DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2017–BT–STD–0048]

RIN 1904–AF27

Energy Conservation Program: Energy Conservation Standards for Dedicated-Purpose Pool Pump Motors

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, prescribes energy conservation standards for various consumer products and certain commercial and industrial equipment, including electric motors. In this notice of proposed rulemaking (''NOPR''), the Department of Energy (DOE) proposes to establish energy conservation standards for dedicated-purpose pool pump motors, a category of electric motors, and also announces a public meeting to receive comment on these proposed standards and associated analyses and results.

DATES:

Comments: DOE will accept comments, data, and information regarding this NOPR no later than August 22, 2022.

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 July 21, 2022.

Meeting: DOE will hold a public meeting via webinar on Tuesday, July 26, 2022, from 1:00 p.m. to 4:00 p.m. See section IV, ''Public Participation,'' for webinar registration information, participant instructions and information about the capabilities available to webinar participants.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov*. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2017–BT–STD–0048, by any of the following methods:

1. *Federal eRulemaking Portal: www.regulations.gov*. Follow the instructions for submitting comments.

2. *Email:* to *DPPMotors2017STD0048@ee.doe.gov*. Include docket number EERE–2017–BT–STD–0048 in the subject line of the message.

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

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including the Federal eRulemaking Portal, email, postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing corona virus 2019 (''COVID–19'') pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586–1445 to discuss the need for alternative arrangements. Once the COVID–19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

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/#!docketDetail;D=EERE-2017-BT-STD-0048*. 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 rulemaking.

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*.

Ms. Amelia Whiting, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC, 20585–0121. Telephone: (202) 586–2588. Email: *amelia.whiting@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 maintain the following previously approved standard in part 431 and incorporate by reference it into part 429: UL 1004–10 (1004–10:2022), ''Standard for Safety for Pool Pump Motors,'' First Edition, approved February 28, 2020, including revisions through March 24, 2022.

Copies of UL 1004–10:2022 can be obtained from: Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062, (841) 272–8800, or go to *https://www.ul.com*.

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

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I. Synopsis of the Proposed Rule

Title III, Part C [1] of the Energy Policy and Conservation Act, as amended (EPCA) [2] established the Energy Conservation Program for Certain Industrial Equipment. (42 U.S.C. 6311–6317) Such equipment includes electric motors, which include dedicated-purpose pool pump motors (''DPPP motors'' or ''DPPPMs'' or ''pool pump motors''), the subject of this proposed rulemaking. (42 U.S.C. 6311(1)(A))

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. 6316(a); 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. 6316(a); 42 U.S.C. 6295(o)(3)(B))

In accordance with these and other statutory provisions discussed in this document, DOE proposes new energy conservation standards for DPPP motors. DOE is proposing performance standard for a class of DPPP motors and design requirements for certain classes of DPPP motors. The proposed performance standard, which are expressed in full-load efficiency, and proposed design requirements are shown in Table I.1 of this document. These proposed standards, if adopted, would apply to all DPPP motors listed in Table I.1 of this NOPR manufactured in, or imported into, the United States starting on the date 2 years after the publication of the final rule for this proposed rulemaking.

[1] For editorial reasons, upon codification in the U.S. Code, part C was re-designated part A–1.

[2] All references to EPCA in this document refer to the statute as amended through the Infrastructure Investment and Jobs Act, Public Law 117–58 (Nov. 15, 2021).

TABLE I.1—PROPOSED ENERGY CONSERVATION STANDARDS FOR DEDICATED PURPOSE POOL PUMP MOTORS

Motor total horsepower (THP)	Performance standard: full-load efficiency (%)	Design requirement: speed capability	Design requirement: freeze protection
THP < 0.5	69	None	None.
0.5 ≤ THP < 1.15		Variable speed control	Only for DPPP motors with freeze protection controls.
1.15 ≤ THP ≤ 5		Variable speed control	Only for DPPP motors with freeze protection controls.

DOE also proposes to require that DPPP motors greater than or equal to 0.5 THP must be variable speed control DPPP motors.[3] Finally, for DPPP motors greater than or equal to 0.5 THP, DOE proposes that DPPP motors with freeze protection controls are to be shipped with the freeze protection feature disabled, or with the following default, user-adjustable settings: (a) the default dry-bulb air temperature setting shall be no greater than 40 °F; (b) the default run time setting shall be no greater than 1 hour (before the temperature is rechecked); and (c) the default motor speed in freeze protection mode shall not be more than half of the maximum operating speed.

A. Benefits and Costs to Consumers

Table I.2 presents DOE's evaluation of the economic impacts of the proposed standards on consumers of DPPP motors, as measured by the average life-cycle cost (''LCC'') savings and the simple payback period (''PBP'').[4] The average LCC savings are positive for all equipment classes, and the PBP is less than the average lifetime of DPPP motors, which is estimated to be 4.5 years (see section IV.F.6 of this document).

TABLE I.2—IMPACTS OF PROPOSED ENERGY CONSERVATION STANDARDS ON CONSUMERS OF DPPP MOTORS

Motor total horsepower (THP)	Average LCC savings (2020$)	Simple payback period (years)
THP < 0.5	3	0.7
0.5 ≤ THP < 1.15	69	2.3
1.15 ≤ THP ≤ 5	292	0.9

DOE's analysis of the impacts of the proposed standards on consumers is described in section IV.F 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 (2021–2055). Using a real discount rate of 7.2 percent, DOE estimates that the INPV for manufacturers of DPPP motors in the case without standards is $798 million in 2020$. Under the proposed standards, the change in INPV is estimated to range from −23.7 percent to 12.9 percent, which is approximately −$189.3 million to $102.9 million. In order to bring products into compliance with standards, it is estimated that the industry would incur total conversion costs of $46.2 million.

DOE's analysis of the impacts of the proposed standards on manufacturers is described in section IV.J 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[5]

DOE's analyses indicate that the proposed energy conservation standards for DPPP motors would save a significant amount of energy. Relative to the case without standards, the lifetime energy savings for DPPP motors purchased in the 30-year period that begins in the anticipated first full year of compliance with the standards (2026–2055) amount to 0.99 quadrillion British thermal units (''Btu''), or quads.[6] This represents a savings of 19.8 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 DPPP motors ranges from $3.0 billion (at a 7-percent discount rate) to $6.3 billion (at a 3-percent discount rate). This NPV expresses the estimated total value of future operating-cost savings minus the estimated increased equipment costs for DPPP motors purchased in 2026–2055.

In addition, the proposed standards for DPPP motors 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 36.2 million metric tons (''Mt'')[7] of carbon dioxide (''CO_2''), 15.8 thousand tons of sulfur dioxide (''SO_2''), 49.9 thousand tons of nitrogen oxides (''NO_X''), 237.2 thousand tons of methane (''CH_4''), 0.4 thousand tons of

[3] Variable speed control DPPP motor is defined in UL 1004–10:2020 (incorporated by reference, See 10 CFR 431.482 and 10 CFR 431.483). In this NOPR, DOE is proposing to reference the latest version of the UL standard, UL 1004–10:2022; see discussion in section III.A.1. Throughout this NOPR, a variable speed motor is a DPPP motor that meets the definition of ''variable speed control dedicated-purpose pool pump motor'' as defined by UL 1004–10:2022.

[4] 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 (*see* section IV.F.8 of this document). The simple PBP, which is designed to compare specific efficiency levels, is measured relative to the baseline product (*see* section V.B.1.a of this document).

[5] All monetary values in this document are expressed in 2020 dollars.

[6] 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.H.1 of this document.

[7] A metric ton is equivalent to 1.1 short tons. Results for emissions other than CO_2 are presented in short tons.

nitrous oxide (''N_2O''), and 0.1 tons of mercury (''Hg'').[8]

DOE estimates the value of climate benefits from a reduction in greenhouse gases 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 greenhouse gases (SC–GHG). DOE used interim SC–GHG values developed by an Interagency Working Group on the Social Cost of Greenhouse Gases (IWG).[9] The derivation of these values is discussed in section IV.L of this document. For presentational purposes, the climate benefits associated with the average SC–GHG at a 3-percent discount rate are estimated to be $1.8 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.[10] DOE estimated the monetary health benefits of SO_2 and NO_X emissions reductions, also discussed in section IV.L of this document. DOE estimated the present value of the health benefits would be $1.6 billion using a 7-percent discount rate, and $3.3 billion using a 3-percent discount rate.[11] 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.[12]

Table I.3 summarizes the economic benefits and costs expected to result from the proposed standards for DPPP motors. There are other important unquantified effects, including certain unquantified climate benefits, unquantified public health benefits from the reduction of toxic air pollutants and other emissions, unquantified energy security benefits, and distributional effects, among others.

TABLE I.3—SUMMARY OF MONETIZED ECONOMIC BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS

[TSL 7]

	Billion 2020$
3% discount rate	
Consumer Operating Cost Savings	8.8
Climate Benefits *	1.8
Health Benefits **	3.3
Total Benefits †	13.9
Consumer Incremental Equipment Costs	2.5
Net Benefits	11.4
7% discount rate	
Consumer Operating Cost Savings	4.6
Climate Benefits * (3% discount rate)	1.8
Health Benefits **	1.6
Total Benefits†	8.0
Consumer Incremental Equipment Costs	1.5
Net Benefits	6.4

Note: This table presents the costs and benefits associated with DPPP motors shipped in 2026–2055. These results include benefits to consumers which accrue after 2055 from the products shipped in 2026–2055.

[8] DOE calculated emissions reductions relative to the no-new-standards case, which reflects key assumptions in the *Annual Energy Outlook 2021* (''*AEO2021*''). *AEO2021* represents current federal and state legislation and final implementation of regulations as of the time of its preparation. *See* section IV.K of this document for further discussion of *AEO2021* assumptions that effect air pollutant emissions.

[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, DC, February 2021. (''February 2021 SC–GHG TSD''). */www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.*

[10] 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 presents monetized benefits where appropriate and permissible under law

[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.

[12] 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.

* Climate benefits are calculated using four different estimates of the social cost of carbon (SC–CO_2), methane (SC–CH_4), and nitrous oxide (SC–N_2O) (model average at 2.5 percent, 3 percent, and 5 percent discount rates; 95th percentile at 3 percent discount rate), as shown in Table IV.17 and Table IV.18. Together these represent the global SC–GHG. 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. *See* section IV.L of this document for more details. 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 presents 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. See section IV.L of this document for more details.

† Total and net benefits include those consumer, climate, and health benefits that can be quantified and monetized. 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.

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 climate and health benefits of emission reduction, all annualized.[13] 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 DPPP motors shipped in 2026–2055. The benefits associated with reduced emissions achieved as a result of the proposed standards are also calculated based on the lifetime of DPPP motors shipped in 2026–2055. Total benefits for both the 3-percent and 7-percent cases are presented using the average GHG social costs with 3-percent discount rate. Estimates of SC–GHG values are presented for all four discount rates in section V.B.8 of this document. Table I.4 presents the total estimated monetized benefits and costs associated with the proposed standard, expressed in terms of annualized values.

