremental costs. (PSMA, No. 19 at p. 2) PSMA noted there was minimal cost overhead due to the high volume manufacturing and claimed that with more representative pricing, raising standards to at the very least CSL1 should be justifiable, but that CSL2 or higher would be preferable looking to where power supply efficiencies will be in the future. (*Id.*) According to PSMA, current semiconductors already meet both CSL2 and CSL3, and therefore currently available technologies could meet those standards. (*Id.*) Similarly, both NEEA and the Joint Efficiency Advocates claimed they obtained manufacturer-reported max-tech incremental cost data that differed significantly from DOE's estimates in the preliminary analysis and that DOE overestimated the incremental costs. The Joint Efficiency Advocates and NEEA further encouraged DOE to perform manufacturer interviews and additional tear-downs to improve estimated cost values. (Joint Efficiency Advocates, No. 24 at p. 2; NEEA, No. 21 at pp.1–4)

After presenting its initial methodology and preliminary engineering analysis in the February 2022 Preliminary Analysis, DOE conducted manufacturer interviews to obtain feedback and updated the engineering analysis as presented in this NOPR. The information received during these interviews as well as additional data from further teardowns has resulted in updated incremental costs, which can be found in chapter 5 of the NOPR TSD.

More detail about the selection process and extrapolation methods can be found in chapter 5 of the NOPR TSD.

To account for manufacturers’ non-production costs and profit margin, DOE applies a non-production cost multiplier (the manufacturer markup) to the MPC. The resulting manufacturer selling price (MSP) is the price at which the manufacturer distributes a unit into commerce. DOE, throughout its analysis, is using the average manufacturer markup presented in the February 2014 Final Rule TSD.[22] This markup was determined based on information collected during the manufacturer interviews preceding that rulemaking. More detail on the manufacturer markup is given in section IV.E of this document.

DOE requests comment on its cost analysis approach performed for this NOPR.

3. Cost-Efficiency Results

The results of the engineering analysis are presented as cost-efficiency data for each of the efficiency levels for each of the product classes that were analyzed at popular power output levels, as well as those extrapolated from a product class with similar capabilities and features. Tables and plots with MPC results, as well as extrapolation methods used both within and across each product class, are presented below as well as in greater detail in chapter 5 of the NOPR TSD. The results of the engineering analysis are reported as cost-efficiency data (or "curves") in the form of daily energy consumption (DEC) (in kWh) versus MSP (in dollars). DOE developed six curves representing the two equipment classes and three different size machines in each equipment class. The methodology for developing the curves started with determining the energy consumption for baseline equipment and MPCs for this equipment. Above the baseline, DOE implemented design options using the ratio of cost to savings, and implemented only one design option at each level. Design options were implemented until all available technologies were employed (*i.e.*, at a max-tech level). See TSD Chapter 5 for additional

[22] See Chapter 12 of the 2014 Final Rule Technical Support Document for External Power Supplies. (Available at: *www. https://www.regulations.gov/document/EERE-2008-BT-STD-0005-0217)* (last accessed Sept. 28, 2022).

detail on the engineering analysis and TSD Appendix 5B for complete cost-efficiency results.

DOE requests comment on the incremental MPCs from the NOPR engineering analysis.

Table IV.8 Incremental Manufacturer Production Costs for AC-DC, Basic-Voltage External Power Supplies

AC-DC, Basic-Voltage				
Power	Efficiency Level	Active Mode Efficiency	No Load Power (W)	Incremental MPC
2.5W	Baseline	73.16%	0.100	--
	1	73.22%	0.075	$0.01
	2	75.79%	0.065	$0.45
	3	77.77%	0.050	$0.85
	4	78.82%	0.039	$1.10
12W	Baseline	82.96%	0.100	--
	1	83.26%	0.075	$0.08
	2	84.47%	0.065	$0.42
	3	85.91%	0.050	$0.88
	4	87.66%	0.039	$1.53
24W	Baseline	86.20%	0.100	--
	1	86.80%	0.075	$0.20
	2	87.49%	0.065	$0.44
	3	88.70%	0.050	$0.90
	4	90.41%	0.039	$1.62
60W	Baseline	88.00%	0.210	--
	1	89.00%	0.150	$0.49
	2	89.50%	0.130	$0.75
	3	90.25%	0.110	$1.14
	4	91.60%	0.089	$1.89
120W	Baseline	88.00%	0.210	--
	1	89.00%	0.150	$0.78
	2	89.50%	0.130	$1.19
	3	90.25%	0.110	$1.82
	4	91.60%	0.089	$3.04

Table IV.9 Incremental Manufacturer Production Costs for AC-DC, Low-Voltage External Power Supplies

AC-DC, Low-Voltage

Power	Efficiency Level	Active Mode Efficiency	No Load Power (W)	Incremental MPC
5W	Baseline	73.62%	0.100	--
	1	73.77%	0.075	$0.03
	2	75.70%	0.065	$0.45
	3	77.44%	0.050	$0.86
	4	78.88%	0.039	$1.23
10W	Baseline	78.70%	0.100	--
	1	79.00%	0.075	$0.08
	2	80.31%	0.065	$0.45
	3	81.82%	0.050	$0.87
	4	83.52%	0.039	$1.36
12W	Baseline	79.94%	0.100	--
	1	80.30%	0.075	$0.11
	2	81.45%	0.065	$0.45
	3	82.90%	0.050	$0.88
	4	84.64%	0.039	$1.41
24W	Baseline	84.04%	0.100	--
	1	84.76%	0.075	$0.23
	2	85.33%	0.065	$0.43
	3	86.54%	0.050	$0.91
	4	88.25%	0.039	$1.69

Table IV.10 Incremental Manufacturer Production Costs for AC-AC, Basic-Voltage External Power Supplies

AC-AC Basic-Voltage				
Power	Efficiency Level	Active Mode Efficiency	No Load Power (W)	Incremental MPC
3.6W	Baseline	75.59%	0.210	--
	1	75.68%	0.185	$0.01
	2	77.93%	0.150	$0.44
	3	79.78%	0.075	$0.86
	4	81.04%	0.039	$1.19
24W	Baseline	86.20%	0.210	--
	1	86.80%	0.185	$0.19
	2	87.49%	0.150	$0.43
	3	88.70%	0.075	$0.90
	4	90.41%	0.039	$1.68
40W	Baseline	87.59%	0.210	--
	1	88.59%	0.185	$0.26
	2	88.96%	0.150	$0.40
	3	90.01%	0.075	$0.96
	4	91.37%	0.039	$2.02

Table IV.11 Incremental Manufacturer Production Costs for AC-AC, Low-Voltage External Power Supplies

AC-AC Low-Voltage				
Power	Efficiency Level	Active Mode Efficiency	No Load Power (W)	Incremental MPC
12W	Baseline	79.94%	0.210	--
	1	80.30%	0.072	$0.11
	2	81.45%	0.060	$0.45
	3	82.90%	0.050	$0.88
	4	84.64%	0.039	$1.41
17W	Baseline	82.15%	0.210	--
	1	82.66%	0.072	$0.16
	2	83.51%	0.060	$0.45
	3	84.83%	0.050	$0.90
	4	86.61%	0.039	$1.53
24W	Baseline	84.04%	0.210	--
	1	84.76%	0.072	$0.23
	2	85.33%	0.060	$0.43
	3	86.54%	0.050	$0.91
	4	88.25%	0.039	$1.69

Table IV.12 Incremental Manufacturer Production Costs for Multiple-Voltage External Power Supplies

Multiple-Voltage				
Power	Efficiency Level	Active Mode Efficiency	No Load Power (W)	Incremental MPC
18W	Baseline	77.78%	0.300	--
	1	82.39%	0.100	$0.01
	2	84.56%	0.075	$0.44
	3	86.04%	0.050	$0.86
	4	86.93%	0.030	$1.19
30W	Baseline	81.61%	0.300	--
	1	85.49%	0.100	$0.19
	2	87.00%	0.075	$0.43
	3	88.41%	0.050	$0.90
	4	89.22%	0.030	$1.68
90W	Baseline	86.00%	0.300	--
	1	88.00%	0.150	$0.26
	2	88.50%	0.125	$0.40
	3	89.50%	0.075	$0.96
	4	90.50%	0.050	$2.02

E. Markups Analysis

The markups analysis develops appropriate markups (*e.g.*, retailer markups, distributor markups, contractor markups) in the distribution chain and sales taxes to convert the MSP estimates derived in the engineering analysis to consumer prices, which are then used in the LCC and PBP analysis and in the manufacturer impact analysis. At each step in the distribution channel, companies mark up the price of the product to cover business costs and profit margin.

For EPSs, the main parties in the distribution chain are EPS Manufacturers, End-Use Product Original Equipment Manufacturers, Consumer Product Retailers, and Consumers.

DOE developed baseline and incremental markups for each actor in the distribution chain. Baseline markups are applied to the price of products with baseline efficiency, while incremental markups are applied to the difference in price between baseline and higher-efficiency models (the incremental cost increase). The incremental markup is typically less than the baseline markup and is designed to maintain similar per-unit operating profit before and after new or amended standards.[23]

In the February 2022 Preliminary Analysis, DOE used the same baseline and incremental markups that were used in the February 2014 Final Rule.[24] DOE did not

[23] Because the projected price of standards-compliant products is typically higher than the price of baseline products, using the same markup for the incremental cost and the baseline cost would result in higher per-unit operating profit. While such an outcome is possible, DOE maintains that in markets that are reasonably competitive it is unlikely that standards would lead to a sustainable increase in profitability in the long run.

[24] See Chapter 6 of the 2014 Final Rule Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2008-BT-STD-0005-0217*) (last accessed Sept. 12, 2022). See also Chapter 6 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022).

receive any comments regarding the markups or distribution channels in the February 2022 Preliminary Analysis. Therefore, DOE used the same markups in this NOPR.

Chapter 6 of the NOPR TSD provides details on DOE's development of markups for EPSs.

DOE requests comment on the estimated increased manufacturer markups and incremental MSPs that result from the analyzed energy conservation standards from the NOPR engineering analysis.

F. Energy Use Analysis

The purpose of the energy use analysis is to determine the annual energy consumption of EPSs at different efficiencies in representative U.S. single-family homes, multi-family residences, and commercial buildings, and to assess the energy savings potential of increased EPS efficiency. The energy use analysis estimates the range of energy use of EPSs in the field (*i.e.*, as they are actually used by consumers). The energy use analysis provides the basis for other analyses DOE performs, particularly assessments of the energy savings and the savings in consumer operating costs that could result from adoption of amended or new standards.

In the February 2022 Preliminary Analysis, DOE used usage profiles that were developed in the February 2014 Final Rule, along with efficiency data at different load conditions to calculate the UECs for EPSs for a variety of applications.[25] Usage profiles are estimates of the average time a device spends in each mode of operation.

DOE received a comment from ITI that the 2014 usage profiles are outdated and that they may not represent current EPS customer usage profiles and energy use, stating that devices used less energy than they used to and that they often spent different times in different modes than in the past. ITI did not provide any data regarding EPS usage and indicated that DOE should conduct a study to understand the current usage profiles of EPSs. (ITI, No. 20 at p. 3)

DOE was unable to find any updated usage information or data for most EPSs. However, in response to the comment from ITI, for certain applications, DOE revised its usage profiles compared to the 2014 estimates. These applications are likely to have more usage (and spend time in different modes) than assumed in the 2014 Final Rule analysis. The specific UECs depend on the output power and efficiency level. Some applications are analyzed across multiple output power ratings. For other applications, DOE maintained the same approach for developing UECs as in the preliminary analysis.

Chapter 7 of the NOPR TSD provides details on DOE's energy use for EPSs.

G. Life-Cycle Cost and Payback Period Analysis

DOE conducted LCC and PBP analyses to evaluate the economic impacts on individual consumers of potential energy conservation standards for EPSs. The effect of new or amended energy conservation standards on individual consumers usually involves

[25] *See* Appendix 7A of the 2014 Final Rule Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2008-BT-STD-0005-0217*) (last accessed Sept. 12, 2022). *See also* Appendix 7A of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022).

a reduction in operating cost and an increase in purchase cost. DOE used the following two metrics to measure consumer impacts:

- The LCC is the total consumer expense of an appliance or product over the life of that product, consisting of total installed cost (manufacturer selling price, distribution chain markups, sales tax, and installation costs) plus operating costs (expenses for energy use, maintenance, and repair). To compute the operating costs, DOE discounts future operating costs to the time of purchase and sums them over the lifetime of the product.

- The PBP is the estimated amount of time (in years) it takes consumers to recover the increased purchase cost (including installation) of a more-efficient product through lower operating costs. DOE calculates the PBP by dividing the change in purchase cost at higher efficiency levels by the change in annual operating cost for the year that amended or new standards are assumed to take effect.

For any given efficiency level, DOE measures the change in LCC relative to the LCC in the no-new-standards case, which reflects the estimated efficiency distribution of EPSs in the absence of new or amended energy conservation standards. In contrast, the PBP for a given efficiency level is measured relative to the baseline product.

For each considered efficiency level in each product class, DOE calculated the LCC and PBP for a nationally representative set of housing units and commercial buildings. DOE developed household samples from the 2015 Residential Energy

Consumption Survey[26] (RECS 2015) and the 2018 Commercial Building Energy Consumption Survey[27] (CBECS 2018). For each sample household, DOE determined the energy consumption for the EPSs and the appropriate energy price. By developing a representative sample of households, the analysis captured the variability in energy consumption and energy prices associated with the use of EPSs.

Inputs to the calculation of total installed cost include the cost of the product—which includes MPCs, manufacturer markups, retailer and distributor markups, and sales taxes—and installation costs. Inputs to the calculation of operating expenses include annual energy consumption, energy prices and price projections, repair and maintenance costs, product lifetimes, and discount rates. DOE created distributions of values for product lifetime, discount rates, and sales taxes, with probabilities attached to each value, to account for their uncertainty and variability.

The computer model DOE uses to calculate the LCC and PBP relies on a Monte Carlo simulation to incorporate uncertainty and variability into the analysis. The Monte Carlo simulations randomly sample input values from the probability distributions and EPCs user samples. For this rulemaking, the Monte Carlo approach is implemented in MS Excel. The model calculated the LCC and PBP for products at each efficiency level for 10,000 housing units and commercial buildings per simulation run. The analytical results include a distribution of 10,000 data points showing the range of LCC savings for a given efficiency level relative to the no-new-standards case efficiency distribution. In performing an iteration of the Monte Carlo simulation for a given consumer, product

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[26] *www.eia.gov/consumption/residential/data/2015/* (last accessed Sept. 12, 2022). EIA is currently working on RECS 2020, and the entire RECS 2020 microdata are expected to be fully released in early 2023. Until that time, RECS 2015 remains the most recent full data release. For future analyses, DOE plans to consider using the complete RECS 2020 microdata when available.

[27] *www.eia.gov/consumption/commercial/* (last accessed Sept. 12, 2022).

efficiency is chosen based on its probability. If the chosen product efficiency is greater than or equal to the efficiency of the standard level under consideration, the LCC and PBP calculation reveals that a consumer is not impacted by the standard level. By accounting for consumers who already purchase more-efficient products, DOE avoids overstating the potential benefits from increasing product efficiency.

DOE calculated the LCC and PBP for all consumers of EPSs as if each were to purchase a new product in the expected year of required compliance with new or amended standards. New and amended standards would apply to EPSs manufactured 2 years after the date on which any new or amended standard is published. (42 U.S.C. 6295(g)(10)(B)) At this time, DOE estimates publication of a final rule in the latter half of 2024 Therefore, for purposes of its analysis, DOE used 2027[28] as the first year of compliance with any amended standards for EPSs.

Table IV.13summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The subsections that follow provide further discussion. Details of the spreadsheet model, and of all the inputs to the LCC and PBP analyses, are contained in chapter 8 of the NOPR TSD and its appendices.

[28] Compliance begins two years from the publication of the final rule (i.e., latter half of 2026). However, for the purposes of simplifying it analysis, DOE used the beginning of 2027 as the first year of compliance with any amended standards for EPSs

Table IV.13 Summary of Inputs and Methods for the LCC and PBP Analysis*

Inputs	Source/Method
Product Cost	Derived by multiplying MPCs by EPS manufacturer and appliance manufacturer markups and sales tax, as appropriate. Used historical PPI data for semiconductors to derive a price scaling index to project product costs.
Installation Costs	No installation costs.
Annual Energy Use	The total annual energy use calculated using product efficiency and operating hours. Variability: Based on the 2015 RECS and 2018 CBECS
Energy Prices	Electricity: EIA data – 2021. Variability: Census Division.
Energy Price Trends	Based on *AEO2022* price projections.
Repair and Maintenance Costs	No repair or maintenance costs were considered.
Product Lifetime	Average: 3 to 10 years
Discount Rates	Approach involves identifying all possible debt or asset classes that might be used to purchase the considered appliances, or might be affected indirectly. Primary data source was the Federal Reserve Board's Survey of Consumer Finances.
Compliance Date	2027

* References for the data sources mentioned in this table are provided in the sections following the table or in chapter 8 of the NOPR TSD.

1. Product Cost

To calculate consumer product costs, DOE multiplied the MPCs developed in the engineering analysis by the markups described previously (along with sales taxes). DOE used different markups for baseline products and higher-efficiency products because DOE applies an incremental markup to the increase in MSP associated with higher-efficiency products.

In the February 2022 Preliminary Analysis, DOE did not use any price trend.[29] In response, NEEA and the CA IOUs commented that DOE should incorporate price learning into its analysis and suggested that DOE use the Producer Price Index (PPI) for the semiconductor industry to develop the price trend. (NEEA, No. 21 at p. 4, CA IOUs, No. 25 at p. 2) In this NOPR, DOE has incorporated a price trend based on the PPI for

[29] See Chapters 8 and 10 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022)

semiconductors,[30] with an estimated annual deflated price decline of approximately 6 percent per year from 1967 through 2021. DOE applied this price trend to the proportion of EPS costs attributable to semiconductors.

2. Installation Cost

NEMA commented that hard-wired AC-outlets traditionally found in residential environments can now be purchased with built-in Universal Serial Bus ("USB") ports that provide USB services as a secondary function. NEMA further stated that the installation of such a product requires certified professionals and results in a non-negligible cost to the consumer. (NEMA, No. 22 at p. 2)

With respect to installation costs, DOE notes that the installation costs would be the same regardless of efficiency level for hard-wired AC receptacles. As a result, the incremental installation costs would be $0 for higher efficiency products and would not impact the LCC analysis. Therefore, DOE did not consider installation costs in this analysis.

3. Annual Energy Consumption

For each sampled household or commercial business, DOE determined the energy consumption for an EPS at different efficiency levels using the approach described previously in section IV.F of this document.

4. Energy Prices

Because marginal electricity price more accurately captures the incremental savings associated with a change in energy use from higher efficiency, marginal

[30] Producer Price Index: Semiconductors and Related Manufacturing. Series ID: PCU334413334413. (Available at: *beta.bls.gov/dataViewer/view/timeseries/PCU334413334413*) (last accessed Sept. 12, 2022)

electricity price provides a better representation of incremental change in consumer costs than average electricity prices. Therefore, DOE applied average electricity prices for the energy use of the product purchased in the no-new-standards case, and marginal electricity prices for the incremental change in energy use associated with the other efficiency levels considered.

For the NOPR, DOE derived average monthly residential and commercial marginal electricity prices for the various regions using 2021 data from EIA.[31]

See chapter 8 of the NOPR TSD for details.

To estimate energy prices in future years, DOE multiplied the 2021 energy prices by the projection of annual average price changes for each of the nine census divisions from the Reference case in *AEO2022*, which has an end year of 2050.[32] To estimate price trends after 2050, DOE used the average annual rate of change in prices from 2023 through 2050.

5. Maintenance and Repair Costs

In the February 2022 Preliminary Analysis, DOE noted that it expects consumers would discard and replace an EPS which fails before the product with which it is designed to operate, rather than seek to repair that EPS.[33] DOE did not receive comment

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[31] U.S. Department of Energy-Energy Information Administration, Form EIA-861M (formerly EIA-826) Database Monthly Electric Utility Sales and Revenue Data (1990-2020). (Available at: *www.eia.gov/electricity/data/eia861m/*) (last accessed Sept. 12, 2022).
[32] EIA. *Annual Energy Outlook 2018 with Projections to 2050*. Washington, DC. (Available at *www.eia.gov/forecasts/aeo/*) (last accessed Sept. 12, 2022).
[33] See Chapter 8, section 8.3.3 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022)

on this approach, and therefore DOE did not consider maintenance and repair costs in this analysis.