Estimates of annualized benefits and costs of the proposed standards are shown in Table I.4 of this document. 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 NO_X and SO_2 emissions benefits, 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 $163.5 million per year in increased equipment costs, while the estimated annual benefits are $482.3 million in reduced equipment operating costs $104.2 million in GHG climate benefits, and $168.7 million in health benefits. In this case, the net benefit would amount to $591.6 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards is $142.9 million per year in increased equipment costs, while the estimated annual benefits are $504.2 million in reduced operating costs, $104.2 million in climate benefits, and $188.9 million in health benefits. In this case, the net benefit would amount to $654.4 million per year.

TABLE I.4—ANNUALIZED MONETIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS

[TSL 7]

	Million 2020$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
3% discount rate			
Consumer Operating Cost Savings	504.2	436.2	580.9
Climate Benefits *	104.2	92.6	115.6
Health Benefits **	188.9	168.1	209.3
Total Benefits †	797.3	696.9	905.9
Consumer Incremental Equipment Costs	142.9	110.0	178.0
Net Benefits	654.4	587.0	727.9
7% discount rate			
Consumer Operating Cost Savings	482.3	424.8	546.8
Climate Benefits * (3% discount rate)	104.2	92.6	115.6
Health Benefits **	168.7	152.0	185.0
Total Benefits †	755.2	669.5	847.5

[13] To convert the time-series of costs and benefits into annualized values, DOE calculated a present value in 2026, 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 2026. 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.

TABLE I.4—ANNUALIZED MONETIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS—Continued

[TSL 7]

	Million 2020$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
Consumer Incremental Equipment Costs	163.5	129.2	199.0
Net Benefits	591.6	540.3	648.5

Note: This table presents the costs and benefits associated with DPPP motors shipped in 2026–2055. These results include benefits to consumers which accrue after 2055 from the products shipped in 2026–2055. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the AEO2021 Reference case, Low Economic Growth case, and High Economic Growth case, respectively. In addition, incremental equipment costs reflect a medium decline rate in the Primary Estimate, a low decline rate in the Low Net Benefits Estimate, and a high decline rate in the High Net Benefits Estimate. The methods used to derive projected price trends are explained in sections IV.F.1 and IV.H.1of this document. Note that the Benefits and Costs may not sum to the Net Benefits due to rounding.

* Climate benefits are calculated using four different estimates of the global SC–GHG (see section IV.L of this document). 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, and it emphasizes the importance and value of considering the benefits calculated using all four SC–GHG estimates. 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 presents 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.L of this document for more details.

† Total 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's analysis of the national impacts of the proposed standards is described in sections IV.G.2, IV.K and IV.L 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 would result in the significant conservation of energy. Specifically, with regards to technological feasibility products achieving these standard levels are already commercially available for all equipment classes covered by this proposal. As for economic justification, DOE's analysis shows that the benefits of the proposed standard exceed, to a great extent, the burdens of the proposed standards.

Using a 7-percent discount rate for consumer benefits and costs and health benefits from NO_X and SO_2 reduction, and a 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated cost of the proposed standards for DPPPM is $163.5 million per year in increased DPPPM costs, while the estimated annual benefits are $482.3 million in reduced equipment operating costs, $104.2 million in climate benefits, and $168.7 million in health benefits. The net benefit amounts to $591.6 million per year.

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.[14] For example, the United States rejoined the Paris Agreement on February 19, 2021. As part of that agreement, the United States has committed to reducing GHG emissions in order to limit the rise in mean global temperature. As such, energy savings that reduce GHG emissions have taken on greater importance. Additionally, 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, 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.

As previously mentioned, the proposed standards would result in estimated national energy savings of 0.99 quad FFC, the equivalent of the electricity use of 9.6 million homes in one year. 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). Finally, DOE notes that 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 proposed 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

[14] Procedures, Interpretations, and Policies for Consideration in New or Revised Energy Conservation Standards and Test Procedures for Consumer Products and Commercial/Industrial Equipment, 86 FR 70892, 70901 (Dec. 13, 2021).

this document and related information collected and analyzed during the course of this proposed 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 DPPP motors.

A. Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part C of EPCA, added by Public Law 95–619, Title IV, section 441(a) (42 U.S.C. 6311–6317, as codified), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This equipment includes those electric motors that are DPPP motors, the subject of this document. (42 U.S.C. 6311(1)(A))

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 include definitions (42 U.S.C. 6311), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), energy conservation standards (42 U.S.C. 6313), and the authority to require information and reports from manufacturers (42 U.S.C. 6316; 42 U.S.C. 6296).

Federal energy efficiency requirements for covered equipment established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6316(a); 42 U.S.C. 6297) 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. 6316(a) (applying the preemption waiver provisions of 42 U.S.C. 6297))

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. 6316(a); 42 U.S.C. 6295(o)(3)(A) and 42 U.S.C. 6295(r)) Manufacturers of covered equipment must use the Federal test procedures as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE must use these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)) The DOE test procedures for DPPP motors appear at title 10 of the Code of Federal Regulations (''CFR'') part 431, subpart Z.

DOE must follow specific statutory criteria for prescribing new or amended standards for covered equipment, including those electric motors that are DPPP motors. 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. 6316(a); 42 U.S.C. 6295(o)(2)(A) and 42 U.S.C. 6295(o)(3)(B)) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(3))

Moreover, DOE may not prescribe a standard: (1) for certain equipment, including those electric motors that are DPPP motors, if no test procedure has been established for the equipment, or (2) if DOE determines by rule that the standard is not technologically feasible or economically justified. (42 U.S.C. 6316(a); 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. 6316(a); 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. 6316(a); 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 an equipment 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. 6316(a); 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 covered equipment. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(1)) Also, the Secretary may not prescribe an amended or new standard if interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States 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. 6316(a); 42 U.S.C. 6295(o)(4))

Additionally, EPCA specifies requirements when promulgating an energy conservation standard for covered equipment that has two or more subcategories. DOE must specify a different standard level for a type or class of equipment that has the same function or intended use, if DOE determines that equipment within such group: (A) consume a different kind of energy from that consumed by other covered equipment within such type (or class); or (B) have a capacity or other performance-related feature which other equipment within such type (or class) do not have and such feature justifies a higher or lower standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(q)(1)) In determining whether a performance-related feature justifies a different standard for a group of equipment, DOE must consider such factors as the utility to the consumer of the feature and other factors DOE deems appropriate. *Id.* Any rule prescribing such a standard must include an explanation of the basis on which such higher or lower level was established. (42 U.S.C. 6316(a); 42 U.S.C. 6295(q)(2))

B. Background

1. Current Standards

DPPP motors are electric motors, which are defined as machines that convert electrical power into rotational mechanical power. 10 CFR 431.12. DOE has established test procedures, labeling requirements, and energy conservation standards for certain electric motors (10 CFR part 431 subpart B), but those requirements do not apply to DPPP motors subject to the proposed energy conservation standards. DOE has separately established test procedure for DPPP motors in 10 CFR part 431 subpart Z (''Subpart Z'').

Currently, DPPP motors that would be subject to the proposed energy conservation standards are not subject to any Federal energy conservation standards or labeling requirements because they do not fall within any of the specific classes of electric motors that are currently regulated by DOE.[15] However, DPPP motors are electric motors and, therefore, are and have been among the types of industrial equipment for which Congress has authorized DOE to establish applicable regulations under EPCA without need for DOE to undertake any additional prior administrative action. (42 U.S.C. 6311(1)(A))

2. History of Standards Rulemaking for DPPP Motors

On January 18, 2017, DOE published a direct final rule establishing energy conservation standards for DPPPs. 82 FR 5650 (the ''January 2017 Direct Final Rule'').[16] Acknowledging comments received in response to the direct final rule in support of regulating DPPP motors that would serve as replacement motors to the regulated pool pumps, DOE published a notice of public meeting on July 3, 2017, and held a public meeting on August 10, 2017, to consider potential scope, definitions, equipment characteristics, and metrics for pool pump motors. 82 FR 30845. DOE also requested comment on potential requirements for DPPP motors in a request for information (''RFI'') pertaining to test procedures for small electric motors and electric motors. 82 FR 35468 (July 31, 2017). On August 14, 2018, DOE received a petition submitted by a variety of entities (collectively, the ''Joint Petitioners'')[17] requesting that DOE issue a direct final rule to establish prescriptive standards and a labeling requirement for DPPP motors (''Joint Petition'').[18] The Joint Petitioners sought a compliance date of July 19, 2021, to align with the standards compliance date for DPPPs. (Id.) *See also* 82 FR 24218 (May 26, 2017). DOE published a notice of the Joint Petition and sought comment on whether to proceed with the proposal, as well as any data or information that could be used in DOE's determination of whether to issue a direct final rule. 83 FR 45851 (Sept. 11, 2018).[19]

On December 12, 2018, representatives from APSP, NEMA, Nidec Motors, Regal Beloit, and Zodiac met with DOE to reiterate the need for implementation of the Joint Petition. (December 2018 *Ex Parte* Meeting, No. 42 at p. 1)[20] On February 5, 2019, the Association of Pool & Spa Professionals (''APSP''), National Electrical Manufacturers Association (''NEMA''), Hayward, Pentair, Nidec Motors, Regal Beloit, WEG Commercial Motors, and Zodiac Pool Systems met with DOE to present an alternative approach to the Joint Petition, suggesting DOE propose a labeling requirement for DPPP motors. (February 2019 *Ex Parte* Meeting, No. 43 at p. 1)[21] These interested parties specifically requested that DOE base the labeling requirement on a newly-available industry standard for pool pump motors published on July 1, 2019 (UL 1004–10:2019, ''Pool Pump Motors''), a design standard that incorporates some of the proposals contained in the Joint Petition. (February 2019 *Ex Parte* Slides, No. 43 at pp. 9–10) A follow-up memorandum was submitted to DOE on March 1, 2019, providing additional information related to UL 1004–10:2019. (March 2019 *Ex Parte* Memo, No. 44) The interested parties noted the timelines and costs that would be involved in applying a label to the affected pool pump motors and the impacts flowing from past labeling efforts. (*See generally* id. at 1–3.)

On October 5, 2020, in response to the Joint Petition and the alternative recommendation presented by several of the Joint Petitioners following submission of the Joint Petition, DOE published a NOPR proposing to establish a test procedure and an accompanying labeling requirement for DPPP motors. 85 FR 62816 (''October 2020 NOPR''). Specifically, DOE proposed to incorporate by reference UL Standard 1004–10:2019 ''Outline of Investigation for Pool Pump Motors'' (''UL 1004–10:2019'') pertaining to DPPP definitions and marking requirements; require the use of CSA C747–09 (R2014), ''Energy Efficiency Test Methods for Small Motors'' (''CSA C747–09'') for testing the energy efficiency of DPPP motors; require the nameplate of a subject DPPP motor (1) to include the full-load efficiency of the motor as determined under the proposed test procedure, and (2) if the DPPP motor is certified to UL–1004–10:2019, to include the statement, ''Certified to UL 1004–10:2019''; require

[15] The current energy conservation standards at 10 CFR 431.425 apply to electric motors that satisfy nine criteria listed at 10 CFR 431.425(g), subject to the exemptions listed at 10 CFR 431.25(l). The nine criteria are as follows: (1) are single-speed, induction motors; (2) are rated for continuous duty (MG1) operation or for duty type S1 (IEC); (3) contain a squirrel-cage (MG1) or cage (IEC) rotor; (4) operate on polyphase alternating current 60-hertz sinusoidal line power; (5) are rated 600 volts or less; (6) have a 2-, 4-, 6-, or 8-pole configuration; (7) are built in a three digit or four-digit NEMA frame size (or IEC metric equivalent), including those designs between two consecutive NEMA frame sizes (or IEC metric equivalent), or an enclosed 56 NEMA frame size (or IEC metric equivalent); (8) produce at least one horsepower (0.746 kW) but not greater than 500 horsepower (373 kW), and; (9) meet all of the performance requirements of one of the following motor types: A NEMA Design A, B, or C motor or an IEC Design N or H motor. The exemptions listed at 10 CFR 431.25(l) are: (1) air-over electric motors; (2) component sets of an electric motor; (3) liquid-cooled electric motors; (4) submersible electric motors; and (5) inverter-only electric motors.

[16] DOE confirmed the adoption of the standards and the effective date and compliance date in a notice published on May 26, 2017. 82 FR 24218. DOE also established a test procedure for DPPPs. 82 FR 36858 (August 7, 2017).

[17] The Joint Petitioners are: The Association of Pool & Spa Professionals, Alliance to Save Energy, American Council for an Energy-Efficient Economy, Appliance Standards Awareness Project, Arizona Public Service, California Energy Commission, California Investor Owned Utilities, Consumer Federation of America, Florida Consumer Action Network, Hayward Industries, National Electrical Manufacturers Association, Natural Resources Defense Council, Nidec Motor Corporation, Northwest Power and Conservation Council, Pentair Water Pool and Spa, Regal Beloit Corporation, Speck Pumps, Texas ROSE (Ratepayers' Organization to Save Energy), Waterway Plastics, WEG Commercial Motors, and Zodiac Pool Systems.

[18] The Joint Petition is available at *www.regulations.gov/document?D=EERE-2017-BT-STD-0048-0014.*

[19] Docket No. EERE–2017–BT–STD–0048, available at: *www.regulations.gov/docket?D=EERE-2017-BT-STD-0048.*

[20] With respect to each of the *ex parte* communications noted in this document, DOE posted a memorandum submitted by the interested party/parties that summarized the issues discussed in the relevant meeting as well as its date and attendees, in compliance with DOE's Guidance on *Ex Parte* Communications. 74 FR 52795–52796 (Oct. 14, 2009). The memorandum of the meeting as well as any documents given to DOE employees during the meeting were added to the docket as specified in that guidance. *See Id.* at 74 FR 52796.

[21] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop the test procedure and labeling requirements for DPPP motors. (Docket No. EERE–2017–BT–STD–0008, which is maintained at *www.regulations.gov/#!docketDetail;D=EERE-2017-BT-STD-0008*). The references are arranged as follows: (commenter, comment docket ID number, page of that document).

that catalogs and marketing materials include the full-load efficiency of the motor; require manufacturers to notify DOE of the subject DPPP motor models in current production (according to the manufacturer's model number) and whether the motor model is certified to UL 1004–10:2019; and require manufacturers to report to DOE the full-load efficiency of the subject DPPP motor models as determined pursuant to the proposed test procedure. 85 FR 62816, 62820. Additionally, if a DPPP motor model is certified to UL 1004–10:2019, DOE proposed to require manufacturers to report the total horsepower (''THP'') and speed configuration of the motor model as provided on the nameplate pursuant to the UL certification. *Id.*

On July 29, 2021, DOE published a final rule adopting a test procedure for DPPP motors. 86 FR 40765. (''July 2021 Final Rule''). Specifically, the test procedure requires to use CSA C747–09 (R2014), ''Energy Efficiency Test Methods for Small Motors'' (''CSA C747–09'') for testing the full-load efficiency of DPPP motors and incorporates by reference UL 1004–10:2020 ''Standard for Pool Pump Motors'' (''UL 1004–10:2020'') pertaining to definitions and scope. The new test procedure is currently located in 10 CFR part 431, subpart Z (''Subpart Z''). 86 FR 40765, 40768. DOE did not establish a labeling requirement and stated that it intends to address any such labeling and/or energy conservation standards requirement in a separate notification. *Id.*

C. Deviation From Appendix A

In accordance with section 3(a) of 10 CFR part 430, subpart C, appendix A (''appendix A''), applicable to covered equipment under 10 CFR 431.4, DOE notes that it is deviating from the provision in appendix A regarding the process for proposing new or amended energy conservation standards. Section 6(a)(1) of appendix A states that as the first step in any proceeding to consider establishing any energy conservation standard, DOE will consider initiating a rulemaking proceeding. 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 an energy conservation standard that DOE will undertake will be a framework document and preliminary analysis, or an advance notice of proposed rulemaking (''ANOPR''). DOE is opting to deviate from both provisions by a publishing a NOPR without first publishing a document announcing that DOE is considering initiating a rulemaking proceeding, a framework document and preliminary analysis or an ANOPR. DOE believes that given the stakeholder involvement and information received to date regarding DPPP motors and potential standards for such equipment, there has been already been significant stakeholder engagement on this topic including: (1) the RFI on July 31, 2017, which include issues for comment relating to dedicated purpose pool pump motors (82 FR 35468); (2) the Joint Petition requesting a direct final rule to establish standards and a labeling requirement for DPPPMs, on which DOE requested comment along with any data or information that could be used in DOE's determination of whether to issue a direct final rule (83 FR 45851); (3) stakeholders engagement from substantive *ex parte* communications with DOE; and (4) the analysis conducted in support of the energy conservation standards for DPPPs, included analyses of DPPP motors comparable to the analyses conducted in support of this NOPR (*See* 82 FR 5650).

Section 6(f)(2) of appendix A states that the length of the public comment period for NOPR rulemaking documents will vary depending upon the circumstances of the particular rulemaking, but will not be less than 75 calendar days. DOE is opting to deviate from this provision in providing a 60-day comment period. DOE has tentatively that a 60-day comment period should be sufficient for stakeholders to evaluate the proposal presented in this NOPR and provide comment given the extensive stakeholder involvement to date and the prior opportunities to comment.

III. General Discussion

A. Scope of Coverage and Equipment Classes

This document covers equipment meeting the definition of DPPP motor as defined in 10 CFR 431.483 and the scope specified in 10 CFR 431.481(b). Specifically, the scope covers DPPP motors with a total THP of less than or equal to 5, but does not apply to: (i) DPPP motors that are polyphase motors capable of operating without a drive and distributed in commerce without a drive that converts single-phase power to polyphase power; (ii) waterfall pump motors; (iii) rigid electric spa pump motors, (iv) storable electric spa pump motors; (v) integral cartridge-filter pool pump motors, and (vi) integral sand-filter pool pump motors.[22]

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

DOE is proposing to establish equipment classes for DPPP motors based on THP. DOE is proposing an extra-small-size equipment corresponding to motors with a THP less than 0.5 hp, a small-size equipment class corresponding to motors with a total horsepower rating greater than or equal to 0.5 hp but less than 1.15 hp, and a standard-size equipment class corresponding to motor with a THP greater than or equal to 1.15 hp and less than or equal to 5 hp. Table III.1 provides a summary of the proposed equipment classes. See section IV.A.3 for further details on the reasoning why DOE determined these equipment classes are appropriate and justify having separate standards.

TABLE III.1—PROPOSED EQUIPMENT CLASSES FOR DPPP MOTORS

Equipment class	Motor total horsepower (Hp)
Extra-small-size	THP < 0.5
Small-size	0.5 ≤ THP < 1.15
Standard-size	1.15 ≤ THP ≤ 5

B. Test Procedure

EPCA sets forth generally applicable criteria and procedures for DOE's adoption and amendment of test procedures. (42 U.S.C. 6314(a)) 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.

As stated, DOE established subpart Z which specifies that the test procedure applies to DPPP motors with a THP of less than or equal to 5, but does not apply to: (i) DPPP motors that are polyphase motors capable of operating without a drive and distributed in commerce without a drive that converts single-phase power to polyphase power; (ii) waterfall pump motors; (iii) rigid electric spa pump motors, (iv) storable

[22] These terms are defined in UL 1004–10:2020, which is incorporated by reference in DOE's test procedure in Subpart Z of 10 CFR part 431. In this NOPR, DOE is proposing to reference the latest version of the UL standard, UL 1004–10:2022; see discussion in section III.A.1.

electric spa pump motors; (v) integral cartridge-filter pool pump motors, and (vi) integral sand-filter pool pump motors). Further, Subpart Z incorporates by reference CSA C747–09 as the energy efficiency test method for DPPP motors, with ''full-load efficiency'' as the metric.

The test procedure references UL 1004–10:2020 ''Standard for Safety for Pool Pump Motors'' for the definitions, (10 CFR 431.483) and references CSA C747–09 as the energy efficiency test method for DPPP motors (10 CFR 431.484(b)). The test procedure establishes full-load efficiency as the metric for DPPP motors. 10 CFR 431.484(b). In this NOPR, DOE is proposing to reference the latest version of the UL standard, UL 1004–10:2022, which added a definition for the term ''factory default setting''; see discussion in section III.A.1. As such, DOE is proposing product-specific enforcement requirements at 10 CFR 429.134 that require DPPPMs be tested in accordance with UL 1004–10:2022 to verify variable-speed capability and applicable freeze protection design requirements.

C. 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 (''Process Rule'').

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. 10 CFR 431.4; Sections 6(b)(3)(ii)–(v) and 7(b)(2)–(5) of the Process Rule. Section IV.B of this document discusses the results of the screening analysis for DPPP motors, particularly the designs DOE considered, those it screened out, and those that are the basis for the standards considered in this proposed rulemaking. For further details on the screening analysis for this proposed rulemaking, see chapter 4 of the NOPR technical support document (''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. 6316(a); 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 DPPP motors, 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 proposed rulemaking are described in section IV.C.1.c of this proposed rule and in chapter 5 of the NOPR TSD.

D. Energy Savings

1. Determination of Savings

For each trial standard level (''TSL''), DOE projected energy savings from application of the TSL to DPPP motors purchased in the 30-year period that begins in the first full year of compliance with the proposed standards (2026–2055).[23] The savings are measured over the entire lifetime of DPPP motors 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 new 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 DPPP motors. The NIA spreadsheet model (described in section IV.H 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 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.[24] 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.H.2 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. 6315(a); 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.[25] For example, the United States rejoined the Paris Agreement on February 19, 2021. As part of that agreement, the United States has committed to reducing greenhouse gas (''GHG'') emissions in order to limit the rise in mean global temperature.[26] As such, energy savings that reduce GHG emission have taken on greater importance. Additionally, 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 full-fuel-cycle (''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, processing, and transporting primary fuels (*i.e.,* coal, natural gas, petroleum fuels), and thus present a more complete

[23] Each TSL is composed of specific efficiency levels for each product class. The TSLs considered for this NOPR are described in section V.A. DOE conducted a sensitivity analysis that considers impacts for products shipped in a 9-year period.

[24] 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).

[25] *See* 86 FR 70892, 70901 (Dec. 13, 2021).

[26] *See* Executive Order 14008, 86 FR 7619 (Feb. 1, 2021) (''Tackling the Climate Crisis at Home and Abroad'').

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 estimates a combined total of 0.99 quads of FFC energy savings at the proposed efficiency levels for DPPP motors. This represents 19.8 percent energy savings relative to the no-new-standards case energy consumption for DPPP motors. DOE has initially determined the energy savings for the trial standard levels considered in this proposal are ''significant'' within the meaning of 42 U.S.C. 6295(o)(3)(B).