6. Product Lifetime

In the February 2022 Preliminary Analysis, DOE based the EPS lifetime on the lifetime of the application for which it is associated.[34] In response, the CA IOUs suggested that this approach is reasonable for most EPSs, but that some manufacturers commonly sell products (like phones) with only a USB cord and not an EPS. Therefore, an EPS with a USB connection may have a lifetime longer than that of the initial application and DOE's assumption may no longer be valid. (CA IOUs, No. 25 at p. 6) The Joint Efficiency Advocates also commented that DOE should re-evaluate the approach to lifetimes as many AC-DC low voltage EPS are sold as stand-alone products that are independent from the end-use product, and that sellers of end-use products increasingly no longer bundle low-voltage EPSs so that users may reuse their existing EPSs. The Joint Efficiency Advocates believe that these stand-alone EPSs will have much longer lifetimes than their end use applications, and therefore DOE should extend the lifetime estimates for these products. (Joint Efficiency Advocates, No. 24 at p. 3). However, the CA IOUs and the Joint Efficiency Advocates did not provide any lifetime data for this specific type of EPS.

DOE was unable to find any updated lifetime information or data for EPSs. However, in response to these comments, DOE increased the lifetime for thirteen applications. DOE agrees that some applications (*e.g.*, phones) are likely to have an EPS lifetime longer than that of the application. DOE also increased the lifetime estimates for

[34] See Chapter 8, section 8.3.4 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022)

a few other applications to be more representative of current usage. The increase in lifetime ranges from one to three years, except for security cameras which now match the lifetime of home security systems used in the 2022 Preliminary Analysis for battery chargers.[35] For the rest of the applications, DOE maintained the lifetime approach that it used in the February 2022 Preliminary Analysis.

7. Discount Rates

In the calculation of LCC, DOE applies discount rates appropriate to households and commercial buildings to estimate the present value of future operating cost savings. DOE estimated a distribution of discount rates for EPSs based on the opportunity cost of consumer funds.

For residential households, DOE applies weighted average discount rates calculated from consumer debt and asset data, rather than marginal or implicit discount rates.[36] The LCC analysis estimates net present value over the lifetime of the product, so the appropriate discount rate will reflect the general opportunity cost of household funds, taking this time scale into account. Given the long time horizon modeled in the LCC analysis, the application of a marginal interest rate associated with an initial source of funds is inaccurate. Regardless of the method of purchase, consumers are expected to continue to rebalance their debt and asset holdings over the LCC analysis period, based on the restrictions consumers face in their debt payment requirements and the relative

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[35] See Chapter 8, section 8.3.4 of the 2022 Preliminary Analysis Technical Support Document for Battery Chargers. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0013-0009*) (last accessed Sept. 12, 2022)

[36] The implicit discount rate is inferred from a consumer purchase decision between two otherwise identical goods with different first cost and operating cost. It is the interest rate that equates the increment of first cost to the difference in net present value of lifetime operating cost, incorporating the influence of several factors: transaction costs; risk premiums and response to uncertainty; time preferences; interest rates at which a consumer is able to borrow or lend. The implicit discount rate is not appropriate for the LCC analysis because it reflects a range of factors that influence consumer purchase decisions, rather than the opportunity cost of the funds that are used in purchases.

size of the interest rates available on debts and assets. DOE estimates the aggregate impact of this rebalancing using the historical distribution of debts and assets.

To establish residential discount rates for the LCC analysis, DOE identified all relevant household debt or asset classes in order to approximate a consumer's opportunity cost of funds related to appliance energy cost savings. It estimated the average percentage shares of the various types of debt and equity by household income group using data from the Federal Reserve Board's Survey of Consumer Finances[37] ("SCF") for 1995, 1998, 2001, 2004, 2007, 2010, 2013, 2016, and 2019. Using the SCF and other sources, DOE developed a distribution of rates for each type of debt and asset by income group to represent the rates that may apply in the year in which amended standards would take effect. DOE assigned each sample household a specific discount rate drawn from one of the distributions. The average rate across all types of household debt and equity and income groups, weighted by the shares of each type, is 4.26% percent.

For commercial buildings, DOE derived the discount rates for the LCC analysis by estimating the cost of capital for companies or public entities that purchase EPSs. For private firms, the weighted average cost of capital ("WACC") is commonly used to estimate the present value of cash flows to be derived from a typical company project or investment. Most companies use both debt and equity capital to fund investments, so their cost of capital is the weighted average of the cost to the firm of equity and debt financing, as estimated from financial data for publicly traded firms across all commercial sectors. The average commercial cost of capital is 6.77%.

[37] Board of Governors of the Federal Reserve System. *Survey of Consumer Finances*. 1995, 1998, 2001, 2004, 2007, 2010, 2013, 2016, and 2019. (Available at: *www.federalreserve.gov/econres/scfindex.htm*) (last accessed Sept. 12, 2022).

See chapter 8 of the NOPR TSD for further details on the development of consumer discount rates.

8. Energy Efficiency Distribution in the No-New-Standards Case

To accurately estimate the share of consumers that would be affected by a potential energy conservation standard at a particular efficiency level, DOE's LCC analysis considered the projected distribution (market shares) of product efficiencies under the no-new-standards case (*i.e.*, the case without amended or new energy conservation standards).

In the February 2022 Preliminary Analysis, DOE used the CCD[38] to estimate the energy efficiency distribution of EPSs for 2027.[39] The estimated market shares for the no-new-standards case for EPSs are shown in Table IV.14. See chapter 8 of the NOPR TSD for further information on the derivation of the efficiency distributions.

Table IV.14 Estimated Market Shares of EPSs in No-New-Standards Case

Power Level	Efficiency Levels				
	Current DOE Stds	EU CoC T2	Top 50%	Best in Market	Max-Tech
PC 1: Dir SV AC-DC Basic (2.5w)	0%	52%	26%	22%	0%
PC 1: Dir SV AC-DC Basic (12w)	18%	35%	41%	6%	0%
PC 1: Dir SV AC-DC Basic (24w)	22%	40%	34%	4%	0%
PC 1: Dir SV AC-DC Basic (60w)	50%	21%	17%	13%	0%
PC 1: Dir SV AC-DC Basic (120w)	26%	32%	26%	16%	0%
PC 2: Dir SV AC-DC Low (5w)	6%	65%	19%	8%	2%
PC 2: Dir SV AC-DC Low (10w)	17%	29%	28%	26%	0%
PC 2: Dir SV AC-DC Low (12w)	27%	28%	26%	17%	3%
PC 2: Dir SV AC-DC Low (24w)	44%	7%	45%	4%	0%
PC 3: Dir SV AC-AC Basic (3.6w)	67%	0%	33%	0%	0%
PC 3: Dir SV AC-AC Basic (24w)	0%	50%	50%	0%	0%
PC 3: Dir SV AC-AC Basic (40w)	100%	0%	0%	0%	0%

[38] https://www.regulations.doe.gov/ccms

[39] See Chapter 8, section 8.4 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022)

PC 5: Dir MV (18w)	2%	14%	51%	24%	8%
PC 5: Dir MV (30w)	56%	8%	25%	11%	0%
PC 5: Dir MV (90w)	0%	50%	25%	0%	25%

9. Payback Period Analysis

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

The inputs to the PBP calculation for each efficiency level are the change in total installed cost of the product and the change in the first-year annual operating expenditures relative to the baseline. The PBP calculation uses the same inputs as the LCC analysis, except that discount rates are not needed.

As noted previously, EPCA establishes a rebuttable presumption that a standard is economically justified if the Secretary finds that the additional cost to the consumer of purchasing a product complying with an energy conservation standard level will be less than three times the value of the first year's energy savings resulting from the standard, as calculated under the applicable test procedure. (42 U.S.C. 6295(o)(2)(B)(iii)) For each considered efficiency level, DOE determined the value of the first year's energy savings by calculating the energy savings in accordance with the applicable DOE test procedure, and multiplying those savings by the average energy price projection for the year in which compliance with the amended standards would be required.

H. Shipments Analysis

DOE uses projections of annual product shipments to calculate the national impacts of potential amended or new energy conservation standards on energy use, NPV, and future manufacturer cash flows.[40] The shipments model takes an accounting approach, tracking market shares of each product class and the vintage of units in the stock. Stock accounting uses product shipments as inputs to estimate the age distribution of in-service product stocks for all years. The age distribution of in-service product stocks is a key input to calculations of both the NES and NPV, because operating costs for any year depend on the age distribution of the stock.

In the February 2022 Preliminary Analysis, DOE developed shipments estimates based on actual shipments from 2019 and a population growth rate based on U.S. Census population projections through 2050.[41] DOE did not receive any comments on the shipments analysis and therefore used this same approach in the NOPR.

See Chapter 9 of the NOPR TSD for more detail on the shipments analysis.

DOE requests comment on its methodology for estimating shipments. DOE also requests comment on its approach to estimate the market share for EPSs of all product classes. DOE requests comment on the observed and expected changes in quantity and use of external power supplies, by type of power supply, and changes in shipments of products that use external power supplies, including consumer electronics, power tools, and medical devices, among others.

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[40] DOE uses data on manufacturer shipments as a proxy for national sales, as aggregate data on sales are lacking. In general, one would expect a close correspondence between shipments and sales.

[41] See Chapter 9 of the 2022 Preliminary Analysis Technical Support Document for External Power Supplies. (Available at: *www.regulations.gov/document/EERE-2020-BT-STD-0006-0012*) (last accessed Sept. 12, 2022)

I. National Impact Analysis

The NIA assesses the NES and the NPV from a national perspective of total consumer costs and savings that would be expected to result from new or amended standards at specific efficiency levels.[42] ("Consumer" in this context refers to consumers of the product being regulated.) DOE calculates the NES and NPV for the potential standard levels considered based on projections of annual product shipments, along with the annual energy consumption and total installed cost data from the energy use and LCC analyses. For the present analysis, DOE projected the energy savings, operating cost savings, product costs, and NPV of consumer benefits over the lifetime of EPSs sold from 2027 through 2056.

DOE evaluates the impacts of new or amended standards by comparing a case without such standards with standards-case projections. The no-new-standards case characterizes energy use and consumer costs for each product class in the absence of new or amended energy conservation standards. For this projection, DOE considers historical trends in efficiency and various forces that are likely to affect the mix of efficiencies over time. DOE compares the no-new-standards case with projections characterizing the market for each product class if DOE adopted new or amended standards at specific energy efficiency levels (*i.e.*, the TSLs or standards cases) for that class. For the standards cases, DOE considers how a given standard would likely affect the market shares of products with efficiencies greater than the standard.

DOE uses a spreadsheet model to calculate the energy savings and the national consumer costs and savings from each TSL. Interested parties can review DOE's

[42] The NIA accounts for impacts in the 50 states and U.S. territories.

analyses by changing various input quantities within the spreadsheet. The NIA spreadsheet model uses typical values (as opposed to probability distributions) as inputs.

Table IV.15 summarizes the inputs and methods DOE used for the NIA analysis for the NOPR. Discussion of these inputs and methods follows the table. See chapter 10 of the NOPR TSD for further details.

Table IV.15 Summary of Inputs and Methods for the National Impact Analysis

Inputs	Method
Shipments	Annual shipments from shipments model.
Compliance Date of Standard	2027
Efficiency Trends	No-new-standards case: Varies by application.
Annual Energy Consumption per Unit	Annual weighted-average values are a function of energy use at each TSL.
Total Installed Cost per Unit	Annual weighted-average values are a function of cost at each TSL. Incorporates projection of future product prices based on historical data.
Annual Energy Cost per Unit	Annual weighted-average values as a function of the annual energy consumption per unit and energy prices.
Repair and Maintenance Cost per Unit	Annual values do not change with efficiency level.
Energy Price Trends	*AEO2022* projections (to 2050) and extrapolation thereafter based on the growth rate from 2023-2050.
Energy Site-to-Primary and FFC Conversion	A time-series conversion factor based on *AEO2022*.
Discount Rate	3 percent and 7 percent
Present Year	2021

1. Product Efficiency Trends

A key component of the NIA is the trend in energy efficiency projected for the no-new-standards case and each of the standards cases. Section IV.G.8 of this document describes how DOE developed an energy efficiency distribution for the no-new-standards case (which yields a shipment-weighted average efficiency) for each of the considered product classes for the year of anticipated compliance with an amended or new standard. To project the trend in efficiency absent amended standards for EPSs over the entire shipments projection period, DOE assumed a constant efficiency trend. The approach is further described in chapter 10 of the NOPR TSD.

For the standards cases, DOE used a "roll-up" scenario to establish the shipment-weighted efficiency for the year that standards are assumed to become effective (2027). In this scenario, the market shares of products in the no-new-standards case that do not meet the standard under consideration would "roll up" to meet the new standard level, and the market share of products above the standard would remain unchanged.

To develop standards case efficiency trends after 2027, DOE used a constant efficiency trend, keeping the distribution equal to the compliance year.

2. National Energy Savings

The national energy savings analysis involves a comparison of national energy consumption of the considered products between each potential standards case ("TSL") and the case with no new or amended energy conservation standards. DOE calculated the national energy consumption by multiplying the number of units (stock) of each product (by vintage or age) by the unit energy consumption (also by vintage). DOE calculated annual NES based on the difference in national energy consumption for the no-new standards case and for each higher efficiency standard case. DOE estimated energy consumption and savings based on site energy and converted the electricity consumption and savings to primary energy (*i.e.*, the energy consumed by power plants to generate site electricity) using annual conversion factors derived from *AEO2022*. Cumulative energy savings are the sum of the NES for each year over the timeframe of the analysis.

Use of higher-efficiency products is occasionally associated with a direct rebound effect, which refers to an increase in utilization of the product due to the increase in efficiency. DOE did not consider a rebound effect in this analysis, because the price differences by EL and energy use are so small that any rebound effect would be close to zero.

In 2011, in response to the recommendations of a committee on "Point-of-Use and Full-Fuel-Cycle Measurement Approaches to Energy Efficiency Standards" appointed by the National Academy of Sciences, DOE announced its intention to use FFC measures of energy use and greenhouse gas and other emissions in the national impact analyses and emissions analyses included in future energy conservation standards rulemakings. 76 FR 51281 (Aug. 18, 2011). After evaluating the approaches discussed in the August 18, 2011 notice, DOE published a statement of amended policy in which DOE explained its determination that EIA's National Energy Modeling System ("NEMS") is the most appropriate tool for its FFC analysis and its intention to use NEMS for that purpose. 77 FR 49701 (Aug. 17, 2012). NEMS is a public domain, multi-sector, partial equilibrium model of the U.S. energy sector[43] that EIA uses to prepare its *Annual Energy Outlook*. The FFC factors incorporate losses in production and delivery in the case of natural gas (including fugitive emissions) and additional energy used to produce and deliver the various fuels used by power plants. The approach used for deriving FFC measures of energy use and emissions is described in appendix 10B of the NOPR TSD.

3. Net Present Value Analysis

The inputs for determining the NPV of the total costs and benefits experienced by consumers are (1) total annual installed cost, (2) total annual operating costs (energy costs and repair and maintenance costs), and (3) a discount factor to calculate the present value of costs and savings. DOE calculates net savings each year as the difference between the no-new-standards case and each standards case in terms of total savings in

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[43] For more information on NEMS, refer to *The National Energy Modeling System: An Overview*. (Available at: *www.eia.gov/analysis/pdfpages/0581(2009)index.php*) (last accessed Sept. 12, 2022).

operating costs versus total increases in installed costs. DOE calculates operating cost savings over the lifetime of each product shipped during the projection period.

As discussed in section IV.G.1 of this document, DOE developed EPS price trends based on historical PPI data for the semiconductor industry. DOE applied the same trends to project prices for each product class at each considered efficiency level. By 2056, which is the end date of the projection period, the average EPS price is projected to drop 90 percent relative to 2021. DOE's projection of product prices is described in appendix 10C of the NOPR TSD.

The operating cost savings are energy cost savings, which are calculated using the estimated energy savings in each year and the projected price of the appropriate form of energy. To estimate energy prices in future years, DOE multiplied the average regional energy prices by the projection of annual national-average residential and commercial energy price changes in the Reference case from *AEO2022*, which has an end year of 2050. To estimate price trends after 2050, DOE used the average annual rate of change in prices from 2023 through 2050.

In calculating the NPV, DOE multiplies the net savings in future years by a discount factor to determine their present value. For this NOPR, 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.[44] The discount rates for the determination of NPV are in contrast to the discount rates used

[44] United States Office of Management and Budget. *Circular A-4: Regulatory Analysis*. September 17, 2003. Section E. (Available at: *www.whitehouse.gov/omb/memoranda/m03-21.html*) (last accessed Sept. 12, 2022).

in the LCC analysis, which are designed to reflect a consumer's perspective. The 7-percent real value is an estimate of the average before-tax rate of return to private capital in the U.S. economy. The 3-percent real value represents the "social rate of time preference," which is the rate at which society discounts future consumption flows to their present value.

J. Consumer Subgroup Analysis

In analyzing the potential impact of new or amended energy conservation standards on consumers, DOE evaluates the impact on identifiable subgroups of consumers that may be disproportionately affected by a new or amended national standard. The purpose of a subgroup analysis is to determine the extent of any such disproportional impacts. DOE evaluates impacts on particular subgroups of consumers by analyzing the LCC impacts and PBP for those particular consumers from alternative standard levels. For this NOPR, DOE analyzed the impacts of the considered standard levels on one subgroup: low-income households. The analysis used subsets of the RECS 2015 and CBECS 2018 sample composed of households that meet the criteria for the two subgroups. DOE used the LCC and PBP spreadsheet model to estimate the impacts of the considered efficiency levels on these subgroups. Chapter 11 in the NOPR TSD describes the consumer subgroup analysis.

K. Manufacturer Impact Analysis

1. Overview

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

The quantitative part of the MIA primarily relies on the Government Regulatory Impact Model ("GRIM"), an industry cash flow model with inputs specific to this rulemaking. The key GRIM inputs include data on the industry cost structure, unit production costs, product shipments, manufacturer markups, and investments in R&D and manufacturing capital required to produce compliant products. The key GRIM outputs are the INPV, which is the sum of industry annual cash flows over the analysis period, discounted using the industry-weighted average cost of capital, and the impact to domestic manufacturing employment. The model uses standard accounting principles to estimate the impacts of more-stringent energy conservation standards on a given industry by comparing changes in INPV and domestic manufacturing employment between a no-new-standards case and the various standards cases ("TSLs"). To capture the uncertainty relating to manufacturer pricing strategies following amended standards, the GRIM estimates a range of possible impacts under different markup scenarios.

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

DOE conducted the MIA for this rulemaking in three phases. In Phase 1 of the MIA, DOE prepared a profile of the EPS manufacturing industry based on the market and technology assessment, manufacturer interviews, and publicly-available information. This included a top-down analysis of EPS manufacturers that DOE used to derive preliminary financial inputs for the GRIM (*e.g.*, revenues; materials, labor, overhead, and depreciation expenses; selling, general, and administrative expenses ("SG&A"); and R&D expenses). DOE also used public sources of information to further calibrate its initial characterization of the EPS manufacturing industry, including company filings of form 10-K from the U.S. Securities and Exchange Commission ("SEC"),[45] corporate annual reports, the U.S. Census Bureau's *Economic Census*,[46] and reports from D&B Hoovers.[47]

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

In Phase 3 of the MIA, DOE also evaluated subgroups of manufacturers that may be disproportionately impacted by amended standards or that may not be accurately

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45 *See www.sec.gov/edgar.shtml*.

46 *See www.census.gov/programs-surveys/asm/data.html*.

47 *See https://app.dnbhoovers.com*.

represented by the average cost assumptions used to develop the industry cash flow analysis. Such manufacturer subgroups may include small business manufacturers, low-volume manufacturers ("LVMs"), niche players, and/or manufacturers exhibiting a cost structure that largely differs from the industry average. DOE identified one subgroup for a separate impact analysis: small business manufacturers. The small business subgroup is discussed in section VI.B of this document, "Review under the Regulatory Flexibility Act", and in chapter 12 of the NOPR TSD.