E. Economic Justification

1. Specific Criteria

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

a. Economic Impact on Manufacturers and Consumers

In determining the impacts of a potential amended standard on manufacturers, DOE conducts an MIA, as discussed in section IV.J of this document. DOE first uses an annual cash-flow approach to determine the quantitative impacts. This step includes both a short-term assessment—based on the cost and capital requirements during the period between when a regulation is issued and when entities must comply with the regulation—and a long-term assessment over a 30-year period. The industry-wide impacts analyzed include (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 following section. 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. 6316(a); 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 full 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.F 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 expected to result directly from the standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(III)) As discussed in section III.D, DOE uses the NIA spreadsheet models to project national energy savings.

d. Lessening of Utility or Performance of Products

In establishing product classes and in evaluating design options and the impact of potential standard levels, DOE evaluates potential standards that would not lessen the utility or performance of the considered products. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(IV)) 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. 6316(a); 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. 6316(a); 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 also considers the need for national energy and water conservation in determining whether a new or amended standard is economically justified. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(i)(VI)) The energy savings from the proposed standards are likely to provide improvements to the security and reliability of the Nation's energy system. Reductions in the demand for electricity also may result in reduced costs for maintaining the reliability of the Nation's electricity system. DOE conducts a utility impact analysis to estimate how standards may affect the Nation's needed power generation capacity, as discussed in section IV.M 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 greenhouse gases (''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.KIV.K; the estimated emissions impacts are reported in section V.B.6 of this document. DOE also estimates the economic value of emissions reductions resulting from the considered TSLs, as discussed in section IV.L 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. 6316(a); 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.''

2. Rebuttable Presumption

EPCA creates a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the equipment 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. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(2)(B)(iii)) DOE's LCC and PBP analyses generate values used to calculate the effects that proposed energy conservation standards would have on the payback period for consumers. These analyses include, but are not limited to, the 3-year payback period contemplated under the rebuttable-presumption test.

In addition, DOE routinely conducts an economic analysis that considers the full range of impacts to consumers, manufacturers, the Nation, and the environment, as required under (42 U.S.C. 6316(a); 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.1.c of this proposed rule.

IV. Methodology and Discussion of Related Comments

This section addresses the analyses DOE has performed for this proposed rulemaking with regard to DPPP motors. 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 proposed rulemaking: *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=76.* 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. 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 proposed 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 DPPP motors. 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

DPPP motors are a category of electric motor used in DPPP applications. In the July 2021 Final Rule, DOE incorporated by reference UL 1004–10:2020 and referenced the definitions published in that industry standard for DPPP motors. 10 CFR 431.483; 86 FR 40765, 40768. Section 2.3 of UL 1004–10:2020 defines a DPPP motor as ''an electric motor that is single-phase or poly-phase and is designed and/or marketed for use in dedicated purpose pool pump applications''. DOE defines dedicated-purpose pool pump as comprising ''self-priming pool filter pumps, non-self-priming pool filter pumps, waterfall pumps, pressure cleaner booster pumps, integral sand-filter pool pumps, integral-cartridge filter pool pumps, storable electric spa pumps, and rigid electric spa pumps.'' 10 CFR 431.462.

With regards to scope, 10 CFR 431.481(b) specifies that the requirements in subpart Z apply to DPPP motors, as specified in paragraphs 1.2, 1.3 and 1.4 of UL 1004–10:2020. This scope covers DPPP motors with a total THP of less than or equal to 5, but does not apply to: (i) DPPP motors that are polyphase motors capable of operating without a drive and distributed in commerce without a drive that converts single-phase power to polyphase power; (ii) waterfall pump motors; (iii) rigid electric spa pump motors, (iv) storable electric spa pump motors; (v) integral cartridge-filter pool pump motors, and (vi) integral sand-filter pool pump motors. Section 1.3 and 1.4 of UL 1004–10: 2020.

Since the July 2021 Final Rule, UL 1004–10 has been updated to the ANSI approved March 24, 2022 version.[27] In the 2022 version, DOE notes that the only update was the addition of a glossary term for ''factory default setting'' in section 2.7A, which is defined as ''upon application of power

[27] *https://standardscatalog.ul.com/ProductDetail.aspx?UniqueKey=42496.*

at initial installation, the program that the unit will run without outside interference or change by the user.'' DOE understands that this definition does not change the content and requirements of UL 1004–10:2020, but only provides a clarification regarding factory default setting as it applies to the industry standard. As such, in this NOPR, DOE proposes to update the reference to the latest version of the industry standard, from UL 1004–10:2020 to UL 1004–10:2022, in sections 10 CFR 431.481(b), 10 CFR 431.482(c)(1) and 10 CFR 431.483.

DOE seeks comment on updating the UL 1004–10 reference from the 2020 version to the 2022 version.

The scope of this DPPP motors energy conservation standards rulemaking covers motors for use in the following dedicated purpose pool pump applications only: (i) self-priming pool filter pumps; (ii) non-self-priming pool filter pumps; and (iii) pressure cleaner booster pumps. The scope of the pool pump application is consistent with the scope of pool pumps that currently have performance-based standards in 10 CFR 431.465(f). Further, the DPPP motor energy conservation standards scope includes both single and polyphase motors (but excluding polyphase motors capable of operating without a drive and distributed in commerce without a drive that converts single-phase power to polyphase power) with a total THP of less than or equal to 5.

2. Market Review

To review the current market of DPPP motors incorporated in DPPPs, DOE relied on information from the DOE Compliance and Certification Database, the California Energy Commission (''CEC''), and the ENERGY STAR program.[28] (''2021 DPPP Database''). These databases included the DPPP motor speed-control capabilities, motor THP, and the weighted-efficiency factor (''WEF'') [29] of the pump with which the motor was certified. The 2021 DPPP database did not contain information related to motor efficiency or topology. To supplement the market review, DOE also reviewed general motor catalog data from 2020 and created a database which contained information regarding motor speed-control, topology, THP, motor application, and full-load efficiency (''2020 Motor Database''). To make the two databases more comparable, DOE filtered the 2020 Motor Database to analyze only motors used in DPPP applications. DOE notes that DPPPMs are electromechanically similar to general motors and use similar methods to improve the efficiency of a given motor, therefore DOE tentatively concludes that efficiencies of the 2020 Motor Database can be expected to mirror the DPPPM market. See section IV.A.4 for further discussion on the DPPP motor technology assessment.

First, DOE analyzed the distribution of motor THP and speed-control from the 2021 DPPP Database and compared this to what was observed in the January 2017 Direct Final Rule. DOE observed that the distribution of THP and speed-control has not changed significantly since 2017. Because the 2021 DPPP Database did not specifically have information related to motor efficiency or topology, DOE compared the motor efficiency data used for the January 2017 Direct Final Rule with efficiencies found in the 2020 Motor Database. In this review, DOE reviewed the range of efficiencies and average catalog efficiency for each available motor topology (capacitor-start induction-run [''CSIR''], capacitor-start capacitor-run [''CSCR''], permanent-split capacitor [''PSC''], etc.) at each THP. DOE found that the range of efficiencies and average catalog efficiency did not significantly change since 2017. DOE also reviewed the distribution of motor topology in the 2020 Motor Database and observed that it has not significantly changed since 2017. Accordingly, DOE has based its engineering analysis on the analysis conducted for the January 2017 Direct Final Rule (*see* section IV.C).

Separately, DOE also notes that the standard for DPPPs at 10 CFR 431.465(f) and the CEC performance and prescriptive standards for replacement DPPP motors, both having a compliance date starting July 19, 2021, are expected to influence the overall DPPP motor market. Specifically, in the October 2020 NOPR, DOE specified that standard-size self-priming pool filter pumps which are subject to the DOE DPPP energy conservation standards would likely require a variable-speed control motor. 85 FR 62816, 62824. Relatedly, the California standard for replacement DPPP motors requires all DPPPMs greater than or equal to 0.5 THP to be variable-speed. California Code of Federal Regulations, Title 20, Section 1605.3(g)(6)(B).

3. Equipment Classes

When evaluating and establishing energy conservation standards, DOE divides covered equipment into equipment classes by the type of energy used, or by capacity or other performance-related features that justify a different standard. (42 U.S.C. 6316(a); 42 U.S.C. 6295(q)) In determining whether capacity or another performance-related feature justifies a different standard, DOE must consider such factors as the utility of the feature to the consumer and other factors DOE deems appropriate. (*Id.*)

As discussed previously, DOE is limiting the scope of this energy conservation standard to motors used in self-priming pool filter pumps, non-self-priming pool filter pumps, and pressure cleaner booster pumps. The scope of the pool pump application is consistent with the scope of pool pumps that currently have performance-based standards in 10 CFR 431.465(f). For this energy conservation standards, DOE is dividing the DPPP motors into equipment classes based on capacity. The capacity of a dedicated-purpose pool pump motor can be expressed in terms of motor total horsepower.

Full load efficiency generally correlates with motor horsepower (*e.g.,* a 3-horsepower motor is usually more efficient than a ¼-horsepower motor). DOE found that motor efficiency varies with motor horsepower in the 2020 Motor Database. Additionally, motor horsepower dictates the maximum load that a motor can drive, which means that a motor's rated horsepower can influence and limit the end use applications where that motor can be used, which in this case is a dedicated purpose pool pump. Horsepower is a critical performance attribute of a DPPP motor, and since horsepower has a direct relationship with full load efficiency and consumer utility, DOE used this element as a criterion for distinguishing among equipment classes.

The motor capacity breakpoints developed in this NOPR align with the pump capacity breakpoints recommended by the consensus working group established under the Appliance Standards and Rulemaking

[28] DOE Compliance Certification Management System. Compliance and Certification Database. Information for DPPP products. *www.regulations.doe.gov/certification-data* (last access July 29, 2021); The California Modernized Appliance Efficiency Database System. Information for DPPP products. *https://cacertappliances.energy.ca.gov/Pages/Search/AdvancedSearch.aspx* (last access July 29, 2021); Energy Star Program. Information for DPPP products. *www.energystar.gov/productfinder/product/certified-pool-pumps/results* (last access July 29, 2021).

[29] DOE notes that while the DPPP energy conservation standards at 10 CFR 431.465(f) does not contain performance standards for the motors used in DPPPs, the DPPP performance metric of weighted energy factor (''WEF'') is directly affected by motor efficiency and the speed-control of the motor sold with the pump.

Federal Advisory Committee (the ''ASRAC DPPP Working Group'').[30][31] 82 FR 5650, 5669. (Jan. 18, 2017). In the January 2017 Direct Final Rule, DOE finalized equipment classes for dedicated purpose pool pumps based on the DPPP Working Group recommendation to set the breakpoint between small-size and standard-size self-priming pool filter pumps at 0.711 hydraulic horsepower (''hhp''). 82 FR 5650, 5669.

In the Joint Petition for DPPP motors, the Joint Petitioners stated that the 0.711 hhp threshold in the DPPP standards for self-priming pool filter pumps aligns with a 1.15 THP motor threshold (1.15 THP is roughly equivalent to 0.711 hhp). Further, the Joint Petition stated that almost all motors used in non-self-priming pool filter pumps and pressure cleaner booster pumps have THPs less than 1.15 THP. (Joint Petition, No. 14 at p. 8). Finally, in the October 2020 NOPR, DOE described that DPPP motors with a total horsepower greater than or equal to 1.15 THP are primarily used in standard-size self-priming pool filter pumps (52 percent of DPPP motor applications), while pool pump motors below 1.15 THP are typically found in small-size self-priming pool filter pumps, non-self-priming pool filter pumps, and pressure cleaner booster pumps (which represent 48 percent of the DPPP motor applications).[32] 85 FR 62816, 62824. Accordingly, because full load efficiency generally correlates with motor horsepower, and the distinct utility of DPPP motors less than 1.15 THP (almost all are used in non-self-priming pool filter pumps and pressure cleaner booster pumps) is different than of DPPP motors equal to or greater than 1.15 THP (primarily used in standard-size self-priming pool filter pumps), DOE proposes to establish small-size and standard-size equipment classes based on a 1.15 THP threshold.

In the January 2017 Direct Final Rule, DOE also considered an extra-small-size equipment class for non-self-priming pool filter pumps less than 0.13 hhp. 82 FR 5650, 5672. This equipment class was ultimately merged into the small-size equipment class after DOE selected the same efficiency level for both extra-small-size and small-size non-self-priming pool filter pumps. *Id.* However, in the context of DPPP motors for this rulemaking, DOE notes that the non-self-priming pool filter DPPP motors with an hhp of less than 0.13 have different maximum efficiency potential than non-self-priming pool filter DPPP motors with an hhp of 0.13 or greater. Specifically, Table 5.6.3 in the TSD for the January 2017 Direct Final Rule (''January 2017 Direct Final Rule TSD'')[33] did not consider either two-speed or variable speed motors for the extra-small-size DPPPP equipment class because both these types of motors provide inadequate flow to the pool pump. Because the distinct performance potential and utility of DPPP motors with an hhp less than 0.13, DOE proposes to include an extra-small-size equipment class for DPPP motors.

To develop the proposed motor total horsepower tier threshold for the extra-small-size equipment class, DOE considered the appropriate motor THP threshold that is applicable to the extra-small-size equipment class hydraulic horsepower threshold from the January 2017 Direct Final Rule. Based on pump fundamentals, the power out of the drive of the motor (*i.e.,* brake horsepower) is the hydraulic horsepower divided by the pump efficiency.[34] Accordingly, DOE converted the hhp to thp by dividing the hydraulic horsepower threshold for the extra-small-size equipment class (0.13 hhp limit from the January 2017 Direct Final Rule) by the hydraulic efficiency for the representative unit meeting the 0.13 hhp threshold (23 percent from Table 5.6.4 of the January 2017 Direct Final Rule TSD). This approximates to a 0.57 THP motor horsepower threshold.

As part of this proposed rulemaking, DOE collected confidential DPPP motor shipment data from manufacturers in 2018 through non-disclosure agreements (''2018 confidential DPPP motor shipments''). In reviewing that data, DOE notes there were no DPPP motor shipments at 0.57 THP; rather, the largest motor THP under 0.57 THP with any shipments was 0.5 THP. Accordingly, for this NOPR, DOE proposes to use the 0.5 THP threshold instead, and therefore proposes an extra-small-size equipment class based on the 0.5 THP threshold.

Table IV.1 provides the summary of the proposed equipment classes for DPPP motors.

TABLE IV.1—PROPOSED EQUIPMENT CLASSES FOR DPPP MOTORS

Equipment class	Motor total horsepower (Hp)
Extra-small-size	THP < 0.5
Small-size	0.5 ≤ THP < 1.15
Standard-size	1.15 ≤ THP ≤ 5

DOE seeks comments on the proposed equipment classes for DPPP motors based on motor THP thresholds.

DOE seeks comment on the proposed equipment classes for DPPP motors based on motor THP thresholds.

4. Technology Assessment and Options

The purpose of the technology assessment is to develop a preliminary list of technology options that could improve the efficiency of DPPP motors. The efficiency of a DPPP motor is dependent on motor topology, capacity, and operating speed. As previously discussed in section IV.A.2 of this document, DOE proposes to delineate equipment classes based on motor capacity (*i.e.,* motor horsepower).

a. Motor Topology

The DPPP motors covered in this proposed rulemaking include both alternating current (AC) (single and certain polyphase) induction motors and permanent magnet AC motors (also known as Electronically Commutated Motors [''ECMs'']).

In the January 2017 Direct Final Rule, DOE noted that the majority of the pool filter pumps available on the market come equipped with single-phase induction motors, of which the majority are either CSCR or PSC motors. 82 FR 5650, 5676. Based on a review of the 2020 Motor Database, DOE concludes that a majority of DPPPMs are still CSCR or PSC motors. Specifically, single-speed DPPPMs are almost exclusively PSC or CSCR and variable-speed motors are primarily ECMs.

AC induction motors have two core components: a stator and a rotor. The components work together to convert electrical energy into rotational mechanical energy. This is done by creating a rotating magnetic field in the stator, which induces a current flow in the rotor. This current flow creates an opposing magnetic field in the rotor, which creates rotational forces. Because of the orientation of these fields, the rotor field follows the stator field. The rotor is connected to a shaft that also rotates and provides the mechanical energy output.

DOE identified six categories of AC induction motors: shaded-pole, split-phase, capacitor-start (CSIR and CSCR),

[30] In accordance with the Federal Advisory Committee Act and the Negotiated Rulemaking Act (5 U.S.C. App.; 5 U.S.C. 561–570).

[31] The dedicated-purpose pool pumps energy conservation standard rulemaking docket EERE–2015–BT–STD–0008 contains all notices, public comments, public meeting transcripts, and supporting documents pertaining to this rulemaking.

[32] Estimate of DPPP motors shipments by DPPP applications for 2021. 85 FR 62816, 62824.

[33] The dedicated-purpose pool pumps energy conservation standard rulemaking TSD can be found in docket EERE–2015–BT–STD–0008–0105 (*www.regulations.gov/document/EERE-2015-BT-STD-0008-0105*).

[34] *www.sciencedirect.com/topics/engineering/hydraulic-horsepower.*

permanent-split capacitor (PSC), and polyphase. A shaded-pole motor is a single-phase induction motor provided with an auxiliary short-circuited winding or windings displaced in magnetic position from the main winding. Shaded-pole motors are typically only used in low-torque applications with power requirements less than 1⁄10 hp. A split-phase motor is a single-phase induction motor equipped with an auxiliary winding displaced in magnetic position from, and connected parallel to, the main winding. The term ''split-phase motor'' describes a motor to be used without impedance other than that offered by the motor windings themselves. A CSCR motor is a single-phase motor with different values of effective capacitance for the starting and running conditions. A PSC motor is another category of single-phase motor that has the same value of capacitance for both starting and running conditions. A polyphase motor is an electric motor that uses the phase changes of the electrical supply to induce a rotational magnetic field and thereby supply torque to the rotor.

Single-phase AC induction motors are inherently less efficient than polyphase AC induction motors due to the fundamental differences in how the two categories of motors operate. Three-phase power in a polyphase motor naturally produces rotation, whereas a single-phase motor requires an auxiliary winding with current and voltage out of phase of the main winding to produce a net rotating magnetic field. The more efficient polyphase AC induction motors require the end user to have access to a three-phase power source. Residential power sources are typically single-phase.

Motor topology within the single-phase AC induction motor category can also have an impact on motor efficiency. CSCR and PSC motors are typically more efficient than CSIR, split-phase, and shaded pole motors due to the presence of a run capacitor that remains connected while the motors are operating. In the notice of the Joint Petition, the recommendation included prohibiting CSIR or split phase motors for DPPPMs because (1) this would align with the DPPP standards; (2) this requirement would be consistent with certain state standards, and (3) these motors are very inefficient. (Joint Petition, No. 14 at p. 7)

In the January 2017 Direct Final Rule, DOE also noted that the pool pump market included ECMs and that ECMs are typically used in variable-speed pool filter pump applications. 82 FR 5650, 5676. Based on a review of the 2021 DPPP database, ECMs are becoming more prevalent because of the recent standards implemented by the CEC and the January 2017 Direct Final Rule standards discussed in section IV.A.2 of this NOPR.

ECMs are similar in construction to AC squirrel-cage induction motors, but feature a different rotor configuration. Instead of using conductive material in the rotor, permanent magnets are integrated into the rotor's laminations or fixed to the rotor's outer surface and do not need to be energized. The magnetic field established by the permanent magnets interacts with the field produced by windings in the stator to generate a torque. Because permanent magnet motors do not require current to be induced in rotor conductors, overall power consumption can be reduced compared to induction motors. Further, because permanent magnet motors operate at synchronous speed, they require a variable frequency drive to start rotation.

ECMs can typically achieve higher motor efficiencies than AC induction motors with similar capacities. ECMs employ rare-earth metal based permanent magnets in the rotor design to establish a magnetic field, which avoids the energy consumption observed when energizing an electro-magnetic rotor for the operation of AC induction motors. Because of the removal of rotor energy losses, ECMs often have higher full-load efficiencies than their induction counterparts. ECMs require a variable speed drive to operate, which may introduce additional losses into the motor system. Even after considering the losses from the variable speed drive and control electronics, ECMs are the most efficient motor topology currently used in dedicated-purpose pool pumps.

b. Motor Speed

Dedicated-purpose pool pumps are designed to circulate water in pool systems to facilitate pool cleaning in addition to water filtering, heating, and chlorination. Pool cleaning functions require a high flow rate, and subsequently a high motor speed, to provide the agitation necessary to stir up large debris so that the filtration system can effectively remove any contaminants. Heating functions typically require a moderate to high flow rate to ensure that heat is dissipated sufficiently and pool system components are not damaged by overheating. Water filtration is most effective at low motor speeds, as a low flow rate will ensure water bypassing the filter will be minimized.

DPPP motors exist in several configurations with different speed capabilities. Single-speed motors can operate at one predefined speed, and therefore the associated dedicated-purpose pool pump can provide only a single flow rate in any given pool system. Single-speed motors are sized to provide the minimum flow rate necessary to facilitate effective pool cleaning, and therefore pool pump functions that operate most efficiently at lower flow rates are rendered less effective.

Two-speed motors can operate at two distinct rotational speeds. Two-speed motors can be sized so that high flow functions like pool cleaning are effective at full speed operation and low flow tasks like filtration can be completed at low speed operation. Two-speed pumps can be operated by timers or other control systems to run at high speed for long enough to complete cleaning functions before switching to low speed operation for the duration of the cycle. The ability to operate at multiple speeds can provide energy savings when utilized correctly, *i.e.,* pool cleaning at high speed and filtration at lower speeds. Multi-speed motors function similarly to two-speed motors, but provide additional flexibility to maximize the effectiveness of specific pool pump functions by allowing users to program pumps to run at more than two distinct speeds.

Variable-speed motors can provide greater energy savings than two-speed or multi-speed motors due to the ability to program these motors to operate at user-defined speed settings. Variable-speed motors used in DPPP applications are typically one of two configurations: an AC induction motor paired with a variable frequency drive or a permanent magnet motor with an integral drive. Permanent magnet variable-speed motors offer improved efficiency over AC induction motors due to the incorporation of a permanent magnet rotor design in place of the powered electro-magnetic rotor design used in AC induction motors. This improvement in efficiency is particularly evident at lower speed settings, where AC induction motor efficiency drops considerably from full speed efficiency.