2. Government Regulatory Impact Model and Key Inputs

DOE uses the GRIM to quantify the changes in cash flow due to amended standards that result in a higher or lower industry value. The GRIM uses a standard, annual discounted cash-flow analysis that incorporates manufacturer costs, markups, shipments, and industry financial information as inputs. The GRIM models changes in costs, distribution of shipments, investments, and manufacturer margins that could result from an amended energy conservation standard. The GRIM uses the inputs to arrive at a series of annual cash flows, beginning in 2022 (the reference year of the analysis) and continuing to 2056. DOE calculated INPVs by summing the stream of annual discounted cash flows during this period. For manufacturers of EPSs, DOE used a real discount rate of 7.1 percent, which was the value used in the February 2014 Final Rule.[48]

The GRIM calculates cash flows using standard accounting principles and compares changes in INPV between the no-new-standards case and each standards case. The difference in INPV between the no-new-standards case and a standards case represents the financial impact of the amended energy conservation standard on manufacturers. As discussed previously, DOE developed critical GRIM inputs using a

[48] 79 FR 7846, 7849

number of sources, including publicly available data, results of the engineering analysis, and information gathered from industry stakeholders. The GRIM results are presented in section V.B.2 of this document. Additional details about the GRIM, the discount rate, and other financial parameters can be found in chapter 12 of the NOPR TSD.

a. Manufacturer Production Costs

Manufacturing more efficient equipment is typically more expensive than manufacturing baseline equipment due to the use of more complex components, which are typically more costly than baseline components. The changes in the MPCs of covered products can affect the revenues, gross margins, and cash flow of the industry. An overview of the methodology used to generate MPCs is located in the engineering analysis, and a complete discussion of the MPCs can be found in chapter 5 of the NOPR TSD.

b. Shipments Projections

The GRIM estimates manufacturer revenues based on total unit shipment projections and the distribution of those shipments by efficiency level. Changes in sales volumes and efficiency mix over time can significantly affect manufacturer finances. For this analysis, the GRIM uses the NIA's annual shipment projections derived from the shipments analysis from 2022 (the base year) to 2056 (the end year of the analysis period). See chapter 9 of the NOPR TSD for additional details.

c. Product and Capital Conversion Costs

Amended energy conservation standards could cause manufacturers to incur conversion costs to bring their production facilities and product designs into compliance. DOE evaluated the level of conversion-related expenditures that would be needed to comply with each considered efficiency level in each product class. For the MIA, DOE classified these conversion costs into two major groups: (1) product conversion costs; and (2) capital conversion costs. Product conversion costs are investments in research, development, testing, marketing, and other non-capitalized costs necessary to make product designs comply with amended energy conservation standards. Capital conversion costs are investments in property, plant, and equipment necessary to adapt or change existing production facilities such that new compliant product designs can be fabricated and assembled.

DOE estimated that EPS manufacturers would not incur any capital conversion costs. DOE expects, as is indicated by the engineering analysis, that efficiency improvements would be accomplished through component changes, changes to the design of EPSs, or some combination therein. To DOE's understanding, this would not require any significant change to the capital equipment used in the production of EPSs. Manufacturers of EPSs typically do not produce their own components but rather source these components from outside manufacturers. Manufacturers of EPSs are not expected to incur any capital costs when purchasing these more expensive and efficient components. However, the increase in per unit component costs is reflected in the higher MPCs derived in the engineering analysis. See section IV.D.2 for a complete description of the MPCs derived for this NOPR analysis. Additionally, the design of EPSs is not expected to change in such a way as a result of any amended standards that the underlying production equipment would change.

DOE does expect that manufacturers would incur product redesign costs due to amended standards. Manufacturers may need to redesign models outside of their normal product redesign cycles and would need to design around a higher efficiency constraint.

To evaluate the level of product conversion costs manufacturers would likely incur to comply with amended energy conservation standards, DOE developed estimates of product conversion costs for each product class at each efficiency level using estimated revenues related to EPSs, the R&D factor of revenue used in the February 2014 Final Rule, and research related to the engineering analysis. . The conversion cost estimates used in the GRIM can be found in section IV.K.2.c of this document. DOE assumes that all conversion-related investments would occur between the year of publication of the final rule and the year by which manufacturers must comply with amended energy conservation standards.

For additional information on the estimated conversion costs and the related methodology, see chapter 12 of the NOPR TSD.

d. Markup Scenarios

MSPs include direct manufacturing production costs (*i.e.*, labor, materials, and overhead estimated in DOE's MPCs) and all non-production costs (*i.e.*, SG&A, R&D, and interest), along with profit. To calculate the MSPs in the GRIM, DOE applied non-production cost markups to the MPCs estimated in the engineering analysis for each product class and efficiency level. Modifying these markups in the standards case yields different sets of impacts on manufacturers. For the MIA, DOE modeled two standards-case markup scenarios to represent uncertainty regarding the potential impacts on prices and profitability for manufacturers following the implementation of amended energy conservation standards: (1) a preservation of gross margin scenario; and (2) a preservation of operating profit scenario. These scenarios lead to different margins that, when applied to the MPCs, result in varying revenue and cash flow impacts.

Under the preservation of gross margin scenario, DOE applied a single uniform gross margin across all efficiency levels, which assumes that manufacturers would be able to maintain the same amount of profit as a percentage of revenues at all efficiency levels within a product class. This scenario represents the upper bound of INPV impacts modeled by DOE in this analysis.

Under the preservation of operating profit scenario, DOE modeled a situation in which manufacturers are not able to maintain the per-unit operating profit in proportion to increases in manufacturer production costs but are able to maintain the total amount operating profit (as a dollar value). This scenario represents the lower bound of INPV impacts modeled by DOE in this analysis.

A comparison of industry financial impacts under the two markup scenarios is presented in section V.B.2.a of this document.

3. Discussion of MIA Comments

ITI commented in response to the February 2022 Preliminary Analysis that if DOE were to raise efficiency levels for EPSs across the board, there is likely to be a significant impact for all manufacturers of small-network equipment and for other equipment that use an off-the-shelf EPS. ITI further stated that these impacts would be seen in the redesigns and supply chains required for complying with higher efficiency standards and therefore these cost impacts would likely be higher than in DOE's preliminary analysis. (ITI, No. 20 at pp. 3-4) ITI also stated that there is significant potential for many units of non-compliant EPSs to be scrapped if standard levels were raised. (ITI, No. 20 at p. 8) In the event that energy efficiency requirements are changed, ITI requested that DOE allow for an implementation time of at least 5 years to account for time needed for inventory draw down, EPS and end-product redesign considerations, and securing necessary components for production. (ITI, No. 20 at pp. 4–6) ITI stated that changing the components of an EPS to abide by more stringent efficiency standards could result in necessary redesigns for the growing or shrinking of the EPS enclosure. (ITI, No. 20 at pp. 8–9)

Regarding ITI's first point, DOE has created estimates of the conversion costs necessary to comply with amended standards as well as estimates of the MSPs of EPSs at different efficiency levels. ITI did not provide data on or quantify the costs that might be expected by manufacturers, so DOE is unable to evaluate those costs in relation to its own estimates. DOE requests comment on DOE's estimated costs to see if they align with expectations. DOE also requests comment on inventory quantities of consumer electronics and other goods that use EPSs that do not meet the proposed standard.

Regarding ITI's second point, DOE does not expect that manufacturers will need to scrap a large number of non-compliant EPSs—a large fraction of the EPSs currently in the market meet the proposed standard level, as laid out in Table IV.14. Additionally, given the compliance window, manufacturers will have time to adjust production and inventories accordingly. Further, while the domestic market is the largest market for North American-type EPSs, markets elsewhere in North America remain an option if inventories of non-compliant models are not successfully drawn down completely.

For the third point, requesting a compliance window of 5 years in the event the proposed amended standards are finalized, DOE believes that the statutorily mandated 2-year compliance window will be sufficient. A 2-year compliance window already covers much of DOE's estimated model lifecycle of 4 years for EPSs, and, as noted previously, many extant EPS models are expected to meet the proposed standard. For the fourth point, the product conversion cost estimates in this NOPR are expected to encapsulate all changes to EPS designs—including enclosure changes.

DOE requests comment on the estimated EPS model production cycle of four years. DOE requests comment on the impacts of the proposed standard, including the compliance date, on the inventory and potential redesign of products that use EPSs that would not meet the proposed standards.

L. Emissions Analysis

The emissions analysis consists of two components. The first component estimates the effect of potential energy conservation standards on power sector and site (where applicable) combustion emissions of CO_2, NO_X, SO_2, and Hg. The second component estimates the impacts of potential standards on emissions of two additional greenhouse gases, CH_4 and N_2O, as well as the reductions to emissions of other gases due to "upstream" activities in the fuel production chain. These upstream activities comprise extraction, processing, and transporting fuels to the site of combustion.

The analysis of electric power sector emissions of CO_2, NO_X, SO_2, and Hg uses emissions factors intended to represent the marginal impacts of the change in electricity consumption associated with amended or new standards. The methodology is based on results published for the *AEO*, including a set of side cases that implement a variety of efficiency-related policies. The methodology is described in appendix 13A in the NOPR TSD. The analysis presented in this notice uses projections from *AEO2022*. Power sector emissions of CH_4 and N_2O from fuel combustion are estimated using Emission Factors for Greenhouse Gas Inventories published by the Environmental Protection Agency (EPA).[49]

FFC upstream emissions, which include emissions from fuel combustion during extraction, processing, and transportation of fuels, and "fugitive" emissions (direct leakage to the atmosphere) of CH_4 and CO_2, are estimated based on the methodology described in chapter 15 of the NOPR TSD.

The emissions intensity factors are expressed in terms of physical units per MWh or MMBtu of site energy savings. For power sector emissions, specific emissions intensity factors are calculated by sector and end use. Total emissions reductions are estimated using the energy savings calculated in the national impact analysis.

1. Air Quality Regulations Incorporated in DOE's Analysis

DOE's no-new-standards case for the electric power sector reflects the *AEO*, which incorporates the projected impacts of existing air quality regulations on emissions. *AEO2022* generally represents current legislation and environmental regulations, including recent government actions, that were in place at the time of preparation of *AEO2022*, including the emissions control programs discussed in the following paragraphs.[50]

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

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[49] Available at *www.epa.gov/sites/production/files/2021-04/documents/emission-factors_apr2021.pdf* (last accessed Sept. 12, 2022).
[50] For further information, see the Assumptions to *AEO2022* report that sets forth the major assumptions used to generate the projections in the Annual Energy Outlook. (Available at: *www.eia.gov/outlooks/aeo/assumptions/*) (last accessed Sept. 12, 2022).

the District of Columbia (D.C.). (42 U.S.C. 7651 *et seq.*) SO_2 emissions from numerous States in the eastern half of the United States are also limited under the Cross-State Air Pollution Rule ("CSAPR"). 76 FR 48208 (Aug. 8, 2011). CSAPR requires these States to reduce certain emissions, including annual SO_2 emissions, and went into effect as of January 1, 2015.[51] *AEO2022* incorporates implementation of CSAPR, including the update to the CSAPR ozone season program emission budgets and target dates issued in 2016. 81 FR 74504 (Oct. 26, 2016). Compliance with CSAPR is flexible among EGUs and is enforced through the use of tradable emissions allowances. 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 another regulated EGU.

However, beginning in 2016, SO_2 emissions began to fall as a result of the Mercury and Air Toxics Standards ("MATS") for power plants. 77 FR 9304 (Feb. 16, 2012). In the MATS final 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 are being reduced as a result of the control technologies installed on coal-fired power plants to comply with the MATS requirements for acid gas. In order to continue operating, coal power plants must have either flue gas desulfurization or dry sorbent injection systems installed. Both technologies, which are used to reduce acid gas

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[51] CSAPR requires states to address annual emissions of SO_2 and NO_X, precursors to the formation of fine particulate matter ($PM_{2.5}$) pollution, in order to address the interstate transport of pollution with respect to the 1997 and 2006 $PM_{2.5}$ National Ambient Air Quality Standards ("NAAQS"). CSAPR also requires certain states to address the ozone season (May-September) emissions of NO_X, a precursor to the formation of ozone pollution, in order to address the interstate transport of ozone pollution with respect to the 1997 ozone NAAQS. 76 FR 48208 (Aug. 8, 2011). EPA subsequently issued a supplemental rule that included an additional five states in the CSAPR ozone season program; 76 FR 80760 (Dec. 27, 2011) (Supplemental Rule).

emissions, also reduce SO_2 emissions. Because of the emissions reductions under the MATS, 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 another regulated EGU. Therefore, energy conservation standards that decrease electricity generation would generally reduce SO_2 emissions. DOE estimated SO_2 emissions reduction using emissions factors based on *AEO2022.*

CSAPR also established limits on NO_X emissions for numerous States in the eastern half of the United States. Energy conservation standards would have little effect on NO_X emissions in those States covered by CSAPR emissions limits if excess NO_X emissions allowances resulting from the lower electricity demand could be used to permit offsetting increases in NO_X emissions from other EGUs. In such case, NOx emissions would remain near the limit even if electricity generation goes down. A different case could possibly result, depending on the configuration of the power sector in the different regions and the need for allowances, such that NO_X emissions might not remain at the limit in the case of lower electricity demand. In this case, energy conservation standards might reduce NOx emissions in covered States. Despite this possibility, DOE has chosen to be conservative in its analysis and has maintained the assumption that standards will not reduce NO_X emissions in States covered by CSAPR. Energy conservation standards would be expected to reduce NO_X emissions in the States not covered by CSAPR. DOE used *AEO2022* data to derive NO_X emissions factors for the group of States not covered by CSAPR.

The MATS limit mercury emissions from power plants, but they do not include emissions caps and, as such, DOE's energy conservation standards would be expected to slightly reduce Hg emissions. DOE estimated mercury emissions reduction using emissions factors based on *AEO2022*, which incorporates the MATS.

M. Monetizing Emissions Impacts

As part of the development of this proposed rule, for the purpose of complying with the requirements of Executive Order 12866, DOE considered the estimated monetary benefits from the reduced emissions of CO_2, CH_4, N_2O, NO_X, and SO_2 that are expected to result from each of the TSLs considered. In order to make this calculation analogous to the calculation of the NPV of consumer benefit, DOE considered the reduced emissions expected to result over the lifetime of products shipped in the projection period for each TSL. This section summarizes the basis for the values used for monetizing the emissions benefits and presents the values considered in this NOPR.

On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22-30087) granted the Federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana v. Biden*, No. 21-cv-1074-JDC-KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from "adopting, employing, treating as binding, or relying upon" the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits where appropriate and permissible under law. DOE requests comment on how to address the climate benefits and other non-monetized effects of the proposal.

1. Monetization of Greenhouse Gas Emissions

DOE estimates the monetized benefits of the reductions in emissions of CO_2, CH_4, and N_2O by using a measure of the social cost ("SC") of each pollutant (*e.g.*, SC-CO_2). These estimates represent the monetary value of the net harm to society associated with a marginal increase in emissions of these pollutants in a given year, or the benefit of avoiding that increase. These estimates are intended to include (but are not limited to) climate-change-related changes in net agricultural productivity, human health, property damages from increased flood risk, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services.

DOE exercises its own judgment in presenting monetized climate benefits as recommended by applicable Executive orders, and DOE would reach the same conclusion presented in this proposed rulemaking in the absence of the social cost of greenhouse gases, including the February 2021 Interim Estimates presented by the Interagency Working Group on the Social Cost of Greenhouse Gases.

DOE estimated the global social benefits of CO_2, CH_4, and N_2O reductions (i.e., SC-GHGs) using the estimates presented in the Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990, published in February 2021 by the IWG ("February 2021 SC-GHG TSD"). The SC-GHGs is the monetary value of the net harm to society associated with a marginal increase in emissions in a given year, or the benefit of avoiding that increase. In principle, SC-GHGs includes the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk and natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. The SC-GHGs therefore, reflects the societal value of reducing emissions of the gas in question by one metric ton. The SC-GHGs is the theoretically appropriate value to use in conducting benefit-cost analyses of policies that affect CO_2, N_2O and CH_4 emissions.

As a member of the IWG involved in the development of the February 2021 SC-GHG TSD, DOE agrees that the interim SC-GHG estimates represent the most appropriate estimate of the SC-GHG until revised estimates have been developed reflecting the latest, peer-reviewed science.

The SC-GHGs estimates presented here were developed over many years, using transparent process, peer-reviewed methodologies, the best science available at the time of that process, and with input from the public. Specifically, in 2009, the IWG, that included the DOE and other executive branch agencies and offices, was established to ensure that agencies were using the best available science and to promote consistency in the social cost of carbon ("SC-CO_2") values used across agencies. The IWG published SC-CO_2 estimates in 2010 that were developed from an ensemble of three widely cited integrated assessment models ("IAMs") that estimate global climate damages using highly aggregated representations of climate processes and the global economy combined into a single modeling framework. The three IAMs were run using a common set of input assumptions in each model for future population, economic, and CO_2 emissions growth, as well as equilibrium climate sensitivity – a measure of the globally averaged temperature response to increased atmospheric CO_2 concentrations. These estimates were updated in 2013 based on new versions of each IAM. In August 2016 the IWG published estimates of the social cost of methane ("SC-CH_4") and nitrous oxide ("SC-N_2O") using methodologies that are consistent with the methodology underlying the SC-CO_2 estimates. The modeling approach that extends the IWG SC-CO_2 methodology to non-CO_2 GHGs has undergone multiple stages of peer review. The SC-CH_4 and SC-N2O estimates were developed by Marten *et al.*[52] and underwent a standard double-blind peer review process prior to journal publication.

In 2015, as part of the response to public comments received to a 2013 solicitation for comments on the SC-CO_2 estimates, the IWG announced a National Academies of Sciences, Engineering, and Medicine review of the SC-CO_2 estimates to offer advice on how to approach future updates to ensure that the estimates continue to reflect the best available science and methodologies. In January 2017, the National Academies released their final report, Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide, and recommended specific criteria for future updates to the SC-CO_2 estimates, a modeling framework to satisfy the specified criteria, and both near-term updates and longer-term research needs pertaining to various components of the estimation process (National Academies, 2017).[53] Shortly thereafter, in March 2017, President Trump issued Executive Order 13783, which disbanded the IWG, withdrew the previous TSDs, and directed agencies to ensure SC-CO_2 estimates used in regulatory analyses are consistent with the guidance contained in OMB's Circular A-4, "including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates" (EO 13783, Section 5(c)). Benefit-cost analyses following E.O. 13783 used SC-GHG estimates that attempted to focus on the

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[52] Marten, A. L., E. A. Kopits, C. W. Griffiths, S. C. Newbold, and A. Wolverton. Incremental CH4 and N2O mitigation benefits consistent with the US Government's SC-CO2 estimates. *Climate Policy*. 2015. 15(2): pp. 272–298.

[53] National Academies of Sciences, Engineering, and Medicine. *Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide*. 2017. The National Academies Press: Washington, DC.

U.S.-specific share of climate change damages as estimated by the models and were calculated using two discount rates recommended by Circular A-4, 3 percent and 7 percent. All other methodological decisions and model versions used in SC-GHG calculations remained the same as those used by the IWG in 2010 and 2013, respectively.

On January 20, 2021, President Biden issued Executive Order 13990, which re-established the IWG and directed it to ensure that the U.S. Government's estimates of the social cost of carbon and other greenhouse gases reflect the best available science and the recommendations of the National Academies (2017). The IWG was tasked with first reviewing the SC-GHG estimates currently used in Federal analyses and publishing interim estimates within 30 days of the EO that reflect the full impact of GHG emissions, including by taking global damages into account. The interim SC-GHG estimates published in February 2021 are used here to estimate the climate benefits for this proposed rulemaking. The E.O. instructs the IWG to undertake a fuller update of the SC-GHG estimates by January 2022 that takes into consideration the advice of the National Academies (2017) and other recent scientific literature. The February 2021 SC-GHG TSD provides a complete discussion of the IWG's initial review conducted under E.O. 13990. In particular, the IWG found that the SC-GHG estimates used under E.O. 13783 fail to reflect the full impact of GHG emissions in multiple ways.