DOE seeks comment on the technologies considered for higher DPPP motor efficiency. DOE seeks comment on whether other motor topologies should be considered as applicable in pool pumps.

B. 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.

10 CFR part 430, subpart C, appendix A, sections 6(b)(3) and 7(b).

In summary, 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.

In the January 2017 Direct Final Rule, DOE considered ''improved motor efficiency'' as a screened in technology option for the pool pump analysis. 82 FR 5650, 5676. This screened-in technology option considered motor topology (induction and ECM motor) and speed applications (*i.e.,* single-, dual- and variable speed). 82 FR 5650, 5676. For this DPPP motor analysis, DOE relied on and aligned with the January 2017 Direct Final Rule analysis where possible. As discussed in sections IV.A.2 and IV.A.4 of this document, the motor technologies applicable to pool pump motors analyzed in the January 2017 Direct Final Rule remain relevant and applicable in the current DPPP motor market. Therefore, DOE has initially determined that the technology options previously considered continue to be technologically feasible because they are being used or have previously been used in commercially-available products or working prototypes. DOE also finds that the technology options continue to 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.

C. Engineering Analysis

The purpose of the engineering analysis is to establish the relationship between the efficiency and cost of DPPP motors. 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 equipment, DOE considers technologies and design option combinations not eliminated by the screening analysis. For each equipment class, DOE estimates the baseline cost, as well as the incremental cost for the equipment 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).

For this analysis, DOE relied on the conclusions from the ''improved motor efficiency'' design option from the January 2017 Direct Final Rule. As discussed in sections IV.A.2 and IV.A.4 of this document, the motor technologies applicable to pool pump motors analyzed in the January 2017 Direct Final Rule remain relevant and applicable in the current DPPP motor market. Therefore, in line with the January 2017 Direct Final Rule, DOE considered three tiers of motor efficiency (low, medium, and high efficiency) and design requirements specifically for two-speed, multi-speed motors and variable speed motors. This is a combination of the efficiency level and design level approach discussed previously. Section 5.6.2 of the January 2017 Direct Final Rule TSD discusses that DOE presented the designs and motor efficiency assumptions to the DPPP Working Group and subsequently refined them to incorporate feedback from the DPPP Working Group.

a. Representative Units

DOE opted to use representative units for each equipment class, consistent with the January 2017 Direct Final Rule, for the engineering analysis. Representative units exemplify typical capacities in each equipment class and are used to quantify the manufacturing costs and the energy savings potential for each equipment class.

Table IV.2 details the DPPP application and associated motor THP of each representative unit considered for the analysis. The DPPP application (pump type, size and hhp) is consistent with Table 5.4.1 of the January 2017 Direct Final Rule TSD, except that DOE did not merge the extra-small-size and standard-size non self-priming pumps into one class for this NOPR. As discussed in section IV.A.3 of this document, the extra-small-size non-self-priming pool filter DPPP motors have different maximum efficiency potential than small- or standard-size equipment classes and are therefore analyzed separately.

The associated motor THP of the representative units are consistent with the motor THPs provided in Table 5.7.1 of the January 2017 Direct Final Rule TSD, with three exceptions: (1) a DPPP motor associated with self-priming filter pump application at 0.65 hhp (Representative unit 2A) was added to represent standard-size DPPP motors that are used in small-size self-priming DPPPs as DOE observed motors on the market of this size going into small-size self-priming pumps; (2) a DPPP motor associated with non-self priming filter pump at 0.87 hhp (Representative unit 6) was added to analyze standard-size DPPPMs used in non-self-priming filter pump applications to better represent THPs observed in the market; and (3) a DPPP motor of 1.125 thp instead of 1.25 thp associated with pressure cleaner booster pump (Representative unit 7) was considered so as to keep this representative unit in the small-size equipment class (EC 2), and to better represent the THP range of motors in pressure cleaner booster pumps.[35]

TABLE IV.2—REPRESENTATIVE UNITS THP AND DPPP APPLICATION

Rep. unit	Equipment class	THP	DPPP application *
1	2 (Small)	0.75	Self-priming Filter Pump, Small-size (0.44 hhp).
2	3 (Standard)	1.65	Self-priming Filter Pump, Standard-size (0.95 hhp).
2A	3 (Standard)	1.65	Self-priming Filter Pump, Small-size (0.65 hhp).
3	3 (Standard)	3.45	Self-priming Filter Pump, Standard-size (1.88 hhp).
4	1 (Extra-small)	0.22	Non Self-priming Filter Pump, Extra-Small (0.09 hhp).
5	2 (Small)	1	Non Self-priming Filter Pump, Standard-size (0.52 hhp).
6	3 (Standard)	1.5	Non Self-priming Filter Pump, Standard-size (0.87 hhp).
7	2 (Small)	1.125	Pressure Cleaner Booster Pump.

* For self-priming pumps, the terms small and standard refer to the hydraulic horsepower. Small-size designates pool pump applications with hydraulic horsepower less than 0.711 hhp, while standard-size designates pool pump applications with hydraulic horsepower greater than or equal to 0.711 hhp. DOE distinguishes extra-small non self-priming filter pumps (less than 0.13 hhp) and standard-size non self-priming filter pumps (less than 2.5 hhp and greater than 0.13 hhp).

DOE seeks comment on the proposed representative units and associated DPPP applications used for the engineering analysis.

b. Baseline Efficiency Levels

For each 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 equipment class represents the characteristics of an 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. Mirroring the January 2017 Direct Final Rule, this DPPP motor analysis also considered the least efficient single-speed DPPP motor on the market for each representative unit.

c. Higher Efficiency Levels

As part of DOE's analysis, the maximum available efficiency level is the highest efficiency unit currently available on the market. DOE also defines a ''max-tech'' efficiency level to represent the maximum possible efficiency for a given product.

Once the baseline was established, higher ELs were established by substituting with higher full-load efficiency DPPPMs and DPPPMs with finer levels of speed control, similar to the January 2017 Direct Final Rule. Table IV.3 details the full-load efficiency, or motor topologies and speed configurations of each EL for each representative unit. The full-load efficiencies and speed configurations being considered are consistent with Table 5.6.3 of the January 2017 Direct Final Rule TSD.

As discussed in section IV.A.4.b of this document, DPPPM have different functions, including pool cleaning, water filtering, heating, freeze protection control and chlorination, that all require different flow rates and motor speeds. Therefore, the ability to operate at multiple speeds can provide energy savings when utilized correctly. As such, there are energy savings that come from controlling the speed of the motor with two-speed, multi-speed or variable-speed capabilities. Accordingly, DOE proposes to include design requirements of speed capability as part of the engineering analysis to capture these added energy savings.[36] These design requirements are consistent with the motor speed design options considered in the January 2017 Direct Final Rule.

Further, as discussed in section IV.A.4.a of this NOPR, the efficiency of a DPPP motor is dependent on motor topology. CSCR and PSC motors are typically more efficient than CSIR, split-phase, and shaded pole motors due to the presence of a run capacitor that remains connected while the motors are operating. In the January 2017 Direct Final Rule, DOE noted that the majority of the pool filter pumps available on the market come equipped with CSCR or PSC motors. 82 FR 5650, 5676. Accordingly, DOE proposes to include design requirements based on motor topology as part of the engineering analysis to capture these added energy savings.

Table IV.3 presents the proposed performance and design requirements for the DPPPM efficiency levels. Efficiency levels 0 through 2 is consistent with Table 5.6.3 of the January 2017 Direct Final Rule TSD and represents the low-efficiency, medium-efficiency and high-efficiency performance of single-speed DPPPMs. Efficiency levels 3 through 6 incorporate certain design requirements based on motor speed capability and topology.[37]

DOE proposes that EL 3 requires motors that are two-speeds, multi-speed or variable speed, but with no restrictions on motor topology. EL 4 requires motors that are two-speeds or multi-speed, but does not allow for the low-efficiency motor topologies (split-phase, shaded-pole, CSIR)—or—requires variable speed motors. EL 5 requires motors that are two-speeds or multi-speed, but does not allow for PSC motors in addition to the other low-efficiency motor topologies—or—requires variable speed motors. Finally,

[35] The Joint Petition noted that almost all motors used in pressure cleaner booster pumps have THPs less than 1.15 THP. (Joint Petition, No. 14 at p. 8).

[36] Full-load efficiency does not capture the energy saving benefits of speed control.

[37] For the purposes of the analysis, however, DOE did consider the full-load efficiencies presented in Table 5.6.3 of the January 2017 Direct Final Rule TSD for efficiency levels 3 through 6.

EL 6 includes variable speed only, which provides the highest energy savings.

As discussed in section IV.A.3 of this document, efficiency levels 3–6 do not apply to representative unit 4 because two-speed, multi-speed and variable speed motors provide inadequate flow to the pool pump for the extra-small-size DPPPP equipment class. Further, consistent with the January 2017 Direct Final Rule, DOE only considered one speed and variable speed motors for representative unit 7 (pressure cleaner booster pump application). 82 FR 5650, 5683. Specifically, the January 2017 Direct Final Rule noted that pressure cleaner booster pumps are only operated at one speed, however the pool pump WEF metric accounts for energy savings available from adjusting the pump speed to reach the minimum required test pressure, *i.e.,* 60 feet, therefore allowing variable-speed motor applications. *Id.* Accordingly, for representative unit 7, efficiency levels 3 through 6 would require variable-speed motors only.

TABLE IV.3—PROPOSED PERFORMANCE AND DESIGN REQUIREMENTS FOR DPPPM ELS

EC	Rep. unit	Motor THP	DPPP application	EL0 (%)	EL1 (%)	EL2 (%)	EL3 *	EL4 *	EL5 *	EL6 *
1	4	0.22	Non Self-priming Filter Pump, Extra-Small (0.09 hhp).	55	69	76				
2	1	0.75	Self-priming Filter Pump, Small-size (0.44 hhp).	55	69	76	Two-speed—OR—Multi-speed—OR—Variable speed.	Two-speed/Multi-speed, not CSIR, not shaded pole, not split-phase;—OR—Variable speed.	Two-speed/Multi-speed, not CSIR, not shaded pole, not split-phase, not PSC;—OR—Variable speed.	Variable speed only.
2	5	1	Non Self-priming Filter Pump, Small-size (0.52 hhp).	55	69	76				
2	7	1.125	Pressure Cleaner Booster Pump.	55	69	76	Variable speed only.			
3	6	1.5	Non Self-priming Filter Pump (0.87 hhp).	55	69	77	Two-speed—OR—Multi-speed—OR—Variable speed.	Two-speed/Multi-speed, not CSIR, not shaded pole, not split-phase;—OR—Variable speed.	Two-speed/Multi-speed, not CSIR, not shaded pole, not split-phase, not PSC;—OR—Variable speed.	Variable speed only.
3	2	1.65	Self-priming Filter Pump, Standard-size (0.95 hhp).	55	69	77				
3	2A	1.65	Self-priming Filter Pump, Small-size (0.65 hhp).	55	69	77				
3	3	3.45	Self-priming Filter Pump, Standard-size (1.88 hhp).	75	79	84				

* includes freeze protection control design requirements.