First, the IWG found that the SC-GHG estimates used under E.O. 13783 fail to fully capture many climate impacts that affect the welfare of U.S. citizens and residents, and those impacts are better reflected by global measures of the SC-GHG. Examples of omitted effects from the E.O. 13783 estimates include direct effects on U.S. citizens, assets, and investments located abroad, supply chains, U.S. military assets and interests abroad, tourism, and spillover pathways such as economic and political destabilization and global migration that can lead to adverse impacts on U.S. national security, public health, and humanitarian concerns. In addition, assessing the benefits of U.S. GHG mitigation activities requires consideration of how those actions may affect mitigation activities by other countries, as those international mitigation actions will provide a benefit to U.S. citizens and residents by mitigating climate impacts that affect U.S. citizens and residents. A wide range of scientific and economic experts have emphasized the issue of reciprocity as support for considering global damages of GHG emissions. If the United States does not consider impacts on other countries, it is difficult to convince other countries to consider the impacts of their emissions on the United States. The only way to achieve an efficient allocation of resources for emissions reduction on a global basis—and so benefit the U.S. and its citizens—is for all countries to base their policies on global estimates of damages. As a member of the IWG involved in the development of the February 2021 SC-GHG TSD, DOE agrees with this assessment and, therefore, in this proposed rule DOE centers attention on a global measure of SC-GHG. This approach is the same as that taken in DOE regulatory analyses from 2012 through 2016. A robust estimate of climate damages that accrue only to U.S. citizens and residents does not currently exist in the literature. As explained in the February 2021 SC-GHG TSD, existing estimates are both incomplete and an underestimate of total damages that accrue to the citizens and residents of the U.S. because they do not fully capture the regional interactions and spillovers discussed above, nor do they include all of the important physical, ecological, and economic impacts of climate change recognized in the climate change literature. As noted in the February 2021 SC–GHG TSD, the IWG will continue to review developments in the literature, including more robust methodologies for estimating a U.S.-specific SC–GHG value, and explore ways to better inform the public of the full range of carbon impacts. As a member of the IWG, DOE will continue to follow developments in the literature pertaining to this issue.

Second, the IWG found that the use of the social rate of return on capital (7 percent under current OMB Circular A-4 guidance) to discount the future benefits of reducing GHG emissions inappropriately underestimates the impacts of climate change for the purposes of estimating the SC-GHG. Consistent with the findings of the National Academies (2017) and the economic literature, the IWG continued to conclude that the consumption rate of interest is the theoretically appropriate discount rate in an intergenerational context,[54] and recommended that discount rate uncertainty and relevant aspects of intergenerational ethical considerations be accounted for in selecting future discount rates.

Furthermore, the damage estimates developed for use in the SC-GHG are estimated in consumption-equivalent terms, and so an application of OMB Circular A-4's guidance for regulatory analysis would then use the consumption discount rate to calculate the SC-GHG. DOE agrees with this assessment and will continue to follow developments in the literature pertaining to this issue. DOE also notes that while OMB Circular A-4, as published in 2003, recommends using 3 percent and 7 percent discount rates as "default" values, Circular A-4 also reminds agencies that "different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions." On discounting, Circular A-4 recognizes that "special ethical

[54] Interagency Working Group on Social Cost of Carbon. *Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*. 2013. (Last accessed April 15, 2022.) www.federalregister.gov/documents/2013/11/26/2013-28242/technical-support-document-technical-update-of-the-social-cost-of-carbon-for-regulatory-impact; Interagency Working Group on Social Cost of Greenhouse Gases, United States Government. Technical Support Document: Technical Update on the Social Cost of Carbon for Regulatory Impact Analysis-Under Executive Order 12866. August 2016. (Available at: *www.epa.gov/sites/default/files/2016-12/documents/sc_co2_tsd_august_2016.pdf*) (Last accessed Sept. 12, 2022) ; Interagency Working Group on Social Cost of Greenhouse Gases, United States Government. Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide. August 2016. (Available at: w*ww.epa.gov/sites/default/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf*) (Last accessed Sept. 12, 2022).

considerations arise when comparing benefits and costs across generations," and Circular A-4 acknowledges that analyses may appropriately "discount future costs and consumption benefits…at a lower rate than for intragenerational analysis." In the 2015 Response to Comments on the Social Cost of Carbon for Regulatory Impact Analysis, OMB, DOE, and the other IWG members recognized that "Circular A-4 is a living document" and "the use of 7 percent is not considered appropriate for intergenerational discounting. There is wide support for this view in the academic literature, and it is recognized in Circular A-4 itself." Thus, DOE concludes that a 7 percent discount rate is not appropriate to apply to value the social cost of greenhouse gases in the analysis presented in this document.

To calculate the present and annualized values of climate benefits, DOE uses the same discount rate as the rate used to discount the value of damages from future GHG emissions, for internal consistency. That approach to discounting follows the same approach that the February 2021 TSD recommends "to ensure internal consistency—i.e., future damages from climate change using the SC-GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate." DOE has also consulted the National Academies' 2017 recommendations on how SC-GHG estimates can "be combined in RIAs with other cost and benefits estimates that may use different discount rates." The National Academies reviewed several options, including "presenting all discount rate combinations of other costs and benefits with [SC-GHG] estimates."

As a member of the IWG involved in the development of the February 2021 SC-GHG TSD, DOE agrees with the aforementioned assessment and will continue to follow developments in the literature pertaining to this issue. While the IWG works to assess how best to incorporate the latest, peer reviewed science to develop an updated set of SC-

GHG estimates, it set the interim estimates to be the most recent estimates developed by the IWG prior to the group being disbanded in 2017. The estimates rely on the same models and harmonized inputs and are calculated using a range of discount rates. As explained in the February 2021 SC-GHG TSD, the IWG has recommended that agencies revert to the same set of four values drawn from the SC-GHG distributions based on three discount rates as were developed in regulatory analyses between 2010 and 2016 and were subject to public comment. For each discount rate, the IWG combined the distributions across models and socioeconomic emissions scenarios (applying equal weight to each) and then selected a set of four values recommended for use in benefit-cost analyses: an average value resulting from the model runs for each of three discount rates (2.5 percent, 3 percent, and 5 percent), plus a fourth value, selected as the 95th percentile of estimates based on a 3 percent discount rate. The fourth value was included to provide information on potentially higher-than-expected economic impacts from climate change. As explained in the February 2021 SC-GHG TSD, and DOE agrees, this update reflects the immediate need to have an operational SC-GHG for use in regulatory benefit-cost analyses and other applications that was developed using a transparent process, peer-reviewed methodologies, and the science available at the time of that process. Those estimates were subject to public comment in the context of dozens of proposed rulemakings as well as in a dedicated public comment period in 2013.

There are a number of limitations and uncertainties associated with the SC-GHG estimates. First, the current scientific and economic understanding of discounting approaches suggests discount rates appropriate for intergenerational analysis in the context of climate change are likely to be less than 3 percent, near 2 percent or lower.[55]

[55] Interagency Working Group on Social Cost of Greenhouse Gases (IWG). 2021. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order

Second, the IAMs used to produce these interim estimates do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate change literature and the science underlying their "damage functions" – i.e., the core parts of the IAMs that map global mean temperature changes and other physical impacts of climate change into economic (both market and nonmarket) damages – lags behind the most recent research. For example, limitations include the incomplete treatment of catastrophic and non-catastrophic impacts in the integrated assessment models, their incomplete treatment of adaptation and technological change, the incomplete way in which inter-regional and intersectoral linkages are modeled, uncertainty in the extrapolation of damages to high temperatures, and inadequate representation of the relationship between the discount rate and uncertainty in economic growth over long time horizons. Likewise, the socioeconomic and emissions scenarios used as inputs to the models do not reflect new information from the last decade of scenario generation or the full range of projections. The modeling limitations do not all work in the same direction in terms of their influence on the SC-CO_2 estimates. However, as discussed in the February 2021 TSD, the IWG has recommended that, taken together, the limitations suggest that the interim SC-GHG estimates used in this proposed rule likely underestimate the damages from GHG emissions. DOE concurs with this assessment.

DOE's derivations of the SC-CO_2, SC-N_2O, and SC-CH_4 values used for this NOPR are discussed in the following sections, and the results of DOE's analyses

13990. February. United States Government. (Available at: *www.whitehouse.gov/briefing-room/blog/2021/02/26/a-return-to-science-evidence-based-estimates-of-the-benefits-of-reducing-climate-pollution/)* (Last accessed Sept. 12, 2022) estimating the benefits of the reductions in emissions of these GHGs are presented in section V.B.6 of this document.

a. Social Cost of Carbon

The SC-CO_2 values used for this NOPR were based on the values developed for the IWG's February 2021 TSD. Table IV.16 shows the updated sets of SC-CO_2 estimates from the IWG's TSD in 5-year increments from 2020 to 2050. The full set of annual values that DOE used is presented in Appendix 14A of the NOPR TSD. For purposes of capturing the uncertainties involved in regulatory impact analysis, DOE has determined it is appropriate include all four sets of SC-CO_2 values, as recommended by the IWG.[56]

Table IV.16 Annual SC-CO_2 Values from 2021 Interagency Update, 2020–2050 (2020 Dollars per Metric Ton CO_2)

Year	Discount Rate			
	5% Average	3% Average	2.5% Average	3% 95th percentile
2020	14	51	76	152
2025	17	56	83	169
2030	19	62	89	187
2035	22	67	96	206
2040	25	73	103	225
2045	28	79	110	242
2050	32	85	116	260

For 2051 to 2070, DOE used SC-CO_2 estimates published by EPA, adjusted to 2021 dollars.[57] These estimates are based on methods, assumptions, and parameters identical to the 2020-2050 estimates published by the IWG. DOE expects additional climate benefits to accrue for any longer-life EPSs after 2070, but a lack of available SC-CO_2 estimates for emissions years beyond 2070 prevents DOE from monetizing these

[56] For example, the February 2021 TSD discusses how the understanding of discounting approaches suggests that discount rates appropriate for intergenerational analysis in the context of climate change may be lower than 3 percent.

[57] See EPA, *Revised 2026 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis*, Washington, D.C., December 2021. (Available at: *www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-revise-existing-national-ghg-emissions*) (last accessed Sept. 12, 2022)

potential benefits in this analysis. If further analysis of monetized climate benefits beyond 2070 becomes available prior to the publication of the final rule, DOE will include that analysis in the final rule.

DOE multiplied the CO_2 emissions reduction estimated for each year by the SC-CO_2 value for that year in each of the four cases. DOE adjusted the values to 2021 dollars using the implicit price deflator for gross domestic product ("GDP") from the Bureau of Economic Analysis. 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 SC-CO_2 values in each case.

b. Social Cost of Methane and Nitrous Oxide

The SC-CH_4 and SC-N_2O values used for this NOPR were generated using the values presented in the February 2021 TSD. Table IV.17 shows the updated sets of SC-CH_4 and SC- N_2O estimates from the latest interagency update in 5-year increments from 2020 to 2050. The full set of annual values used is presented in Appendix 14A of the NOPR TSD. To capture the uncertainties involved in regulatory impact analysis, DOE has determined it is appropriate to include all four sets of SC-CH_4 and SC- N_2O values, as recommended by the IWG. DOE derived values after 2050 using the approach described above for the SC-CO_2.

Table IV.17 Annual SC-CH_4 and SC-N_2O Values from 2021 Interagency Update, 2020–2050 (2020 Dollars per Metric Ton)

Year	SC-CH_4				SC-N_2O			
	Discount Rate and Statistic				Discount Rate and Statistic			
	5%	3%	2.5%	3%	5%	3%	2.5 %	3%
	Average	Average	Average	95th percentile	Average	Average	Average	95th percentile
2020	670	1500	2000	3900	5800	18000	27000	48000
2025	800	1700	2200	4500	6800	21000	30000	54000
2030	940	2000	2500	5200	7800	23000	33000	60000
2035	1100	2200	2800	6000	9000	25000	36000	67000
2040	1300	2500	3100	6700	10000	28000	39000	74000

2045	1500	2800	3500	7500	12000	30000	42000	81000
2050	1700	3100	3800	8200	13000	33000	45000	88000

DOE multiplied the CH_4 and N_2O emissions reduction estimated for each year by the SC-CH_4 and SC-N_2O estimates for that year in each of the cases. DOE adjusted the values to 2021 dollars using the implicit price deflator for gross domestic product ("GDP") from the Bureau of Economic Analysis. To calculate a present value of the stream of monetary values, DOE discounted the values in each of the cases using the specific discount rate that had been used to obtain the SC-CH_4 and SC-N_2O estimates in each case.

2. Monetization of Other Emissions Impacts

For the NOPR, DOE estimated the monetized value of NO_X and SO_2 emissions reductions from electricity generation using the latest benefit per ton estimates for that sector from the EPA's Benefits Mapping and Analysis Program.[58] DOE used EPA's values for PM2.5-related benefits associated with NO_X and SO_2 and for ozone-related benefits associated with NO_X for 2025 2030, and 2040, calculated with discount rates of 3 percent and 7 percent. DOE used linear interpolation to define values for the years not given in the 2025 to 2040 period; for years beyond 2040 the values are held constant. DOE derived values specific to the sector for EPSs using a method described in appendix 14B of the NOPR TSD.

N. Utility Impact Analysis

The utility impact analysis estimates several effects on the electric power generation industry that would result from the adoption of new or amended energy

[58] *Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 21 Sectors*. (Available at: *www.epa.gov/benmap/estimating-benefit-ton-reducing-pm25-precursors-21-sectors*) (last accessed Sept. 12, 2022)

conservation standards. The utility impact analysis estimates the changes in installed electrical capacity and generation that would result for each TSL. The analysis is based on published output from the NEMS associated with *AEO2022*. NEMS produces the *AEO* Reference case, as well as a number of side cases that estimate the economy-wide impacts of changes to energy supply and demand. For the current analysis, impacts are quantified by comparing the levels of electricity sector generation, installed capacity, fuel consumption and emissions in the *AEO2022* Reference case and various side cases. Details of the methodology are provided in the appendices to chapters 13 and 15 of the NOPR TSD.

The output of this analysis is a set of time-dependent coefficients that capture the change in electricity generation, primary fuel consumption, installed capacity and power sector emissions due to a unit reduction in demand for a given end use. These coefficients are multiplied by the stream of electricity savings calculated in the NIA to provide estimates of selected utility impacts of potential new or amended energy conservation standards.

O. Employment Impact Analysis

DOE considers employment impacts in the domestic economy as one factor in selecting a proposed standard. Employment impacts from new or amended energy conservation standards include both direct and indirect impacts. Direct employment impacts are any changes in the number of employees of manufacturers of the products subject to standards, their suppliers, and related service firms. 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 appliances. Indirect employment impacts from standards consist of the net jobs created or eliminated in the national economy, other than in the manufacturing sector being regulated, caused by (1) reduced spending by consumers on energy, (2) reduced spending on new energy supply by the utility industry, (3) increased consumer spending on the products to which the new standards apply and other goods and services, and (4) the effects of those three factors throughout the economy.

One method for assessing the possible effects on the demand for labor of such shifts in economic activity is to compare sector employment statistics developed by the Labor Department's Bureau of Labor Statistics ("BLS"). BLS regularly publishes its estimates of the number of jobs per million dollars of economic activity in different sectors of the economy, as well as the jobs created elsewhere in the economy by this same economic activity. Data from BLS indicate that expenditures in the utility sector generally create fewer jobs (both directly and indirectly) than expenditures in other sectors of the economy.[59] 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, the BLS data suggest that net national employment may increase due to shifts in economic activity resulting from energy conservation standards.

[59] See U.S. Department of Commerce–Bureau of Economic Analysis. *Regional Input-Output Modeling System (RIMS II) User's Guide*. (Available at: *www.bea.gov/resources/methodologies/RIMSII-user-guide*) (last accessed Sept. 12, 2022).

DOE estimated indirect national employment impacts for the standard levels considered in this NOPR using an input/output model of the U.S. economy called Impact of Sector Energy Technologies version 4 ("ImSET").[60] ImSET is a special-purpose version of the "U.S. Benchmark National Input-Output" ("I-O") model, which was designed to estimate the national employment and income effects of energy-saving technologies. The ImSET software includes a computer- based I-O model having structural coefficients that characterize economic flows among 187 sectors most relevant to industrial, commercial, and residential building energy use.

DOE notes that ImSET is not a general equilibrium forecasting model, and that 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 this rule. Therefore, DOE used ImSET only to generate results for near-term timeframes (2027-2032), where these uncertainties are reduced. For more details on the employment impact analysis, see chapter 16 of the NOPR TSD.

P. 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. EISA 2007 set initial standards for Class A EPSs, and required that all Class A EPSs be clearly and permanently marked in accordance with the "International Efficiency Marking Protocol for External Power Supplies" (the "Marking Protocol"). (42 U.S.C. 6295(u)(3)(C)). Subsequently, the February 2014 Final Rule amended the Marking

[60] Livingston, O. V., S. R. Bender, M. J. Scott, and R. W. Schultz. *ImSET 4.0: Impact of Sector Energy Technologies Model Description and User Guide.* 2015. Pacific Northwest National Laboratory: Richland, WA. PNNL-24563.

Protocol to mandate the labeling of its finalized efficiency standards (the Level VI standards) with the Roman number VI. 79 FR 7846, 7895-7897.

DOE notes that it is proposing amended standards for EPSs across all product classes that exceed efficiency level "VI", the highest level currently defined in the Marking Protocol. DOE is proposing to define the proposed standards as "Level VII" and require updating markings per the Marking Protocol. As noted in Section III.A, these Level VII standards would be applicable to all EPSs, including direct and indirect operation Class A and non-Class A EPSs. This approach makes the distinction between these various types of EPSs redundant with respect to the applicability of energy conservation standards. Accordingly, DOE proposes to avoid using these terms in establishing Level VII standards in 10 CFR 430.32 (w)(1)(iv).

DOE requests comment on its proposal for Level VII efficiency markings. DOE also requests feedback on its proposal to using the terms direct and indirect operation Class A and non-Class A EPSs in establishing Level VII standards in 10 CFR 430.32 (w)(1)(iv).

V. Analytical Results and Conclusions

The following section addresses the results from DOE's analyses with respect to the considered energy conservation standards for EPSs. It addresses the TSLs examined by DOE, the projected impacts of each of these levels if adopted as energy conservation standards for EPSs, and the standards levels that DOE is proposing to adopt in this NOPR. Additional details regarding DOE's analyses are contained in the NOPR TSD supporting this document.

A. Trial Standard Levels

In general, DOE typically evaluates potential amended standards for products and equipment by grouping individual efficiency levels for each class into TSLs. Use of TSLs allows DOE to identify and consider manufacturer cost interactions between the product classes, to the extent that there are such interactions, and market cross elasticity from consumer purchasing decisions that may change when different standard levels are set.

In the analysis conducted for this NOPR, DOE analyzed the benefits and burdens of six TSLs for EPSs. DOE developed TSLs that combine efficiency levels for each analyzed product class. DOE presents the results for the TSLs in this document, while the results for all efficiency levels that DOE analyzed are in the NOPR TSD.

Table V.1 presents the TSLs and the corresponding efficiency levels that DOE has identified for potential amended energy conservation standards for EPSs. TSL 6 represents the maximum technologically feasible ("max-tech") energy efficiency for all product classes.

Table V.1 Trial Standard Levels for EPSs

	Efficiency Level				
TSL	**AC-DC Basic-Voltage**	**AC-DC Low-Voltage**	**AC-AC Basic-Voltage**	**AC-AC Low-Voltage**	**Multiple-Voltage**
1	0	1	1	1	1
2	0	1	3	1	2
3	1	1	1	1	1
4	1	1	3	1	2
5	3	1	4	1	1

6	4	4	4	4	4

DOE constructed the TSLs for this NOPR to include ELs representative of ELs with similar characteristics (*i.e.*, using similar technologies and/or efficiencies, and having roughly comparable equipment availability). The use of representative ELs provided for greater distinction between the TSLs. While representative ELs were included in the TSLs, DOE considered all efficiency levels as part of its analysis.[61]

B. Economic Justification and Energy Savings

1. Economic Impacts on Individual Consumers

DOE analyzed the economic impacts on EPS consumers by looking at the effects that potential amended standards at each TSL would have on the LCC and PBP. DOE also examined the impacts of potential standards on selected consumer subgroups. These analyses are discussed in the following sections.

a. Life-Cycle Cost and Payback Period

In general, higher-efficiency products affect consumers in two ways: (1) purchase price increases and (2) annual operating costs decrease. Inputs used for calculating the LCC and PBP include total installed costs (*i.e.*, product price plus installation costs), and operating costs (*i.e.*, annual energy use, energy prices, energy price trends, repair costs, and maintenance costs). The LCC calculation also uses product lifetime and a discount rate. Chapter [8] of the NOPR TSD provides detailed information on the LCC and PBP analyses.

[61] Efficiency levels that were analyzed for this NOPR are discussed in section IV.D of this document. Results by efficiency level are presented in TSD chapters 8, 10, and 12.

Table V.2 through Table V.5 show the LCC and PBP results for the TSLs considered for each product class. The impacts are measured relative to the efficiency distribution in the no-new-standards case in the compliance year (see section IV.G.8 of this document). The savings refer only to consumers who are affected by a standard at a given TSL. Those who already purchase a product with efficiency at or above a given TSL are not affected. Consumers for whom the LCC increases at a given TSL experience a net cost. Results for AC-AC Low Voltage are not shown because there are no shipments of this product class.

Table V.2 Average LCC and PBP Results for AC-DC Basic-Voltage

EL	Average Costs and Savings (2021 Dollars)			Average LCC Savings* (2021 Dollars)	Percent of Consumers with Net Cost	Simple Payback (years)	Average Lifetime (years)
	Installed Cost	First Year's Operating Savings	Lifetime Operating Savings				
EL 1	$0.35	$0.06	$0.31	-$0.03	20%	5.0	4.8
EL 2	$0.53	$0.09	$0.43	-$0.10	49%	6.5	4.8
EL 3	$0.95	$0.14	$0.68	-$0.27	77%	7.3	4.8
EL 4	$1.82	$0.24	$1.17	-$0.64	86%	8.0	4.8

* The savings represent the average LCC for affected consumers.
Numbers may not add up due to rounding.

Table V.3 Average LCC and PBP Results for AC-DC Low Voltage

EL	Average Costs and Savings (2021 Dollars)			Average LCC Savings* (2021 Dollars)	Percent of Consumers with Net Cost	Simple Payback (years)	Average Lifetime (years)
	Installed Cost	First Year's Operating Savings	Lifetime Operating Savings				
EL 1	$0.05	$0.01	$0.05	$0.01	4%	3.2	4.2
EL 2	$0.59	$0.02	$0.09	-$0.50	69%	26.4	4.2
EL 3	$1.07	$0.04	$0.15	-$0.91	89%	27.3	4.2
EL 4	$1.51	$0.05	$0.21	-$1.30	97%	28.5	4.2

* The savings represent the average LCC for affected consumers.
Numbers may not add up due to rounding.

Table V.4 Average LCC and PBP Results for AC-AC Basic-Voltage

EL	Average Costs and Savings (2021 Dollars)			Average LCC Savings* (2021 Dollars)	Percent of Consumers with Net Cost	Simple Payback (years)	Average Lifetime (years)
	Installed Cost	First Year's Operating Savings	Lifetime Operating Savings				
EL 1	$0.18	$0.07	$0.36	$0.18	10%	2.3	6.2
EL 2	$0.53	$0.16	$0.81	$0.29	17%	3.7	6.2
EL 3	$1.02	$0.30	$1.53	$0.52	28%	4.1	6.2
EL 4	$1.96	$0.48	$2.51	$0.55	43%	4.7	6.2

* The savings represent the average LCC for affected consumers.
Numbers may not add up due to rounding.

Table V.5 Average LCC and PBP Results for Multiple-Voltage

EL	Average Costs and Savings (2021 Dollars)			Average LCC Savings* (2021 Dollars)	Percent of Consumers with Net Cost	Simple Payback (years)	Average Lifetime (years)
	Installed Cost	First Year's Operating Savings	Lifetime Operating Savings				
EL 1	$0.02	$0.06	$0.49	$0.46	0%	0.1	6.2
EL 2	$0.42	$0.09	$0.65	$0.24	39%	7.0	6.2
EL 3	$1.23	$0.14	$0.85	-$0.38	66%	9.8	6.2
EL 4	$2.37	$0.20	$1.12	-$1.25	70%	12.5	6.2

* The savings represent the average LCC for affected consumers.
Numbers may not add up due to rounding.

b. Consumer Subgroup Analysis

In the consumer subgroup analysis, DOE estimated the impact of the considered TSLs on low-income households. Table V.6 compares the average LCC savings and PBP at each efficiency level for the consumer subgroups with similar metrics for the entire consumer sample for a product class. In most cases, the average LCC savings and PBP for low-income households at the considered efficiency levels are not substantially different from the average for all households. Chapter 11 of the NOPR TSD presents the complete LCC and PBP results for the subgroups.

Table V.6 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; AC-DC Basic-Voltage

	Low-Income Households	All Households
Average LCC Savings (2021 Dollars)		
EL 1	$0.00	-$0.03
EL 2	-$0.06	-$0.10
EL 3	-$0.20	-$0.27
EL 4	-$0.53	-$0.64
Payback Period (years)		
EL 1		5.0
EL 2	6.1	6.5
EL 3	6.8	7.3
EL 4	7.6	8.0
Consumers with Net Cost (%)		
EL 1	19%	20%
EL 2	48%	49%
EL 3	74%	77%
EL 4	84%	86%

Table V.7 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; AC-DC Low Voltage

	Low-Income Households	All Households
Average LCC Savings (2021 Dollars)		
EL 1	$0.01	$0.01
EL 2	-$0.51	-$0.50
EL 3	-$0.92	-$0.91
EL 4	-$1.31	-$1.30
Payback Period (years)		
EL 1	3.0	3.2
EL 2	26.8	26.4
EL 3	27.8	27.3
EL 4	29.1	28.5
Consumers with Net Cost (%)		
EL 1	4%	4%
EL 2	70%	69%
EL 3	89%	89%
EL 4	98%	97%

Table V.8 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; AC-AC Basic-Voltage

	Low-Income Households	All Households
Average LCC Savings (2021 Dollars)		
EL 1	$0.24	$0.18
EL 2	$0.41	$0.29
EL 3	$0.74	$0.52
EL 4	$0.95	$0.55
Payback Period (years)		
EL 1		2.3
EL 2	3.5	3.7
EL 3	3.9	4.1
EL 4	4.5	4.7
Consumers with Net Cost (%)		
EL 1	10%	10%
EL 2	14%	17%
EL 3	22%	28%
EL 4	27%	43%

Table V.9 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Multiple-Voltage

	Low-Income Households	All Households
Average LCC Savings (2021 Dollars)		
EL 1	$0.46	$0.46
EL 2	$0.21	$0.24
EL 3	-$0.43	-$0.38
EL 4	-$1.32	-$1.25
Payback Period (years)		
EL 1		0.1
EL 2	8.1	7.0
EL 3	11.3	9.8
EL 4	14.3	12.5
Consumers with Net Cost (%)		
EL 1	0%	0%
EL 2	39%	39%
EL 3	67%	66%
EL 4	71%	70%

c. Rebuttable Presumption Payback

As discussed in section IV.G.9, EPCA establishes a rebuttable presumption that an energy conservation standard is economically justified if the increased purchase cost for a product that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. In calculating a rebuttable presumption payback period for each of the considered TSLs, DOE used discrete values, and as required by EPCA, based the energy use calculation on the DOE test procedure for EPSs.

Table V.10 presents the rebuttable-presumption payback periods for the considered TSLs for EPSs. While DOE examined the rebuttable-presumption criterion, it considered whether the standard levels considered for the NOPR are economically justified through a more detailed analysis of the economic impacts of those levels, pursuant to 42 U.S.C. 6295(o)(2)(B)(i), that considers the full range of impacts to the consumer, manufacturer, nation, and environment. The results of that analysis serve as the basis for DOE to definitively evaluate the economic justification for a potential standard level, which may support or rebut the preliminary determination of economic justification.

Table V.10 Rebuttable-Presumption Payback Periods

EL	AC-DC Basic-Voltage	AC-DC Low-Voltage	AC-AC Basic-Voltage	Multiple-Voltage
1	5.0	3.2	2.3	0.1
2	6.5	26.4	3.7	7.0
3	7.3	27.3	4.1	9.8
4	8.0	28.5	4.7	12.5

2. Economic Impacts on Manufacturers

DOE performed an MIA to estimate the impact of amended energy conservation standards on manufacturers of EPSs. The following section describes the expected impacts on manufacturers at each considered TSL. Section IV.K of this document discusses the MIA methodology, and chapter 12 of the NOPR TSD explains the analysis in further detail.

a. Industry Cash Flow Analysis Results

In this section, DOE provides GRIM results from the analysis, which examines changes in the industry that would result from a standard. The following tables summarize the estimated financial impacts (represented by changes in INPV) of potential amended energy conservation standards on manufacturers of EPSs as well as the conversion costs that DOE estimates manufacturers of EPSs would incur at each TSL.

Table V.11 Manufacturer Impact Analysis for External Power Supplies - Preservation of Gross Margin Scenario

	Units	No-New-Standards Case	Trial Standard Level					
			1	2	3	4	5	6
INPV	*2021 Dollars millions*	847.5	846.1	845.3	840.4	839.6	801.5	814.6
Change in INPV	*2021 Dollars millions*	-	(1.4)	(2.2)	(7.1)	(7.9)	(46.0)	(32.9)
	%	-	(0.2)	(0.3)	(0.8)	(0.9)	(5.4)	(3.9)
Total Conversion Costs	*2021 Dollars millions*	-	2.7	4.7	15.4	17.4	105.9	186.5

* Numbers in parentheses "()" are negative. Some numbers might not round due to rounding.

Table V.12 Manufacturer Impact Analysis for External Power Supplies - Preservation of Operating Profit Scenario

	Units	No-New-Standards Case	Trial Standard Level					
			1	2	3	4	5	6
INPV	*2021 Dollars millions*	847.5	845.8	844.4	837.3	835.9	775.2	700.0
Change in INPV	*2021 Dollars millions*	-	(1.7)	(3.1)	(10.2)	(11.6)	(72.3)	(147.5)
	%	-	(0.2)	(0.4)	(1.2)	(1.4)	(8.5)	(17.4)
Total Conversion Costs	*2021 Dollars millions*	-	2.7	4.7	15.4	17.4	105.9	186.5

* Numbers in parentheses "()" are negative. Some numbers might not round due to rounding.

At TSL 1, DOE estimates impacts on INPV will range from approximately -$1.7 million to -$1.4 million, which represents a change of approximately -0.2 percent. At TSL 1, industry free cash-flow decreases to $77.6 million, which represents a decrease of approximately 1.5 percent, compared to the no-new-standards case value of $78.7 million in 2026, the year before the estimated compliance date.

TSL 1 would set the energy conservation standard at baseline for the AC-DC Basic-Voltage product class and at EL 1 for all other product classes. DOE estimates that all AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, approximately 41 percent of AC-AC basic-voltage shipments, and approximately 89 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 1 in 2027. As noted previously, shipment data is not available for the AC-AC Low-Voltage product class. DOE expects EPS manufacturers to incur approximately $2.7 million in product conversion costs to redesign all non-compliant models.

At TSL 1, the shipment-weighted average MPC for EPSs slightly increases by 0.1 percent, relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this slight cost increase. The slight increase in shipment weighted average MPC is outweighed by the $2.7 million in conversion costs, causing a slightly negative change in INPV at TSL 1 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, manufacturers earn the same per-unit operating profit as would be earned in the no-new-standards case, but manufacturers do not earn additional profit from their investments or higher MPCs. In this scenario, the 0.1 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the margin and the $2.7 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 1 under the preservation of operating profit scenario.

At TSL 2, DOE estimates impacts on INPV will range from -$3.1 million to -$2.2 million, which represents a change of -0.4 percent to -0.3 percent, respectively. At TSL 2, industry free cash-flow decreases to $76.7 million, which represents a decrease of approximately 2.6 percent, compared to the no-new-standards case value of $78.7 million in 2026, the year before the estimated compliance date.

TSL 2 would set the energy conservation standard at baseline for the AC-DC Basic-Voltage product class; at EL 1 for the AC-DC Low-Voltage and AC-AC Low-Voltage product classes; at EL 2 for the Multiple-Voltage product class; and at EL 3 for the AC-AC Basic-Voltage product class. DOE estimates that all AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, approximately 24 percent of AC-AC basic-voltage shipments, and approximately 23 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 2 in 2027. DOE expects EPS manufacturers to incur approximately $4.7 million in product conversion costs to redesign all non-compliant models.

At TSL 2, the shipment-weighted average MPC for EPSs slightly increases by 0.3 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this slight cost increase. The slight increase in shipment weighted average MPC is outweighed by the $4.7 million in conversion costs, causing a slightly negative change in INPV at TSL 2 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 0.3 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the margin and the $4.7 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 2 under the preservation of operating profit scenario.

At TSL 3, DOE estimates impacts on INPV will range from -$10.2 million to -$7.1 million, which represents a change of -1.2 percent to -0.8 percent, respectively. At TSL 3, industry free cash-flow decreases to $72.1 million, which represents a decrease of approximately 8.5 percent, compared to the no-new-standards case value of $78.7 million in 2026, the year before the estimated compliance date.

TSL 3 would set the energy conservation standard at EL 1 for all AC-DC Basic-Voltage product classes. DOE estimates that approximately 75 percent of AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, approximately 41 percent of AC-AC basic-voltage shipments, and approximately 89 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 3 in 2027. DOE expects EPS manufacturers to incur approximately $15.4 million in product conversion costs to redesign all non-compliant models.

At TSL 3, the shipment-weighted average MPC for EPSs slightly increases by 0.8 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this cost increase. The increase in shipment weighted average MPC is outweighed by the $15.4 million in conversion costs, resulting in a slightly negative change in INPV at TSL 3 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 0.8 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the margin and the $15.4 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 3 under the preservation of operating profit scenario.

At TSL 4, DOE estimates impacts on INPV will range from -$11.6 million to -$7.9 million, which represents a change of -1.4 percent to -0.9 percent, respectively. At TSL 4, industry free cash-flow decreases to $71.2 million, which represents a decrease of approximately 9.6 percent, compared to the no-new-standards case value of $78.7 million in 2026, the year before the estimated compliance date.

TSL 4 would set the energy conservation standard at EL 1 for all product classes except for the Multiple-Voltage and AC-AC Basic-Voltage product classes, which would be set at EL 2 and EL 3 respectively. DOE estimates that approximately 75 percent of AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, approximately 0 percent of AC-AC basic-voltage shipments, and approximately 49 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 4 in 2027. DOE expects EPS manufacturers to incur approximately $17.4 million in product conversion costs to redesign all non-compliant models.

At TSL 4, the shipment-weighted average MPC for EPSs slightly increases by 1.0 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this slight cost increase. The slight increase in shipment weighted average MPC is outweighed by the $17.4 million in conversion costs, causing a slightly negative change in INPV at TSL 4 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, manufacturers earn the same per-unit operating profit as would be earned in the no-new-standards case, but manufacturers do not earn additional profit from their investments or higher MPCs. In this scenario, the 1.0 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the margin and the $17.4 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 4 under the preservation of operating profit scenario.

At TSL 5, DOE estimates impacts on INPV will range from -$72.3 million to -$46.0 million, which represents a change of -8.5 percent to -5.4 percent, respectively. At TSL 5, industry free cash-flow decreases to $32.7 million, which represents a decrease of approximately 58.4 percent, compared to the no-new-standards case value of $78.7 million in 2026, the year before the estimated compliance date.

TSL 5 would set the energy conservation standard at EL 1 for the AC-DC Low-Voltage, AC-AC Low-Voltage, and Multiple-Voltage product classes. The AC-DC Basic-Voltage and AC-AC Basic-Voltage product classes would be set at EL 3 and EL 4 respectively. EL 4 constitutes max-tech for the AC-AC Basic-Voltage product class. DOE estimates that approximately 8 percent AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, approximately 0 percent of AC-AC basic-voltage shipments, and approximately 89 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 5 in 2027. DOE expects EPS manufacturers to incur approximately $105.9 million in product conversion costs to redesign all non-compliant models.

At TSL 5, the shipment-weighted average MPC for EPSs moderately increases by 6.8 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this moderate cost increase. The moderate increase in shipment weighted average MPC is outweighed by the $105.9 million in conversion costs, causing a moderately negative change in INPV at TSL 5 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 6.8 percent shipment weighted average MPC increase results in a moderate reduction in the margin after the analyzed compliance year. This reduction in the margin and the $105.9 million in conversion costs incurred by manufacturers cause a moderately negative change in INPV at TSL 5 under the preservation of operating profit scenario.

At TSL 6, DOE estimates impacts on INPV will range from -$147.5 million to -$32.9 million, which represents a change of -17.4 percent to -3.9 percent, respectively. At TSL 6, industry free cash-flow decreases to -$5.9 million, which represents a decrease of approximately 107.5 percent, compared to the no-new-standards case value of $78.7 million in 2026, the year before the estimated compliance date.

TSL 6 would set the energy conservation standard at EL 4 for all product classes. EL 4 constitutes max-tech for all product classes. DOE estimates that approximately 0 percent of AC-DC basic-voltage shipments, approximately 2 percent of AC-DC low-voltage shipments, approximately 0 percent of AC-AC basic-voltage shipments, and approximately 19 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 6 in 2027. DOE expects EPS manufacturers to incur approximately $186.5 million in product conversion costs to redesign all non-compliant models.

At TSL 6, the shipment-weighted average MPC for EPSs significantly increases by 29.6 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this cost increase. The significant increase in shipment weighted average MPC is outweighed by the $186.5 million in conversion costs, causing a slightly negative change in INPV at TSL 6 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 29.6 percent shipment weighted average MPC increase results in a significant reduction in the margin after the analyzed compliance year. This reduction in the margin and the $186.5 million in conversion costs incurred by manufacturers cause a moderately negative change in INPV at TSL 6 under the preservation of operating profit scenario.

DOE requests comment on the GRIM results and the estimated conversion costs.

b. Direct Impacts on Employment

DOE was unable to identify any domestic EPS manufacturing facilities, based on the industry profile developments for this NOPR analysis and manufacturer interviews that were conducted for this product as well as other products that use EPSs. As such, DOE does not expect that there would be any direct impacts on domestic production employment as a result of any amended energy conservation standards.

DOE requests comment on whether there is domestic EPS manufacturing, where and to what extent such manufacturing occurs, and how the proposed energy conservation standard might affect that possible domestic EPS manufacturing.

c. Impacts on Manufacturing Capacity

As noted in prior sections, DOE does not expect that energy conservation standards would result in substantial changes to EPS manufacturing equipment. Further, DOE does not expect that there would be capacity issues providing components to EPS manufacturers for more efficient EPSs.

DOE requests comment on possible impacts on manufacturing capacity stemming from amended energy conservation standards, including any potential issues with supply chain costs, and or chips and devices used in the national security sector.

d. Impacts on Subgroups of Manufacturers

DOE identified one subgroup of manufactures that may experience disproportionate or different impacts as a result of amended standards—small businesses. Analysis of the possible impact on this group is discussed in Section VI.B of this document.

e. Cumulative Regulatory Burden

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

Table V.13 Compliance Dates and Expected Conversion Expenses of Federal Energy Conservation Standards Affecting External Power Supply Manufacturers

Federal Energy Conservation Standard	Number of Manufacturers*	Number of Manufacturers Affected from this Rule**	Approx. Standards Year	Industry Conversion Costs *(millions)*	Industry Conversion Costs / Product Revenue***
Room Air Conditioners† 87 FR 20608 (Apr. 7, 2022)	8	3	2026	$22.8 (2020 Dollar)	0.5%
Microwave Ovens† 87 FR 52282 (Aug. 24, 2022)	19	6	2026	$46.1 (2021 Dollars)	0.7%
Clothes Dryers† 87 FR 51734 (Aug. 23, 2022)	15	2	2027	$149.7 (2020 Dollar)	1.8%

* This column presents the total number of manufacturers identified in the energy conservation standard rule contributing to cumulative regulatory burden.
** This column presents the number of manufacturers producing EPSs that are also listed as manufacturers in the listed energy conservation standard contributing to cumulative regulatory burden.
*** This column presents industry conversion costs as a percentage of product revenue during the conversion period. Industry conversion costs are the upfront investments manufacturers must make to sell compliant products/equipment. The revenue used for this calculation is the revenue from just the covered product/equipment associated with each row. The conversion period is the time frame over which conversion costs are made and lasts from the publication year of the final rule to the compliance year of the energy conservation standard. The conversion period typically ranges from 3 to 5 years, depending on the rulemaking.
† Indicates NOPR or SNOPR publications. Values may change on publication of a Final Rule.