To determine the motor input power for the energy use analysis in section IV.E, DOE also had to determine the hydraulic power of each pump. DOE calculated the relationships between flow rate of the pump and the total dynamic head required for each system curve. Once these relationships were established, the hydraulic power required for each curve was calculated using both the head and flow rate. *See* Section 5.3.1.3 of the January 2017 Direct Final Rule TSD. Each efficiency level presented has an associated Energy Factor (in Gallons/Watt-hour) and Flow (in gallons per minute) used to determine efficiency of the pump system. This energy factor considers the performance of the motor and the energy savings that come from running the motor at a lower speed. For this analysis, all pump performance curves were kept consistent with Tables 5.8.1, 5.8.2, 5.8.3 and 5.8.4 of the January 2017 Direct Final Rule TSD. For more information on how these curves were developed, see Section 5.8.2 of the January 2017 Direct Final Rule TSD.

DOE seeks comment on the efficiency levels, including the associated full load efficiencies and design requirements evaluated in the engineering analysis.

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 DPPPMs 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 the present case, DOE conducted the cost analysis using historical price surveys and product teardowns. DOE used feedback from manufacturers presented in the January 2017 Direct Final Rule to determine the cost of DPPP motors. Specifically, Table 5.7.1 of the January 2017 Direct Final Rule TSD presents the manufacturer production cost (''MPC'') of DPPPMs used in the analysis. However, DOE notes this cost data was in terms of *2015$.* For this evaluation, DOE updated the cost data to be representative of the market in 2020. DOE adjusted the *2015$* costs to *2020$* using the historical Bureau of Labor Statistics Producer Price Index (''PPI'') for each product's industry.[38] Finally, DOE also conducted physical teardowns to determine updated DPPP motor controller costs for variable-speed motors. DOE did not consider any added costs for the freeze protection design requirements, as these requirements do not require any additional labor, material, or technology to produce a DPPP motor meeting these requirements, and a manufacturer is able to just disable the controls to meet the requirement. Further, the January 2017 Direct Final Rule, which also adopted freeze protection controls as a prescriptive standards per the ASRAC DPPP Working Group, did not consider any added costs. 82 FR 5650, 5737.

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 developed an average manufacturer markup of 1.37 by examining the annual Securities and Exchange Commission (SEC) 10–K reports filed by publicly-traded manufacturers primarily engaged in DPPP manufacturing and whose combined product range includes a variety of pool products. Table IV.4 lists the MSPs of each EL for DPPPMs. See TSD chapter 5 for additional detail on the engineering analysis and complete cost-efficiency results.

TABLE IV.4—MSPS IN 2020$ FOR DPPPMS

EC	Rep. unit	THP	DPPP application	EL0	EL1	EL2	EL3	EL4	EL5	EL6
1	4	0.22	Non Self-priming Filter Pump, Extra-Small (0.09 hhp)	$25	$31	$51	....	....	....	....
2	1	0.75	Self-priming Filter Pump, Small-size (0.44 hhp)	57	71	90	$93	$104	$115	$357
2	5	1	Non Self-priming Filter Pump, Small-size (0.52 hhp)	52	57	77	79	94	111	357
2	7	1.125	Pressure Cleaner Booster Pump	60	78	98	....	....	....	357
3	6	1.5	Non Self-priming Filter Pump (0.87 hhp)	68	90	108	109	128	149	357
3	2	1.65	Self-priming Filter Pump, Standard-size (0.95 hhp)	75	96	115	116	135	155	357
3	2A	1.65	Self-priming Filter Pump, Small-size (0.65 hhp)	75	96	115	116	135	155	357
3	3	3.45	Self-priming Filter Pump, Standard-size (1.88 hhp)	161	201	224	256	271	287	480

DOE seeks comment on using a 1.37 manufacturer markup for the cost analysis.

DOE seeks comment on the cost methodology and associated costs for each of efficiency levels evaluated in the engineering analysis, including any associated costs for the proposed freeze protection controls requirement.

D. 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.

DOE identified distribution channels for DPPP motors incorporated in pumps (See Table IV.5) and replacement DPPP motors sold alone (See Table IV.6). To characterize these channels, DOE referred to information collected in support of the January 2017 Direct Final Rule, which reflects the consensus of the ASRAC DPPP Working Group.

TABLE IV.5—DISTRIBUTION CHANNELS FOR DPPP MOTORS INCORPORATED IN PUMPS

Distribution channel	Fraction of shipments (%)
Replacement for an Existing Pool	
DPPP Motor Manufacturer → DPPP Manufacturer → Wholesaler → Pool Service Contractor → Consumer	75
DPPP Motor Manufacturer → DPPP Manufacturer → Pool Product Retailer → Consumer	20
New Installation for a New Pool	
DPPP Motor Manufacturer → DPPP Manufacturer → Pool Builder → Consumer	5

TABLE IV.6—DISTRIBUTION CHANNELS FOR REPLACEMENT DPPP MOTORS SOLD ALONE

Distribution channel	Fraction of shipments %
DPPP Motor Manufacturer → Wholesaler → Contractor → End-User	25
DPPP Motor Manufacturer → Wholesaler → Retailer → End-User	25
DPPP Motor Manufacturer → Pool Pump Retailer → End-User	50

DOE developed baseline and incremental markups for each actor in the distribution chain. Baseline markups are applied to the price of equipment with baseline efficiency, while incremental markups are applied

[38] Series IDs: Integral motors (<=1 hp): WPU117304, Fractional motors (<1 hp): WPU117303, Environmental Controls: WPU1181; *www.bls.gov/ppi/.*

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.[39]

To estimate average baseline and incremental markups DOE relied on several sources including: (1) for pool wholesalers, SEC form 10–K from Pool Corp;[40] (2) for pool product retailers, SEC form 10–K from several major home improvement centers[41] and U.S. Census Bureau 2017 Annual Retail Trade Survey for the miscellaneous store retailers sector (NAICS 453),[42] (3) for pool contractors and pool builders, U.S. Census Bureau 2017 Economic Census data for the plumbing, heating and air-conditioning contractor sector (NAICS 238220) and all other specialty trade contractors sector (NAICS 238990),[43] (4) for motor wholesalers, U.S. Census Bureau 2017 Annual Wholesale Trade Survey for the household appliances and electrical and electronic goods merchant wholesaler sector (NAICS 4536),[44] (5) for electrical contractor, 2020 RSMeans Electrical Cost Data,[45] (6) for motor retailers, U.S. Census Bureau 2017 Annual Retail Trade Survey for the building material and garden equipment and supplies dealers (NAICS 444), and (7) for pool pump retailers, U.S. Census Bureau 2017 Annual Retail Trade Survey for the miscellaneous store retailers sector (NAICS 453).

In addition to the markups, DOE obtained state and local taxes from data provided by the Sales Tax Clearinghouse.[46] These data represent weighted average taxes that include county and city rates. DOE derived shipment-weighted average tax values for each region considered in the analysis.

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

DOE seeks comment on the distribution channels identified for DPPP motors and fraction of sales that go through each of these channels.

E. Energy Use Analysis

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

1. DPPP Motor Applications

The annual energy consumption of a pool pump motor is expressed in terms of electricity consumption and depends on the DPPP motor efficiency level, pool pumping requirement, on the performance of the DPPP incorporating the motor, and on the DPPP annual operating hours. This electricity consumption is identical to the annual electricity consumption of the DPPP incorporating the motor. The pool pump motor energy consumption value is the sum of the energy consumption values in each mode of operation. Each mode of operation corresponds to a motor speed setting. Single-speed motors only have one mode of operation, while dual and variable-speed pool pump motors operate at a low- and high-speed mode. The unit energy consumption values in each mode are calculated based on the DPPP usage, which is calculated based on the pool pump system curve that the DPPP is operating on, the pump flow rate of the mode, the pump energy factor of the mode (which in turn determine the motor input power)[47] and the annual run time of the pool pump spent in that mode. DOE calculated the pool pump annual run time based on the application (residential or commercial), the assumed pool size, the assumed number of turns per day, and the sample application's geographic location, which implies the corresponding pool seasons. A typical DPPP application, characterized by the DPPP equipment class and hydraulic horsepower (hhp), was associated to each representative unit in equipment classes 1, 2, and 3 based on inputs from the engineering analysis (See Table IV.2).

2. DPPP Motor Consumer Sample

DOE created individual consumer samples for five DPPP motor markets: (1) single-family homes with a swimming pool; (2) indoor swimming pools in commercial applications; (3) single-family community swimming pools; (4) multi-family community swimming pools; and (5) outdoor swimming pools in commercial applications. DOE used the samples to determine DPPP motor annual energy consumption as well as for conducting the LCC and PBP analyses.

DOE used the Energy Information Administration's (EIA) 2015 Residential Energy Consumption Survey (RECS 2015) to establish a sample of single-family homes that have a swimming pool.[48 49] For DPPPs used in indoor swimming pools in commercial applications, DOE developed a sample using the 2012 Commercial Building Energy Consumption Survey (CBECS 2012).[50] RECS and CBECS include information such as the household or building owner demographics and the location of the household or building.

Neither RECS nor CBECS provide data on community pools or outdoor swimming pools in commercial applications, so DOE created samples based on other available data. To develop samples for DPPPs in single or multi-family communities, DOE used a combination of RECS 2009,[51] U.S. Census 2009 American Home Survey

[39] 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.

[40] U.S. Securities and Exchange Commission. *SEC 10–K Reports* for Pool Corp (2010–2017). Available at *www.sec.gov/* (Last accessed July 26, 2021.)

[41] U.S. Securities and Exchange Commission. *SEC 10–K Reports* for Home Depot, Lowe's, Wal-Mart and Costco. Available at *www.sec.gov/* (Last accessed July 26, 2021.)

[42] U.S. Census Bureau, *2017 Annual Retail Trade Survey,* available at *www.census.gov/retail/index.html* (last accessed July 26, 2021).

[43] U.S. Census Bureau, *2017 Economic Census Data,* available at *www.census.gov/econ/* (last accessed July 26, 2021).

[44] U.S. Census Bureau, *2017 Annual Wholesale Trade Survey,* available at *www.census.gov/awts* (last accessed July 26, 2021).

[45] RSMeans Electrical Cost Data, available at *www.rsmeans.com* (last accessed July 26, 2021).

[46] Sales Tax Clearinghouse Inc., State Sales Tax Rates Along with Combined Average City and County Rates (2021), available at *https://thestc.com/STrates.stm* (last accessed Feb. 14, 2021).

[47] The motor input power is equal to the DPPP flow (gallon per minute) divided by the DPPP Energy Factor (gallon per Wh) and multiplied by 60 (number of minutes in an hour).

[48] U.S. Department of Energy—Energy Information Administration. *2009 RECS Survey Data.* (Last accessed July 27, 2016.) *www.eia.gov/consumption/residential/data/2009/.*

[49] U.S. Department of Energy—Energy Information Administration. *2015 RECS Survey Data.* (Last accessed September 11, 2018.) *www.eia.gov/consumption/residential/data/2015/.*

[50] U.S. Department of Energy—Energy Information Administration. 2012 CBECS Survey Data. (Last accessed: July 27, 2016.) *www.eia.gov/consumption/commercial/data/2012/index.cfm?view=microdata.*

[51] The earlier version of RECS was used for consistency with the year of the AHS survey available with pool ownership information.

Data (2009 AHS),[52] and 2015 PK Data report.[53] To develop a sample for pool pumps in outdoor commercial swimming pools, DOE used a combination of CBECS 2012 and 2015 PK Data report.