In addition to the rulemaking listed in Table V.13 DOE has ongoing rulemakings for other products or equipment that EPS manufacturers produce, including air cleaners;[62] automatic commercial ice makers;[63] commercial clothes washers;[64] dehumidifiers;[65]

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[62] *www.regulations.gov/docket/EERE-2021-BT-STD-0035*
[63] *www.regulations.gov/docket/EERE-2017-BT-STD-0022*
[64] *www.regulations.gov/docket/EERE-2019-BT-STD-0044*
[65] *www.regulations.gov/docket/EERE-2019-BT-STD-0043*

miscellaneous refrigeration products;[66] refrigerators, refrigerator-freezers, and freezers;[67] conventional cooking products;[68] battery chargers;[69] and residential clothes washers.[70] If DOE proposes or finalizes any energy conservation standards for these products or equipment prior to finalizing energy conservation standards for EPSs, DOE will include the energy conservation standards for these other products or equipment as part of the cumulative regulatory burden for the EPS final rule.

DOE requests information regarding the impact of cumulative regulatory burden on manufacturers of EPSs associated with multiple DOE standards or product-specific regulatory actions of other Federal agencies.

3. National Impact Analysis

This section presents DOE's estimates of the national energy savings and the NPV of consumer benefits that would result from each of the TSLs considered as potential amended standards.

a. Significance of Energy Savings

To estimate the energy savings attributable to potential amended standards for EPSs, DOE compared their energy consumption under the no-new-standards case to their anticipated energy consumption under each TSL. The savings are measured over the entire lifetime of products purchased in the 30-year period that begins in the year of anticipated compliance with amended standards (2027–2056). presents DOE's

[66] *www.regulations.gov/docket/EERE-2020-BT-STD-0039*
[67] *www.regulations.gov/docket/EERE-2017-BT-STD-0003*
[68] *www.regulations.gov/docket/EERE-2014-BT-STD-0005*
[69] *www.regulations.gov/docket/EERE-2020-BT-STD-0013*
[70] *www.regulations.gov/docket/EERE-2017-BT-STD-0014*

projections of the national energy savings for each TSL considered for EPSs. The savings were calculated using the approach described in section IV.I of this document.

Table V.14 Cumulative National Energy Savings for External Power Supplies; 30 Years of Shipments (2027-2056)

	Trial Standard Level					
	1	**2**	**3**	**4**	**5**	**6**
	quads					
Primary energy	0.01	0.04	0.08	0.11	0.49	1.09
FFC energy	0.02	0.04	0.09	0.11	0.51	1.14

OMB Circular A-4[71] 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 9 years, 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 certain energy conservation standards and potential revision of and compliance with such revised standards.[72] The review timeframe established in EPCA is generally not synchronized with the product lifetime, product manufacturing cycles, or other factors specific to EPSs. Thus, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology. The NES sensitivity analysis results based on a 9-year analytical period are presented in Table V.15. The impacts are counted over the lifetime of EPSs purchased in 2026–2035.

[71] U.S. Office of Management and Budget. *Circular A-4: Regulatory Analysis*. September 17, 2003. *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed Sept. 12, 2022).

[72] Section 325(m) of EPCA requires DOE to review its standards at least once every 6 years, and requires, for certain products, a 3-year period after any new standard is promulgated before compliance is required, except that in no case may any new standards be required within 6 years of the compliance date of the previous standards. While adding a 6-year review to the 3-year compliance period adds up to 9 years, DOE notes that it may undertake reviews at any time within the 6 year period and that the 3-year compliance date may yield to the 6-year backstop. A 9-year analysis period may not be appropriate given the variability that occurs in the timing of standards reviews and the fact that for some products, the compliance period is 5 years rather than 3 years.

Table V.15 Cumulative National Energy Savings for External Power Supplies; 9 Years of Shipments (2027–2036)

	Trial Standard Level					
	1	2	3	4	5	6
	quads					
Primary energy	0.004	0.01	0.02	0.03	0.14	0.31
FFC energy	0.004	0.01	0.02	0.03	0.14	0.32

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,[73] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table V.16 shows the consumer NPV results with impacts counted over the lifetime of products purchased in 2027-2056.

Table V.16 Cumulative Net Present Value of Consumer Benefits for External Power Supplies; 30 Years of Shipments (2027-2056)

Discount Rate	Trial Standard Level					
	1	2	3	4	5	6
	billion (2021 Dollars)					
3 percent	0.08	0.22	0.31	0.45	1.96	(1.14)
7 percent	0.03	0.10	0.11	0.17	0.75	(1.72)

The NPV results based on the aforementioned 9-year analytical period are presented in . The impacts are counted over the lifetime of products purchased in 2027-2035. As mentioned previously, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology or decision criteria.

[73] U.S. Office of Management and Budget. *Circular A-4: Regulatory Analysis*. September 17, 2003. (Available at: *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/*) (last accessed Sept. 12, 2022).

Table V.17 Cumulative Net Present Value of Consumer Benefits for External Power Supplies; 9 Years of Shipments (2027-2035)

Discount Rate	Trial Standard Level					
	1	2	3	4	5	6
	billion (2021 Dollars)					
3 percent	0.02	0.06	0.05	0.09	0.35	(2.47)
7 percent	0.01	0.04	0.02	0.04	0.17	(1.99)

c. Indirect Impacts on Employment

It is estimated that that amended energy conservation standards for EPSs would reduce energy expenditures for consumers of those products, with the resulting net savings being redirected to other forms of economic activity. These expected shifts in spending and economic activity could affect the demand for labor. As described in section IV.O of this document, DOE used an input/output model of the U.S. economy to estimate indirect employment impacts of the TSLs that DOE considered. There are uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis. Therefore, DOE generated results for near-term timeframes (2027-2032), where these uncertainties are reduced.

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

4. Impact on Utility or Performance of Products

As discussed in section IV.C of this document, DOE has tentatively concluded that the standards proposed in this NOPR would not lessen the utility or performance of the EPSs under consideration in this rulemaking. Manufacturers of these products currently offer units that meet or exceed the proposed standards without a loss of utility or performance.

5. Impact of Any Lessening of Competition

DOE considered any lessening of competition that would be likely to result from new or amended standards. As discussed in section III.F.1.e, the Attorney General determines the impact, if any, of any lessening of competition likely to result from a proposed standard, and transmits such determination in writing to the Secretary, together with an analysis of the nature and extent of such impact. To assist the Attorney General in making this determination, DOE has provided DOJ with copies of this NOPR and the accompanying TSD for review. DOE will consider DOJ's comments on the proposed rule in determining whether to proceed to a final rule. DOE will publish and respond to DOJ's comments in that document. DOE invites comment from the public regarding the competitive impacts that are likely to result from this proposed rule. In addition, stakeholders may also provide comments separately to DOJ regarding these potential impacts. See the **ADDRESSES** section for information to send comments to DOJ.

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 (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. Chapter 15 in the NOPR TSD presents the estimated impacts on electricity generating capacity, relative to the no-new-standards case, for the TSLs that DOE considered in this rulemaking.

Energy conservation resulting from potential energy conservation standards for EPSs is expected to yield environmental benefits in the form of reduced emissions of certain air pollutants and greenhouse gases. Table V.18 provides DOE's estimate of cumulative emissions reductions expected to result from the TSLs considered in this rulemaking. The emissions were calculated using the multipliers discussed in section IV.L. DOE reports annual emissions reductions for each TSL in chapter 13 of the NOPR TSD.

Table V.18 Cumulative Emissions Reduction for EPSs Shipped in 2027-2056

	Trial Standard Level					
	1	2	3	4	5	6
Power Sector Emissions						
CO_2 (*million metric tons*)	0.5	1.4	2.7	3.6	16.1	36.0
CH_4 (*thousand tons*)	0.04	0.1	0.2	0.3	1.3	2.8
N_2O (*thousand tons*)	0.01	0.01	0.03	0.04	0.2	0.4
NO_X (*thousand tons*)	0.2	0.7	1.4	1.8	8.2	18.5
SO_2 (*thousand tons*)	0.2	0.7	1.3	1.7	7.7	17.4
Hg (*tons*)	0.001	0.004	0.008	0.011	0.048	0.108
Upstream Emissions						
CO_2 (*million metric tons*)	0.04	0.1	0.2	0.3	1.2	2.7
CH_4 (*thousand tons*)	3.5	9.9	19.6	26.0	115.4	257.0
N_2O (*thousand tons*)	0.0002	0.001	0.001	0.001	0.01	0.01
NO_X (*thousand tons*)	0.6	1.6	3.1	4.2	18.5	41.2
SO_2 (*thousand tons*)	0.0	0.01	0.02	0.02	0.1	0.2
Hg (*tons*)	0.000	0.000	0.000	0.000	0.0002	0.0004
Total FFC Emissions						
CO_2 (*million metric tons*)	0.5	1.5	2.9	3.9	17.3	38.7
CH_4 (*thousand tons*)	3.5	10.0	19.8	26.3	116.7	259.8
N_2O (*thousand tons*)	0.01	0.02	0.03	0.04	0.2	0.4
NO_X (*thousand tons*)	0.8	2.3	4.5	6.0	26.8	59.7
SO_2 (*thousand tons*)	0.2	0.7	1.3	1.7	7.8	17.6
Hg (*tons*)	0.001	0.004	0.008	0.011	0.048	0.109

As part of the analysis for this rulemaking, DOE estimated monetary benefits likely to result from the reduced emissions of CO_2 that DOE estimated for each of the considered TSLs for EPSs. Section IV.L of this document discusses the SC-CO_2 values that DOE used. 9 presents the value of CO_2 emissions reduction at each TSL for each of the SC-CO_2 cases. The time-series of annual values is presented for the proposed TSL in chapter 14 of the NOPR TSD.

Table V.19 Present Value of CO_2 Emissions Reduction for EPSs Shipped in 2027-2056

TSL	SC-CO_2 Case			
	Discount Rate and Statistics			
	5% Average	3% Average	2.5% Average	3% 95th percentile
	million (2021 Dollars)			
1	5	22	34	67
2	15	62	97	190
3	30	124	192	377
4	39	164	255	500
5	176	738	1145	2245
6	395	1650	2560	5023

As discussed in section IV.L.2, DOE estimated the climate benefits likely to result from the reduced emissions of methane and N_2O that DOE estimated for each of the considered TSLs for EPSs. Table V.20 presents the value of the CH_4 emissions reduction at each TSL, and Table V.21 presents the value of the N_2O emissions reduction at each TSL. The time-series of annual values is presented for the proposed TSL in chapter 14 of the NOPR TSD.

Table V.20 Present Value of Methane Emissions Reduction for EPSs Shipped in 2027-2056

TSL	SC-CH_4 Case			
	Discount Rate and Statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	million (2021 Dollars)			
1	2	5	6	12
2	5	13	18	35
3	9	26	36	69
4	12	35	48	92
5	54	154	213	408
6	120	343	475	910

Table V.21 Present Value of Nitrous Oxide Emissions Reduction for EPSs Shipped in 2027-2056

TSL	SC-N_2O Case			
	Discount Rate and Statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	million (2021 Dollars)			
1	0.0	0.1	0.1	0.2
2	0.1	0.2	0.3	0.6
3	0.1	0.5	0.7	1.2
4	0.2	0.6	0.9	1.6
5	0.7	2.7	4.2	7.2
6	1.6	6.1	9.3	16.2

DOE is well aware that scientific and economic knowledge about the contribution of CO_2 and other GHG emissions to changes in the future global climate and the potential resulting damages to the global and U.S. economy continues to evolve rapidly. DOE, together with other Federal agencies, will continue to review 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. DOE notes that the proposed standards would be economically justified even without inclusion of monetized benefits of reduced GHG emissions.

DOE also estimated the monetary value of the health benefits associated with NO_X and SO_2 emissions reductions anticipated to result from the considered TSLs for EPSs. The dollar-per-ton values that DOE used are discussed in section IV.M of this document. Table V.22 presents the present value for NO_X emissions reduction for each TSL calculated using 7-percent and 3-percent discount rates, and Table V.23 presents similar results for SO_2 emissions reductions. The results in these tables reflect application of EPA's low dollar-per-ton values, which DOE used to be conservative. The time-series of annual values is presented for the proposed TSL in chapter 14 of the NOPR TSD.

Table V.22 Present Value of NO_X Emissions Reduction for EPSs Shipped in 2027-2056

TSL	7% Discount Rate	3% Discount Rate
	million (2021 Dollars)	
1	15	34
2	42	97
3	86	193
4	113	256
5	510	1146
6	1144	2561

Table V.23 Present Value of SO_2 Emissions Reduction for EPSs Shipped in 2027-2056

TSL	7% Discount Rate	3% Discount Rate
	million (2021 Dollars)	
1	6	13
2	17	38
3	35	76
4	46	100
5	209	455
6	472	1024

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)(VII)) No other factors were considered in this analysis.

8. Summary of Economic Impacts

Table V.24 presents the NPV values that result from adding the estimates of the potential economic benefits resulting from reduced GHG and NO_X and SO_2 emissions to the NPV of consumer benefits calculated for each TSL considered in this rulemaking. The consumer benefits are domestic U.S. monetary savings that occur as a result of purchasing the covered products, and are measured for the lifetime of products shipped in 2027-2056. The benefits associated with reduced GHG emissions resulting from the adopted standards are global benefits, and are also calculated based on the lifetime of EPSs shipped in 2027-2056.

Table V.24 Consumer NPV Combined with Present Value of Benefits from Climate and Health Benefits

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
3% discount rate for Consumer NPV and Health Benefits (billion 2021 Dollars)						
5% Average SC-GHG case	0.13	0.37	0.61	0.86	3.79	2.97
3% Average SC-GHG case	0.15	0.43	0.72	1.01	4.45	4.45
2.5% Average SC-GHG case	0.16	0.47	0.80	1.11	4.92	5.49
3% 95th percentile SC-GHG case	0.20	0.58	1.02	1.40	6.22	8.40
7% discount rate for Consumer NPV and Health Benefits (billion 2021 Dollars)						
5% Average SC-GHG case	0.06	0.17	0.27	0.38	1.70	0.42
3% Average SC-GHG case	0.08	0.23	0.38	0.53	2.36	1.90
2.5% Average SC-GHG case	0.09	0.27	0.46	0.64	2.83	2.95
3% 95th percentile SC-GHG case	0.13	0.38	0.68	0.93	4.13	5.85

C. Conclusion

When considering new or amended energy conservation standards, the standards that DOE adopts for any type (or class) of covered product must be designed to achieve the maximum improvement in energy efficiency that the Secretary 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 or amended standard must also result in significant conservation of energy. (42 U.S.C. 6295(o)(3)(B))

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

To aid the reader as DOE discusses the benefits and/or burdens of each TSL, tables in this section present a summary of the results of DOE's quantitative analysis for each TSL. In addition to the quantitative results presented in the tables, DOE also considers other burdens and benefits that affect economic justification. These include the impacts on identifiable subgroups of consumers who may be disproportionately affected by a national standard and impacts on employment.

DOE also notes that the economics literature provides a wide-ranging discussion of how consumers trade off upfront costs and energy savings in the absence of government intervention. Much of this literature attempts to explain why consumers appear to undervalue energy efficiency improvements. There is evidence that consumers undervalue future energy savings as a result of (1) a lack of information, (2) a lack of sufficient salience of the long-term or aggregate benefits, (3) a lack of sufficient savings to warrant delaying or altering purchases, (4) excessive focus on the short term, in the form of inconsistent weighting of future energy cost savings relative to available returns on other investments, (5) computational or other difficulties associated with the evaluation of relevant tradeoffs, and (6) a divergence in incentives (for example, between renters and owners, or builders and purchasers). Having less than perfect foresight and a high degree of uncertainty about the future, consumers may trade off these types of investments at a higher than expected rate between current consumption and uncertain future energy cost savings.

In DOE's current regulatory analysis, potential changes in the benefits and costs of a regulation due to changes in consumer purchase decisions are included in two ways. First, if consumers forego the purchase of a product in the standards case, this decreases sales for product manufacturers, and the impact on manufacturers attributed to lost revenue is included in the MIA. Second, DOE accounts for energy savings attributable only to products actually used by consumers in the standards case; if a standard decreases the number of products purchased by consumers, this decreases the potential energy savings from an energy conservation standard. DOE provides estimates of shipments and changes in the volume of product purchases in chapter 9 of the NOPR TSD. However, DOE's current analysis does not explicitly control for heterogeneity in consumer preferences, preferences across subcategories of products or specific features, or consumer price sensitivity variation according to household income.[74]

While DOE is not prepared at present to provide a fuller quantifiable framework for estimating the benefits and costs of changes in consumer purchase decisions due to an energy conservation standard, DOE is committed to developing a framework that can support empirical quantitative tools for improved assessment of the consumer welfare impacts of appliance standards. DOE has posted a paper that discusses the issue of consumer welfare impacts of appliance energy conservation standards, and potential enhancements to the methodology by which these impacts are defined and estimated in the regulatory process.[75] DOE welcomes comments on how to more fully assess the potential impact of energy conservation standards on consumer choice and how to quantify this impact in its regulatory analysis in future rulemakings.

1. Benefits and Burdens of TSLs Considered for EPS Standards

Table V.25 and Table V.26 summarize the quantitative impacts estimated for each TSL for EPSs. The national impacts are measured over the lifetime of EPSs purchased in the 30-year period that begins in the anticipated year of compliance with amended standards (2027-2056). The energy savings, emissions reductions, and value of emissions reductions refer to full-fuel-cycle results. The efficiency levels contained in each TSL are described in section V.A of this document.

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[74] P.C. Reiss and M.W. White. Household Electricity Demand, Revisited. *Review of Economic Studies*. 2005. 72(3): pp. 853–883. doi: *10.1111/0034-6527.00354*.

[75] Sanstad, A.H. *Notes on the Economics of Household Energy Consumption and Technology Choice*. 2010. Lawrence Berkeley National Laboratory. *www1.eere.energy.gov/buildings/appliance_standards/pdfs/consumer_ee_theory.pdf* (last accessed Oct. 4, 2022).

Table V.25 Summary of Analytical Results for External Power Supply TSLs: National Impacts

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Cumulative FFC National Energy Savings						
Quads	0.02	0.04	0.09	0.11	0.51	1.14
Cumulative FFC Emissions Reduction						
CO_2 (*million metric tons*)	0.5	1.5	2.9	3.9	17.3	38.7
CH_4 (*thousand tons*)	3.5	10.0	19.8	26.3	116.7	259.8
N_2O (*thousand tons*)	0.0	0.0	0.0	0.0	0.2	0.4
SO_2 (*thousand tons*)	0.8	2.3	4.5	6.0	26.8	59.7
NO_X (*thousand tons*)	0.2	0.7	1.3	1.7	7.8	17.6
Hg (*tons*)	0.0	0.0	0.0	0.0	0.0	0.1
Present Value of Benefits and Costs (*3% discount rate, billion 2021 Dollars*)						
Consumer Operating Cost Savings	0.11	0.31	0.62	0.82	3.73	8.40
Climate Benefits*	0.03	0.08	0.15	0.20	0.89	2.00
Health Benefits**	0.05	0.13	0.27	0.36	1.60	3.58
Total Benefits†	0.18	0.52	1.04	1.38	6.23	13.99
Consumer Incremental Product Costs	0.03	0.09	0.32	0.37	1.78	9.54
Consumer Net Benefits	0.08	0.22	0.31	0.45	1.96	(1.14)
Total Net Benefits	0.15	0.43	0.72	1.01	4.45	4.45
Present Value of Benefits and Costs (*7% discount rate, billion 2021 Dollars*)						
Consumer Operating Cost Savings	0.05	0.15	0.31	0.40	1.85	4.18
Climate Benefits*	0.03	0.08	0.15	0.20	0.89	2.00
Health Benefits**	0.02	0.06	0.12	0.16	0.72	1.62
Total Benefits†	0.10	0.29	0.58	0.76	3.46	7.79
Consumer Incremental Product Costs	0.02	0.06	0.19	0.23	1.10	5.89
Consumer Net Benefits	0.03	0.10	0.11	0.17	0.75	(1.72)
Total Net Benefits	0.08	0.23	0.38	0.53	2.36	1.90

Note: This table presents the costs and benefits associated with external power supplies shipped in 2027-2056. These results include benefits to consumers which accrue after 2056 from the products shipped in 2027-2056.

* Climate benefits are calculated using four different estimates of the global SC-GHG (see section IV.M of this notice). For presentational purposes of this table, the climate benefits associated with the average SC-GHG at a 3 percent discount rate are shown, but the Department does not have a single central SC-GHG point estimate. On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22-30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in Louisiana v. Biden, No. 21-cv-1074-JDC-KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from "adopting, employing, treating as binding, or relying upon" the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits where appropriate and permissible under law.

** Health benefits are calculated using benefit-per-ton values for NO_X and SO_2. DOE is currently only monetizing (for NO_X and SO_2) $PM_{2.5}$ precursor health benefits and (for NO_X) ozone precursor health benefits, but will continue to assess the ability to monetize other effects such as health benefits from reductions in direct $PM_{2.5}$ emissions. The health benefits are presented at real discount rates of 3 and 7 percent. See section IV.M of this document for more details.

† Total and net benefits include consumer, climate, and health benefits. For presentation purposes, total and net benefits for both the 3-percent and 7-percent cases are presented using the average SC-GHG with 3-percent discount rate, but the Department does not have a single central SC-GHG point estimate. DOE emphasizes the importance and value of considering the benefits calculated using all four SC-GHG estimates. See Table V.24for net benefits using all four SC-GHG estimates.

Table V.26 Summary of Analytical Results for External Power Supply TSLs: Manufacturer and Consumer Impacts

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Manufacturer Impacts						
Industry NPV (*million* 2021 Dollars) (No-new-standards case INPV = 847.5)	845.8 - 846.1	844.4 - 845.3	837.3 - 840.4	835.9 - 839.6	775.2 - 801.5	700.0 - 814.6
Industry NPV *(% change*)	(0.2) - (0.2)	(0.4) - (0.3)	(1.2) - (0.8)	(1.4) - (0.9)	(8.5) - (5.4)	(17.4) - (3.9)
Consumer Average LCC Savings (2021 Dollars)						
AC-DC Basic-Vol.	$0.00	$0.00	($0.03)	($0.03)	($0.27)	($0.64)
AC-DC Low-Vol.	$0.01	$0.01	$0.01	$0.01	$0.01	($1.30)
AC-AC Basic-Vol.	$0.18	$0.52	$0.18	$0.52	$0.55	$0.55
Multiple-Voltage	$0.46	$0.24	$0.46	$0.24	$0.46	($1.25)
Consumer Simple PBP (years)						
AC-DC Basic-Vol.	0.0	0.0	5.0	5.0	7.3	8.0
AC-DC Low-Vol.	3.2	3.2	3.2	3.2	3.2	28.5
AC-AC Basic-Vol.	2.3	4.1	2.3	4.1	4.7	4.7
Multiple-Voltage	0.1	7.0	0.1	7.0	0.1	12.5
Percent of Consumers that Experience a Net Cost						
AC-DC Basic-Vol.	0%	0%	20%	20%	77%	86%
AC-DC Low-Vol.	4%	4%	4%	4%	4%	97%
AC-AC Basic-Vol.	10%	28%	10%	28%	43%	43%
Multiple-Voltage	0%	39%	0%	39%	0%	70%

Parentheses indicate negative (-) values.

DOE first considered TSL 6, which represents the max-tech efficiency levels for all product classes. Approximately 5 percent of all EPS models on the market currently meet these efficiency levels. Achieving max-tech level efficiencies may require several of the technology options identified in Table IV.1. TSL 6 would save an estimated 1.14 quads of energy, an amount DOE considers significant. Under TSL 6, the NPV of consumer impacts would represent a cost of $1.72 billion using a discount rate of 7 percent, and a cost of $1.14 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 6 are 38.7 Mt of CO_2, 259.8 thousand tons of CH_4, 0.4 thousand tons of N_2O, 59.7 thousand tons of NO_X, 17.6 thousand tons of SO_2, and 0.1 tons of Hg. The estimated monetary value of the climate benefits from reduced GHG emissions (associated with the average SC-GHG at a 3-percent discount rate) at TSL 6 is $2.0 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 6 is $1.62 billion using a 7-percent discount rate and $3.58 billion using a 3-percent discount rate.

Using a 7-percent discount rate for consumer benefits and costs, health benefits from reduced SO_2 and NO_X emissions, and the 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated total NPV at TSL 6 is $1.90 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 6 is $4.45 billion. The estimated total NPV is provided for additional information, however DOE primarily relies upon the NPV of consumer benefits when determining whether a proposed standard level is economically justified.

As discussed in chapters 3, 5, and 9 of the NOPR TSD, shipments for the AC-DC Low Voltage and AC-DC Basic Voltage product classes dominate the EPS market. These two classes are followed by Multiple Voltage, AC-DC Basic Voltage, and AC-DC Low Voltage, respectively. At TSL 6, the average LCC impact is negative for all product classes except AC-AC Basic-Voltage, which has significantly fewer shipments than the AC-DC product classes and represents approximately 1% of the market. A negative LCC results when the incremental installed costs exceed the incremental lifetime operating savings. The average increases in incremental installed costs range from $1.51 to $2.37 and the average lifetime operating savings range from $0.21 to $2.51. The simple payback period ranges from 4.7 years to nearly 30 years, the latter being significantly longer than the lifetime of most EPSs (4.8 years). The fraction of consumers experiencing a net LCC cost ranges from 43 percent to 97 percent, indicating that a majority of consumers would experience a net cost at TSL 6 over the lifetime of EPSs due to the increases in purchase costs. Low-income households would experience a similar impact as the full consumer sample and thus a majority of those households would experience a net cost.

At TSL 6, the projected change in INPV ranges from a decrease of $147.5 million to a decrease of $32.9 million, which corresponds to a decrease of 17.4 percent and a decrease of 3.9 percent, respectively. DOE estimates that industry must invest $186.5 million to comply with standards set at TSL 6—these investments would all relate to the research and development costs associated with generating new EPS designs, prototyping, and testing EPS models (conversion costs are elaborated on in IV.K.2.c). Based on DOE's shipments analysis conducted for this NOPR, DOE estimates that in the absence of new standards, less than 1 percent of AC-DC basic-voltage shipments, approximately 2 percent of AC-DC low-voltage shipments, no AC-AC basic-voltage shipments, and approximately 19 percent of multiple-voltage shipments would meet the efficiency levels analyzed at TSL 6 by 2027, the estimated compliance year. As noted previously, shipments data are not available for the AC-AC low-voltage product class. Based on this shipments analysis, at TSL 6, which is max-tech for all product classes, manufacturers would be required to redesign approximately 99 percent[76] of all EPS shipments covered by this rulemaking. This would require manufacturers to redesign models corresponding to approximately 739 million EPS shipments in the 2-year compliance time frame. These redesigns would require a significant overhaul of the design and components associated with non-compliant EPS models. It is questionable if most manufacturers would have the engineering capacity to complete the necessary redesigns within the 2-year compliance period. If manufacturers require more than 2 years to redesign all their covered EPSs, they will likely prioritize redesigns based on sales volume. There is risk that some models will become either temporarily or permanently unavailable after the compliance date.

The Secretary tentatively concludes that at TSL 6 for EPSs, the benefits of energy savings, emission reductions, and the estimated monetary value of the emissions reductions would be outweighed by the substantial negative NPV of consumer benefits, and the impacts on manufacturers, including the large conversion costs and the potential impacts to profit margin that would result in a reduction in INPV, and the lack of manufacturers currently offering products meeting the efficiency levels required at this TSL for some product classes. Consequently, the Secretary has tentatively concluded that TSL 6 is not economically justified.

DOE then considered TSL 5. At this TSL, the efficiency level for the AC-AC Basic-Voltage product class remains at max-tech. For the AC-DC Basic-Voltage product class, the efficiency level represents "best in market" (characterized in section IV.D.1.b

[76] DOE estimates five percent of the models in the CCD as being able to meet the max-tech levels. DOE additionally estimates that these models represent less than one percent of shipments.

as the active mode efficiency and standby mode power consumption that only the top 10 to 20 percent of models on the market are able to achieve). For AC-AC and AC-DC product classes, the efficiency levels correspond to the proposed EU CoC Tier 2 standards and with Multiple-Voltage at EL1. TSL 5 would save an estimated 0.51 quads of energy, an amount DOE considers significant. Under TSL 5, the NPV of consumer benefit would be $0.75 billion using a discount rate of 7 percent, and $1.96 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 5 are 17.3 Mt of CO_2, 116.7 thousand tons of CH_4, 0.2 thousand tons of N_2O, 26.8 thousand tons of NO_X, 7.8 thousand tons of SO_2, and 0.05 tons of Hg. The estimated monetary value of the climate benefits from reduced GHG emissions (associated with the average SC-GHG at a 3-percent discount rate) at TSL 5 is $0.89 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 5 is $0.72 billion using a 7-percent discount rate and $1.60 billion using a 3-percent discount rate.

Using a 7-percent discount rate for consumer benefits and costs, health benefits from reduced SO_2 and NO_X emissions, and the 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated total NPV at TSL 5 is $2.36 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 5 is $4.45 billion. The estimated total NPV is provided for additional information, however DOE primarily relies upon the NPV of consumer benefits when determining whether a proposed standard level is economically justified.

At TSL 5, the average LCC impact is negative for the AC-DC Basic-Voltage product class, with a large majority (77 percent) of AC-DC basic-voltage EPS consumers experiencing a net cost due to increases in purchase costs coupled with low operating cost savings throughout the lifetime. A negative LCC results when the incremental installed costs exceed the incremental lifetime operating savings. The average increase in incremental installed costs for AC-DC basic voltage EPS consumers is $0.95 and the average lifetime operating savings is only $0.68. The simple payback period is 7.3 for the AC-DC Basic-Voltage product class, which is significantly longer than the average lifetime of 4.8 years. Additionally, individual households are likely to have several EPSs from a variety of separate end-uses, such that the aggregate LCC impact for a given household is likely to be more negative. Low-income households would experience a similar impact as the full consumer sample and thus a large majority would experience a net cost as well. The other product classes experience positive LCC savings at TSL 5 with a smaller percentage of consumers experiencing a net cost. However, given that the AC-DC Basic-Voltage product class represents nearly 40 percent of shipments of the total EPS market, overall, many EPS consumers would experience a net cost at TSL 5.

At TSL 5, the projected change in INPV ranges from a decrease of $72.3 million to a decrease of $46.0 million, which corresponds to a decrease of 8.5 percent and a decrease of 5.4 percent, respectively. DOE estimates that industry must invest $105.9 million to comply with standards set at TSL 5. DOE estimates that in the absence of new standards, approximately 8 percent of AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, no AC-AC basic-voltage shipments, and approximately 89 percent of multiple-voltage shipments would meet or exceed the efficiency levels analyzed at TSL 5 by 2027, the estimated compliance year. Based on this shipments analysis, at TSL 5, manufacturers would be required to redesign approximately 36 percent of all EPS shipments covered by this rulemaking. This would require manufacturers to redesign models corresponding to approximately 284 million

EPS shipments in the 2-year compliance time frame. These redesigns would require a significant overhaul of the design and components associated with the AC-DC basic and AC-AC basic product classes and less substantial component level improvements for all other product classes.

The Secretary tentatively concludes that at TSL 5 for EPSs, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the emissions reductions would be outweighed by the economic burden on many consumers (77 percent of AC-DC basic voltage EPS consumers and 43 percent of AC-AC basic voltage EPS consumers experience a net cost), and the impacts on manufacturers, including the large conversion costs and the potential impact to profit margin that would result in a reduction in INPV, and the lack of manufacturers currently offering products meeting the efficiency levels required at this TSL for some product classes. Consequently, the Secretary has tentatively concluded that TSL 5 is not economically justified.

DOE then considered TSL 4. At this TSL, the efficiency levels for AC-AC basic-voltage EPSs represent "best in market" models (characterized in section IV.D.1.b as the active mode efficiency and standby mode power consumption that only the top 10 to 20 percent of models on the market are able to achieve). For multiple-voltage EPSs, approximately 50 percent of models on the market currently meet these efficiency levels, representing an approximate mid-point of the market. For the other product classes, the efficiency levels correspond to the proposed EU CoC Tier 2 standards. TSL 4 would save an estimated 0.11 quads of energy, an amount DOE considers significant. Under TSL 4, the NPV of consumer benefit would be $0.17 billion using a discount rate of 7 percent, and $0.45 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 4 are 3.9 Mt of CO_2, 26.3 thousand tons of CH_4, 0.04 thousand tons of N_2O, 6.0 thousand tons of NO_X, 1.7 thousand tons of SO_2, and 0.01 tons of Hg. The estimated monetary value of the climate benefits from reduced GHG emissions (associated with the average SC-GHG at a 3-percent discount rate) at TSL 4 is \$0.20 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 4 is \$0.16 billion using a 7-percent discount rate and \$0.36 billion using a 3-percent discount rate.

Using a 7-percent discount rate for consumer benefits and costs, health benefits from reduced SO_2 and NO_X emissions, and the 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated total NPV at TSL 4 is \$0.53 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 4 is \$1.01 billion. The estimated total NPV is provided for additional information, however DOE primarily relies upon the NPV of consumer benefits when determining whether a proposed standard level is economically justified.

At TSL 4, the average LCC impact for the AC-DC Basic-Voltage product class, while negative, is close to zero (negative \$0.03) and only 20 percent of AC-DC basic-voltage EPS consumers experience a net cost. The average increase in incremental installed costs for AC-DC basic voltage EPS consumers is \$0.35 and the average lifetime operating savings is \$0.31. The simple payback period is 5.0 for the AC-DC Basic-Voltage product class, which is nearly the same as the average lifetime of 4.8 years. DOE also notes that the LCC impacts, as presented in Table V.26 above, are only estimated for the first year of compliance (2027) of a potential standard. However, due to the price trend on EPS costs (as described in section IV.G.1), the incremental purchase costs of more efficient EPSs will significantly decrease in years after 2027 while operating savings will remain largely the same. Therefore, LCC impacts become more positive in years beyond 2027 and a lower percentage of consumers will experience a net cost. For this reason, the NPV as estimated in the NIA is positive even though the LCC is marginally negative for the AC-DC basic voltage EPS product class. Low-income households would experience a similar impact as the full consumer sample, since the usage characteristics do not vary much between the two samples. The other product classes experience positive LCC savings at TSL 4. The average increases in incremental installed costs for product classes other than AC-DC basic voltage EPSs range from $0.05 to $1.02 and the average lifetime operating savings range from $0.05 to $1.53.

At TSL 4, the projected change in INPV ranges from a decrease of $11.6 million to a decrease of $7.9 million, which corresponds to a decrease of 1.4 percent and a decrease of 0.9 percent, respectively. DOE estimates that industry must invest $17.4 million to comply with standards set at TSL 4. DOE estimates that 75 percent of 2021 AC-DC basic-voltage shipments, approximately 93 percent of AC-DC low-voltage shipments, no AC-AC basic-voltage shipments, and approximately 49 percent of multiple-voltage shipments would meet or exceed the efficiency levels analyzed at TSL 4 by 2027, the estimated compliance year. Based on this shipments analysis, at TSL 4, manufacturers would be required to redesign approximately 15 percent of all EPS shipments covered by this rulemaking. This would require manufacturers to redesign models corresponding to approximately 113 million EPS shipments in the 2-year compliance time frame. While these redesigns would require a significant overhaul at the design and component level for the AC-AC basic voltage product class, DOE notes that the high compliance rates for the AC-DC and multiple voltage product classes demonstrate that manufacturers are already familiar with implementing the design options needed to achieve these levels for these products.

After considering the analysis and weighing the benefits and burdens, the Secretary has tentatively concluded that at a standard set at TSL 4 for external power supplies would be economically justified. At this TSL, a minority of consumers experience a net cost, and the average LCC savings for consumers are positive or a minimally negative $0.03. The average incremental product costs for all EPSs are very small relative to the costs of the applications using the EPSs (*e.g.*, a smartphone), which are likely greater by several factors of 10. Furthermore, due to price trends reducing EPS costs, the average LCC savings will grow in years beyond 2027 and fewer consumers would actually experience a net cost. Low-income households are likely to experience very similar results and are not disproportionately disadvantaged at this TSL. The FFC national energy savings are significant and the NPV of consumer benefits is positive using both a 3-percent and 7-percent discount rate. Notably, the benefits to consumers vastly outweigh the cost to manufacturers. At TSL 4, the NPV of consumer benefits, even measured at the more conservative discount rate of 7 percent is over 14 times higher than the maximum estimated manufacturers' loss in INPV. The standard levels at TSL 4 are economically justified even without weighing the estimated monetary value of emissions reductions. When those emissions reductions are included – representing $0.20 billion in climate benefits (associated with the average SC-GHG at a 3-percent discount rate), and $0.36 billion (using a 3-percent discount rate) or $0.16 billion (using a 7-percent discount rate) in health benefits – the rationale becomes stronger still.

As stated, DOE conducts the walk-down analysis to determine the TSL that represents the maximum improvement in energy efficiency that is technologically feasible and economically justified as required under EPCA. The walk-down is not a comparative analysis, as a comparative analysis would result in the maximization of net benefits instead of the maximization of energy savings that are technologically feasible and economically justified, which would be contrary to the statute. 86 FR 70892, 70908. Although DOE has not conducted a comparative analysis to select the proposed energy conservation standards, DOE notes that at TSLs higher than the one proposed, a significant fraction of consumers for some product classes experience increased purchase costs greater than operating savings.

Although DOE considered proposed amended standard levels for EPSs by grouping the efficiency levels for each product class into TSLs, DOE evaluates all analyzed efficiency levels in its analysis.

Therefore, based on the previous considerations, DOE proposes to adopt the energy conservation standards for EPSs at TSL 4. The proposed amended energy conservation standards for EPSs, which are expressed as average efficiency in active mode and power in no-load mode, are shown in Table V.27.

Table V.27 Proposed Amended Energy Conservation Standards for EPSs

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	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.071 \times \ln(P_{out}) - 0.00115 \times P_{out} + 0.67$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.890	≤ 0.150
$P_{out} > 250$ W	≥ 0.890	≤ 0.150
Single-Voltage External AC-DC Power Supply, Low-Voltage		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0011 \times P_{out} + 0.609$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.150
$P_{out} > 250$ W	≥ 0.880	≤ 0.150
Single-Voltage External AC-AC Power Supply, Basic-Voltage		

$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0582 \times \ln(P_{out}) - 0.00104 \times P_{out} + 0.727$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.902	≤ 0.075
$P_{out} > 250$ W	≥ 0.902	≤ 0.200
Single-Voltage External AC-AC Power Supply, Low-Voltage		
$P_{out} \leq 1$ W	$\geq 0.517 \times P_{out} + 0.091$	≤ 0.072
1 W $< P_{out} \leq 49$ W	$\geq 0.0834 \times \ln(P_{out}) - 0.0011 \times P_{out} + 0.609$	≤ 0.072
49 W $< P_{out} \leq 250$ W	≥ 0.880	≤ 0.185
$P_{out} > 250$ W	≥ 0.880	≤ 0.500
Multiple-Voltage External Power Supply		
$P_{out} \leq 1$ W	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.075
1 W $< P_{out} \leq 49$ W	$\geq 0.0782 \times \ln(P_{out}) - 0.0013 \times P_{out} + 0.643$	≤ 0.075
49 W $< P_{out} \leq 250$ W	≥ 0.885	≤ 0.125
$P_{out} > 250$ W	≥ 0.885	≤ 0.125

2. Annualized Benefits and Costs of the Proposed Standards

The benefits and costs of the proposed standards can also be expressed in terms of annualized values. The annualized net benefit is (1) the annualized national economic value (expressed in 2021 Dollars) of the benefits from operating products that meet the proposed standards (consisting primarily of operating cost savings from using less energy, minus increases in product purchase costs, and (2) the annualized monetary value of the climate and health benefits from emission reductions.

Table V.288 shows the annualized values for EPSs under TSL 4, expressed in 2021 Dollars. The results under the primary estimate are as follows.

Using a 7-percent discount rate for consumer benefits and costs and NOx and SO_2 reduction benefits, and a 3-percent discount rate case for GHG social costs, the estimated cost of the proposed standards for EPSs is \$24.3 million per year in increased equipment costs, while the estimated annual benefits are $42.7 million from reduced equipment operating costs, $11.5 million from GHG reductions, and $16.7 million from reduced NO_X and SO_2 emissions. In this case, the net benefit amounts to $46.6 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards for EPSs is $21.4 million per year in increased equipment costs, while the estimated annual benefits are $47.3 million in reduced operating costs, $11.5 million from GHG reductions, and $20.4 million from reduced NO_X and SO_2 emissions. In this case, the net benefit amounts to $57.8 million per year.

Table V.28 Annualized Benefits and Costs of Proposed Energy Conservation Standards for External Power Supplies (TSL 4)

	Million 2021 Dollars/year		
	Primary Estimate	**Low-Net-Benefits Estimate**	**High-Net-Benefits Estimate**
3% discount rate			
Consumer Operating Cost Savings	47.3	46.1	48.8
Climate Benefits*	11.5	11.5	11.5
Health Benefits**	20.4	20.4	20.4
Total Benefits†	79.2	78.0	80.7
Consumer Incremental Product Costs	21.4	23.4	19.3
Net Benefits	57.8	54.6	61.3
7% discount rate			
Consumer Operating Cost Savings	42.7	41.8	43.9
Climate Benefits* (3% discount rate)	11.5	11.5	11.5
Health Benefits**	16.7	16.7	16.7
Total Benefits†	70.9	70.0	72.1
Consumer Incremental Product Costs	24.3	26.1	22.4
Net Benefits	46.6	43.9	49.6

Note: This table presents the costs and benefits associated with EPSs shipped in 2027-2056. These results include benefits to consumers which accrue after 2056 from the products shipped in 2027-2056.

* Climate benefits are calculated using four different estimates of the global SC-GHG (see section IV.M of this proposed rule). For presentational purposes of this table, the climate benefits associated with the average SC-GHG at a 3 percent discount rate are shown, but the Department does not have a single central SC-GHG point estimate. On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22-30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana v. Biden*, No. 21-cv-1074-JDC-KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from "adopting, employing, treating as binding, or relying upon" the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits where appropriate and permissible under law.
** Health benefits are calculated using benefit-per-ton values for NO_X and SO_2. DOE is currently only monetizing (for SO_2 and NO_X) $PM_{2.5}$ precursor health benefits and (for NO_X) ozone precursor health benefits, but will continue to assess the ability to monetize other effects such as health benefits from reductions in direct $PM_{2.5}$ emissions. The health benefits are presented at real discount rates of 3 and 7 percent. See section IV.M of this document for more details.
† Total and net benefits include consumer, climate, and health benefits. For presentation purposes, total and net benefits for both the 3-percent and 7-percent cases are presented using the average SC-GHG with 3-percent discount rate, but the Department does not have a single central SC-GHG point estimate. DOE emphasizes the importance and value of considering the benefits calculated using all four SC-GHG estimates. See Table V.24 for net benefits using all four SC-GHG estimates.

D. Reporting, Certification, and Sampling Plan

Manufacturers, including importers, must use product-specific certification templates to certify compliance to DOE. For EPSs, the certification template reflects the general certification requirements specified at 10 CFR 429.12 and the product-specific requirements specified at 10 CFR 429.37. As discussed in the previous paragraphs, DOE is not proposing to amend the product-specific certification requirements for these products.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866 and 13563

Executive Order ("E.O.") 12866, "Regulatory Planning and Review," as supplemented and reaffirmed by E.O. 13563, "Improving Regulation and Regulatory Review, 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, 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 E.O. 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 ("OIRA") in the Office of Management and Budget ("OMB") 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, this proposed/final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit "significant regulatory actions" to OIRA for review. OIRA has determined that this proposed regulatory action constitutes a "significant regulatory action" within the scope of section 3(f)(1) of E.O. 12866. Accordingly, pursuant to section 6(a)(3)(C) of E.O. 12866, DOE has provided to OIRA an assessment, including the underlying analysis, of benefits and costs anticipated from the proposed regulatory action, together with, to the extent feasible, a quantification of those costs; and an assessment, including the underlying analysis, of costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation, and an explanation why the planned regulatory action is preferable to the identified potential alternatives. These assessments are summarized in this preamble and further detail can be found in the technical support document for this rulemaking.

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, 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 E.O. 13272, "Proper Consideration of Small Entities in Agency Rulemaking," 67 FR 53461 (Aug. 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website (*energy.gov/gc/office-general-counsel*). DOE has prepared the following IRFA for the products that are the subject of this proposed rulemaking.

For manufacturers of EPSs the 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. (*See* 13 CFR part 121.) The size standards are listed by North American Industry Classification System ("NAICS") code and industry description and are available at *www.sba.gov/document/support-table-size-standards*. Manufacturing of EPSs is classified under NAICS 335999, "All Other Miscellaneous

Electrical Equipment and Component Manufacturing." The SBA sets a threshold of 500 employees or fewer for an entity to be considered as a small business for this category.

1. Description of Reasons Why Action Is Being Considered

EPCA requires that, not later than 6 years after the issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a NOPR including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m)(1)).

2. Objectives of, and Legal Basis for, Rule

DOE must follow specific statutory criteria for prescribing new or amended standards for covered equipment, including EPSs. Any new or amended standard for a covered product must be designed to achieve the maximum improvement in energy efficiency that the Secretary of Energy determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) and 42 U.S.C. 6295(o)(3)(B))

3. Description on Estimated Number of Small Entities Regulated

DOE conducted a more focused inquiry of the companies that could be small businesses that manufacture or sell EPSs covered by this rulemaking. DOE referenced DOE's publicly available CCD to generate a list of businesses producing or selling covered products and referenced D&B Hoovers reports,[77] as well as the online presence of identified businesses in order to determine whether they might meet the criteria of a small business. DOE screened out companies that do not offer products covered by this rulemaking, do not meet the definition of a "small business," or are foreign owned and

[77] *app.avention.com*

operated. Additionally, DOE filters out businesses that do not directly produce EPSs, but that rather sell sourced EPSs with other products or relabel sourced EPSs to sell separately.

From these sources, DOE identified 658 unique businesses associated with at least one covered EPS model, of which 165 were identified as businesses that meet SBA's definition of a small business under this rulemaking. While each of these small businesses certify models with DOE's CCD, DOE has not been able to identify any domestic manufacturing of EPSs and therefore does not expect that any of the small businesses manufacture EPSs, even if they may be OEM manufacturers of EPS applications.

DOE requests comment on the number of small businesses identified that manufacture or sell EPSs covered by this proposed rulemaking.

4. Description and Estimate of Compliance Requirements Including Differences in Cost, if Any, for Different Groups of Small Entities

While DOE has not been able to identify any domestic manufacturing of EPSs directly, DOE does expect that some small businesses may design EPSs—in part or in total—and therefore would incur some product conversion costs as a result of the proposed standard, if finalized. As with the broader industry, outlined in section IV.K of this document, DOE has estimated that these conversion costs would be proportional to the annual revenue attributable to EPSs that do not meet the standards. If, as a result of standards, a small business were to need to redesign all of their EPS models, DOE expects that these small businesses would incur product conversion costs equivalent to one additional annual R&D expenditure across the two-year compliance window.[78] DOE estimated the industry average annual R&D expenditure to be approximately 3.8 percent of annual revenue. Accordingly, small manufacturers may incur product conversion costs of up to 1.9 percent of revenue attributable to EPSs for each year during the two-year compliance period.

Additional information about product conversion costs and small business impacts is in chapter 12 of the NOPR TSD.

DOE requests comment on the estimated product conversion costs of small businesses that manufacture or sell EPSs covered by this rulemaking.

5. Duplication, Overlap, and Conflict with Other Rules and Regulations

DOE is not aware of any other rules or regulations that duplicate, overlap, or conflict with the rule being considered today.

6. Significant Alternatives to the Rule

The discussion in the previous section analyzes impacts on small businesses that would result from DOE's proposed rule, represented by TSL 4. In reviewing alternatives to the proposed rule, DOE examined energy conservation standards set at lower efficiency levels. While selecting from TSLs 1-3, would reduce the possible impacts on small businesses, it would come at the expense of a significant reduction in energy savings. TSL 4 achieves approximately over 760 percent of the energy savings compared to the energy savings at TSL 1, over 260 percent of the energy savings compared to the energy savings at TSL 2, and over 130% of the energy savings as compared to the energy

[78] These conversion costs would be in addition to the normal annual R&D expenditures that manufacturers incur every year associated with manufacturing EPSs.

savings at TSL 3. DOE additionally estimates that TSLs 1-3 would result in a lower net present value of consumer benefits than TSL 4 to the order of approximately $142 million, $79 million, and $63 million respectively.

Based on the presented discussion, establishing standards at TSL 4 balances the benefits of the energy savings at TSL 4 with the potential burdens placed on EPS manufacturers and small businesses. Accordingly, DOE does not propose one of the other TSLs considered in the analysis, or the other policy alternatives examined as part of the regulatory impact analysis and included in chapter 17 of the NOPR TSD.

Additional compliance flexibilities may be available through other means. EPCA provides that a manufacturer whose annual gross revenue from all of its operations does not exceed $8 million may apply for an exemption from all or part of an energy conservation standard for a period not longer than 24 months after the effective date of a final rule establishing the standard. (42 U.S.C. 6295(t)) Additionally, manufacturers subject to DOE's energy efficiency standards may apply to DOE's Office of Hearings and Appeals for exception relief under certain circumstances. Manufacturers should refer to 10 CFR part 430, subpart E, and 10 CFR part 1003 for additional details.

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. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including EPSs. (*See* generally 10 CFR part 429). 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 35 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

DOE is analyzing this proposed regulation in accordance with the National Environmental Policy Act of 1969 ("NEPA") and DOE's NEPA implementing regulations (10 CFR part 1021). DOE's regulations include a categorical exclusion for rulemakings that establish energy conservation standards for consumer products or industrial equipment. 10 CFR part 1021, subpart D, appendix B5.1. DOE anticipates that this rulemaking qualifies for categorical exclusion B5.1 because it is a rulemaking that establishes energy conservation standards for consumer products or industrial equipment, none of the exceptions identified in categorical exclusion B5.1(b) apply, no extraordinary circumstances exist that require further environmental analysis, and it otherwise meets the requirements for application of a categorical exclusion. *See* 10 CFR 1021.410. DOE will complete its NEPA review before issuing the final rule.

E. Review Under Executive Order 13132

E.O. 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. DOE has examined this proposed rule and has tentatively determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) Therefore, 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 E.O. 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, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. 61 FR 4729 (Feb. 7, 1996). Regarding the review required by section 3(a), section 3(b) of E.O. 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this proposed rule meets the relevant standards of E.O. 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 ("UMRA") requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, section 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed "significant intergovernmental mandate," and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect them. 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 *energy.gov/sites/prod/files/gcprod/documents/umra_97.pdf*.

Although this proposed rule does not contain a Federal intergovernmental mandate, it may require expenditures of $100 million or more in any one year by 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 proposed rule. (2 U.S.C. 1532(c)) The content requirements of section 202(b) of UMRA relevant to a private sector mandate substantially overlap the economic analysis requirements that apply under section 325(o) of EPCA and Executive Order 12866. The **SUPPLEMENTARY INFORMATION** section of this NOPR and the TSD for this proposed rule respond to those requirements.

Under section 205 of UMRA, the Department is obligated to identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a written statement under section 202 is required. (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 proposed 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(u), this proposed rule would establish amended 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, as required by 6295(o)(2)(A) and 6295(o)(3)(B). A full discussion of the alternatives considered by DOE is presented in chapter 17 of the TSD for this proposed rule.

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

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed 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

Pursuant to E.O. 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights,” 53 FR 8859 (Mar. 15, 1988), DOE has determined that this proposed rule 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 information quality 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). Pursuant to OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf*. DOE has reviewed this NOPR under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

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

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

L. Information Quality

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 2664, 2667.

In response to OMB's Bulletin, DOE conducted formal peer reviews of the energy conservation standards development process and the analyses that are typically used and has prepared a report describing that peer review.[79] 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. Because available data,

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[79] The 2007 "Energy Conservation Standards Rulemaking Peer Review Report" is available at the following website: *energy.gov/eere/buildings/downloads/energy-conservation-standards-rulemaking-peer-review-report-0* (last accessed Oct. 4, 2022).

models, and technological understanding have changed since 2007, DOE has engaged with the National Academy of Sciences to review DOE's analytical methodologies to ascertain whether modifications are needed to improve the Department's analyses. DOE is in the process of evaluating the resulting report.[80] .

M. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference Version 4.0 of the International Efficiency Marking Protocol for External Power Supplies to account for the changes in labeling due to the proposed amended energy conservation standards. The international efficiency marking protocol provides a system for EPS manufacturers to designate the minimum efficiency performance of an EPS, so that finished product manufacturers and government representatives can easily determine a unit's efficiency. This document can be found in the docket at *www.regulations.gov/docket/EERE-2020-BT-STD-0006.*

VII. Public Participation

A. Attendance at the Public Meeting

The time, date, and location of the public meeting are listed in the **DATES** and **ADDRESSES** sections at the beginning of this document. If you plan to attend the public meeting, please notify the Appliance and Equipment Standards staff at (202) 287-1445 or *Appliance_Standards_Public_Meetings@ee.doe.gov*.

Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures which require advance notice prior to attendance

[80] The report is available at *www.nationalacademies.org/our-work/review-of-methods-for-setting-building-and-equipment-performance-standards.*

at the public meeting. If a foreign national wishes to participate in the public meeting, please inform DOE of this fact as soon as possible by contacting Ms. Regina Washington at (202) 586-1214 or by email (*Regina.Washington@ee.doe.gov*) so that the necessary procedures can be completed.

DOE requires visitors to have laptops and other devices, such as tablets, checked upon entry into the Forrestal Building. Any person wishing to bring these devices into the building will be required to obtain a property pass. Visitors should avoid bringing these devices, or allow an extra 45 minutes to check in. Please report to the visitor's desk to have devices checked before proceeding through security.

Due to the REAL ID Act implemented by the Department of Homeland Security ("DHS"), there have been recent changes regarding ID requirements for individuals wishing to enter Federal buildings from specific States and U.S. territories. DHS maintains an updated website identifying the State and territory driver's licenses that currently are acceptable for entry into DOE facilities at *www.dhs.gov/real-id-enforcement-brief*. A driver's licenses from a State or territory identified as not compliant by DHS will not be accepted for building entry and one of the alternate forms of ID listed below will be required. Acceptable alternate forms of Photo-ID include U.S. Passport or Passport Card; an Enhanced Driver's License or Enhanced ID-Card issued by States and territories as identified on the DHS website (Enhanced licenses issued by these States and territories are clearly marked Enhanced or Enhanced Driver's License); a military ID or other Federal government-issued Photo-ID card.

In addition, you can attend the public meeting via webinar. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website at *www.energy.gov/eere/buildings/public-meetings-and-comment-deadlines*. Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements for Distribution

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

C. Conduct of the Public Meeting

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

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

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

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

D. Submission of Comments

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

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

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

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

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

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

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No telefacsimiles ("faxes") will be accepted.

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

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

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

E. Issues on Which DOE Seeks Comment

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

(1) DOE requests comment on its proposal to incorporate by reference version 4.0 of IEMP for this rulemaking.

(2) DOE requests comment on its cost analysis approach performed for this NOPR.

(3) DOE requests comment on the incremental MPCs from the NOPR engineering analysis.

(4) DOE requests comment on the estimated increased manufacturer markups and incremental MSPs that result from the analyzed energy conservation standards from the NOPR engineering analysis.

(5) DOE requests comment on the estimated EPS model production cycle of four years.

(6) DOE requests comment on the GRIM results and the estimated conversion costs.

(7) DOE requests comment on whether there is domestic EPS manufacturing, where and to what extent such manufacturing occurs, and how the proposed energy conservation standard might affect that possible domestic EPS manufacturing.

(8) DOE requests comment on possible impacts on manufacturing capacity stemming from amended energy conservation standards, including any potential issues with supply chain costs, and or chips and devices used in the national security sector.

(9) DOE requests information regarding the impact of cumulative regulatory burden on manufacturers of EPSs associated with multiple DOE standards or product-specific regulatory actions of other Federal agencies.

(10) DOE requests comment on the number of small businesses identified that manufacture or sell EPSs covered by this proposed rulemaking.

(11) DOE requests comment on the estimated product conversion costs of small businesses that manufacture or sell EPSs covered by this proposed rulemaking.

Additionally, DOE welcomes comments on other issues relevant to the conduct of this rulemaking that may not specifically be identified in this document.

VIII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of proposed rulemaking and announcement of public meeting.

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, Small businesses.

Signing Authority

This document of the Department of Energy was signed on January 13, 2023, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on January 19, 2023

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Treena V. Garrett
Federal Register Liaison Officer,
U.S. Department of Energy

For the reasons stated in the preamble, DOE amends part 430 of chapter II of title 10, 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. Amend §430.3 by adding a new paragraph (s)(4), to read as follows:

§430.3 Materials incorporated by reference.

* * * * *

(s) * * *

(4) International Efficiency Marking Protocol for External Power Supplies, Version 4.0, January 2023, IBR approved for §430.32.

* * * * *

3. Amend §430.32 by adding a new paragraph (w)(1)(iv) to read as follows:

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

* * * * *

(w) * * *

(1) * * *

(iv) Except as provided in paragraphs (w)(5), (6), and (7) of this section, all external power supplies manufactured on or after [date 2 years after publication of a final rule], shall meet the following Level VII 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]**
(A) $P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.169$	≤ 0.075

(B) 1 W < P_{out} ≤ 49 W	≥ 0.071 × ln(P_{out}) – 0.00115 × P_{out} + 0.67	≤ 0.075
(C) 49 W < P_{out} ≤ 250 W	≥ 0.890	≤ 0.150
(D) P_{out} > 250 W	≥ 0.890	≤ 0.150
Single-Voltage External AC-DC Power Supply, Low-Voltage		
(E) P_{out} ≤ 1 W	≥ 0.517 × P_{out} + 0.091	≤ 0.075
(F) 1 W < P_{out} ≤ 49 W	≥ 0.0834 × ln(P_{out}) – 0.0011× P_{out} + 0.609	≤ 0.075
(G) 49 W < P_{out} ≤ 250 W	≥ 0.880	≤ 0.150
(H) P_{out} > 250 W	≥ 0.880	≤ 0.150
Single-Voltage External AC-AC Power Supply, Basic-Voltage		
(I) P_{out} ≤ 1 W	≥ 0.5 × P_{out} + 0.169	≤ 0.075
(J) 1 W < P_{out} ≤ 49 W	≥ 0.0582 × ln(P_{out}) – 0.00104 × P_{out} + 0.727	≤ 0.075
(K) 49 W < P_{out} ≤ 250 W	≥ 0.902	≤ 0.075
P_{out} > 250 W	≥ 0.902	≤ 0.200
Single-Voltage External AC-AC Power Supply, Low-Voltage		
(L) P_{out} ≤ 1 W	≥ 0.517 × P_{out} + 0.091	≤ 0.072
(M) 1 W < P_{out} ≤ 49 W	≥ 0.0834 × ln(P_{out}) – 0.0011× P_{out} + 0.609	≤ 0.072
(N) 49 W < P_{out} ≤ 250 W	≥ 0.880	≤ 0.185
(O) P_{out} > 250 W	≥ 0.880	≤ 0.500
Multiple-Voltage External Power Supply		
(P) P_{out} ≤ 1 W	≥ 0.497 × P_{out} + 0.067	≤ 0.075
(Q) 1 W < P_{out} ≤ 49 W	≥ 0.0782 × ln(P_{out}) – 0.0013 × P_{out} + 0.643	≤ 0.075
(R) 49 W < P_{out} ≤ 250 W	≥ 0.885	≤ 0.125
(S) P_{out} > 250 W	≥ 0.885	≤ 0.125

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[FR Doc. 2023-01282 Filed: 2/1/2023 8:45 am; Publication Date: 2/2/2023]