Table IV.7 shows the estimated shares of the five DPPP markets in the existing stock based on the afore-mentioned sources. The vast majority of DPPPs are used for residential single-family swimming pools.

TABLE IV.7—FRACTION OF DPPP MOTOR APPLICATION BY MARKET

Description	Fraction of DPPP motor stock (%)
Residential Single Family Swimming Pools	95.1
Community Pools (Single Family)	0.8
Community Pools (Multi Family)	0.4
Commercial Indoor Pools	0.3
Commercial Outdoor Swimming Pools	3.4

DPPPs can be installed with either above-ground or in-ground swimming pools. DOE established separate sets of consumer samples for in-ground pools and above-ground pools by adjusting the original sample weights using data on the number of installed in-ground and above-ground pools gathered during the January 2017 Direct Final Rule, which relied on 2014 data per state provided by APSP.[54] The consumer samples for DPPP motors used in self-priming and pressure cleaner booster pumps are drawn from the in-ground pool samples; the consumer samples for motors used with non-self-priming pool pumps are obtained from the above-ground pool samples.

See chapter 7 of the NOPR TSD for more details about the creation of the consumer samples and the regional breakdowns.

DOE seeks comment on the overall methodology to develop consumer samples and on the fraction of DPPP motor existing stock across the five following markets: (1) single-family homes with a swimming pool; (2) indoor swimming pools in commercial applications; (3) single-family community swimming pools; (4) multi-family community swimming pools; and (5) outdoor swimming pools in commercial applications.

3. Self-Priming and Non-Self-Priming Pool Pump Motor Input Power

The input power of DPPP motors used in self-priming and non-self-priming pump applications was calculated based on the flow rates (gallons per minute) and typical Energy Factor (gallons per watt hour) associated to each representative unit.[55] At efficiency levels corresponding to single-speed and dual-speed motors, the flow and Energy Factor values were based on input from the engineering analysis (see section IV.C) and provided for each system curve (A, B or C).[56] For each user of self-priming and non-self-priming pool pump in the consumer sample, DOE then specified the system curve used (A, B or C) by drawing from a probability distribution in which 35 percent of the pool pumps follow curve A, 10 percent of the pool pumps follow curve B, and the remaining 55 percent follow curve C. The probability distribution was based on inputs from the ASRAC DPPP Working Group gathered during the January 2017 Direct Final Rule.[57]

At efficiency levels corresponding to variable-speed motors, the engineering analysis only provided flow and Energy Factor values for the high-speed mode on each system curve. For the low-speed mode, DOE used data on pool volume and desired time per turnover from the January 2017 Direct Final Rule technical support document to calculate a consumer-specific low-speed flow.[58] These relied on inputs from stakeholders and several other references.[59 60 61] DOE then used the equation provided by the engineering analysis to calculate the Energy Factor as a function of Q for each representative unit on each system curve.

4. Pressure Cleaner Booster Pumps Motor Input Power

The input power of DPPP motors used in pressure cleaner booster pumps was calculated using the relationship between input power and flow and the system curve provided by the engineering analysis (see section IV.C). To characterize operating flow for each consumer in the sample, DOE drew a value from a statistical distribution of flow established during the January 2017 Direct Final Rule. This distribution was developed around the test procedure test point of 10 gpm of flow rate, as recommended by the ASRAC DPPP Working Group. (Docket EERE–2015–BT–STD–0008–0092 p. 311) For single-speed pressure cleaner booster pumps, DOE then calculated the input power using the power curve from the engineering analysis. For variable-speed motors used in pressure cleaner booster pumps, DOE also calculated the pool pump motor input power in a low-speed setting. Based on information from the January 2017 Direct Final Rule, DOE used a value of 10 gpm to characterize the low-speed flow and calculate the hydraulic horsepower using the system curve.[62] Then, DOE calculated the input power using the relationship between input power and flow as provided by the engineering analysis (see section IV.C).

5. Daily Operating Hours

DOE relied on information gathered during the January 2017 Direct Final Rule to develop estimates of pool pump daily operating hours. For self-priming and non-self-priming pool filter pumps in residential applications, operating hours are calculated uniquely for each consumer based on pool size, number of turnovers per day (itself based on ambient conditions), and the pump flow rate. In commercial applications, DOE assumed these pumps operate 24 hours per day. For pressure cleaner booster pumps, operating hours are drawn from a distribution which were based on the January 2017 Direct Final Rule.[63] Table IV.8 summarizes the resulting daily

[52] U.S. Census Bureau. 2009 AHS survey data (Last accessed: September 13, 2021.) *www.census.gov/programs-surveys/ahs/data/2009/ahs-2009-public-use-file--puf-/2009-ahs-national-puf-microdata.html.*

[53] PK Data. 2015 Swimming Pool and Pool Heater Customized Report for LBNL. (Last accessed: April 30, 2016.) *www.pkdata.com/annual-reports.html/.*

[54] For more details see chapter 7 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

[55] The motor input power is equal to the flow (gallon per minute) divided by the Energy Factor (gallon per Wh) and multiplied by 60 (number of minutes in an hour).

[56] When a pump is tested on a system curve (such as curve C), any one of the measurements hydraulic power, P (hp), volumetric flow, Q (gpm) and total dynamic head, H (feet of water) can be used to calculate the other two measurements.

[57] For more details see chapter 7 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

[58] Flow (in gallon per minute) is equal to the pool volume (gallon) divided by the desired time per turnover (in minutes).

[59] CEE Residential Swimming Pool Initiative, December 2021.

[60] California Energy Commission Pool Heater CASE. (Last Accessed: July 28, 2016) *https://efiling.energy.ca.gov/GetDocument.aspx?tn=71754&DocumentContentId=8285.*

[61] Evaluation of potential best management practices—Pools, Spas, and Fountains 2010. (Last Accessed: July 28, 2016) *https://calwep.org/wp-content/uploads/2021/03/Pools-Spas-and-Fountains-PBMP-2010.pdf.*

[62] For more details see chapter 7 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

[63] For more details see chapter 7 of the dedicated-purpose pool pumps direct final rule TSD, at */www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

operating hours during the pool operating season.

TABLE IV.8—WEIGHTED-AVERAGE DAILY OPERATING HOURS BY REPRESENTATIVE UNIT AND POOL PUMP APPLICATION

Equipment class	Representative unit	THP	Pool pump application *	Residential weighted average daily operating hours **	Commercial weighted average daily operating hours **
1	4	0.22	Non Self-priming Filter Pump, Extra-Small (0.09 hhp)	3.3	
2	1	0.75	Self-priming Filter Pump, Small-size (0.44 hhp)	9.6	
2	5	1	Non Self-priming Filter Pump, Small-size (0.52 hhp)	8.2	
2	7	1.125	Pressure Cleaner Booster Pump	2.5	2.5
3	6	1.5	Non Self-priming Filter Pump (0.87 hhp)	8.2	
3	2	1.65	Self-priming Filter Pump, Standard-size (0.95 hhp)	15.3	
3	2A	1.65	Self-priming Filter Pump, Small-size (0.65 hhp)	9.6	
3	3	3.45	Self-priming Filter Pump, Standard-size (1.88 hhp)	14.6	22.7

* For self-priming pumps, the terms small and standard refer to the hydraulic horsepower. Small-size designates pool pump applications with hydraulic horsepower less than 0.711 hhp, while standard-size designates pool pump applications with hydraulic horsepower greater than or equal to 0.711 hhp.

** During the pool operating season.

6. Annual Days of Operation

DOE calculated the annual unit energy consumption (UEC) by multiplying the daily operating hours by the annual days of operation, which depends on the number of months of pool operation. For each consumer sample, DOE assigned different annual days of operation depending on the region in which the DPPP is installed. Table IV.9 provides the assumptions of pool pump operating season based on geographical locations. This assignment was based on information collected during the January 2017 Direct Final Rule. It is based on several sources: DOE's Energy Saver website assumptions[64] and PK Data[65] that include average pool season length (*i.e.,* operating months) by state, along with discussion of the geographic distribution of pool operating days by the ASRAC DPPP Working Group. The ASRAC DPPP Working Group suggested that although some of the regions had warm weather, the pool pumps should still be operating all year long. (*See* Docket EERE–2015–BT–STD–0008–0094 pp. 191–193)

TABLE IV.9—POOL PUMP OPERATING SEASON BY GEOGRAPHICAL LOCATION

Location (states or census divisions)	Avg. months of pool use	Pool use months
CT, ME, NH, RI, VT	4	5/1–8/31
MA	4	5/1–8/31
NY	4	5/1–8/31
NJ	4	5/1–8/31
PA	4	5/1–8/31
IL	4	5/1–8/31
IN, OH	4	5/1–8/31
MI	4	5/1–8/31
WI	4	6/1–9/30
IA, MN, ND, SD	4	6/1–9/30
KS, NE	4	6/1–9/30
MO	4	6/1–9/30
VA	7	4/1–10/31
DE, DC, MD	5	5/1–9/30
GA	7	4/1–10/31
NC, SC	7	4/1–10/31
FL	12	1/1–12/31
AL, KY, MS	12	1/1–12/31
TN	12	1/1–12/31
AR, LA, OK	12	1/1–12/31
TX	12	1/1–12/31
CO	4	5/1–8/31
ID, MT, UT, WY	4	5/1–8/31
AZ	12	1/1–12/31
NV, NM	12	1/1–12/31
CA	12	1/1–12/31
OR, WA	3	6/1–8/31
AK	5	5/1–9/30
HI	12	1/1–12/31
WV	5	5/1–9/30

[64] DOE Energy Saver. (Last Accessed: April 26, 2016) *https://energy.gov/energysaver/articles/heat-pump-swimming-pool-heaters.*

[65] PK Data. 2015 Swimming Pool and Pool Heater Customized Report for LBNL. (Last accessed: April 16, 2016) *www.pkdata.com/annual-reports.html/.*

TABLE IV.9—POOL PUMP OPERATING SEASON BY GEOGRAPHICAL LOCATION—Continued

Location (states or census divisions)	Avg. months of pool use	Pool use months
New England	4	5/1–8/31
Middle Atlantic	5	5/1–9/30
East North Central	5	5/1–9/30
West North Central	4	6/1–9/30
South Atlantic	12	1/1–12/31
East South Central	12	1/1–12/31
West South Central	12	1/1–12/31
Mountain	4	5/1–8/31
Pacific	12	1/1–12/31

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

DOE seeks comment on the overall methodology and inputs used to estimate DPPP motor energy use. Specifically, DOE seeks feedback on the average daily operating hours and annual days of operation used in the energy use analysis.

F. 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 DPPP motors. The effect of new energy conservation standards on individual consumers usually involves 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 equipment over the life of that equipment, 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 equipment 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 DPPP motors 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 equipment class, DOE calculated the LCC and PBP for a nationally representative set of consumers. As stated previously, DOE considered five DPPP motor markets: (1) single-family homes with a swimming pool; (2) indoor swimming pools in commercial applications; (3) single-family community swimming pools; (4) multi-family community swimming pools; and (5) outdoor swimming pools in commercial applications. As described in section IV.E.2, DOE developed consumer samples from various data sources including 2009 RECS, 2009 AHS, 2015 RECS and 2012 CBECS. For each consumer in the sample, DOE determined the energy consumption for the DPPP motor and the appropriate energy price. By developing a representative sample of consumers, the analysis captured the variability in energy consumption and energy prices associated with the use of DPPP motors.

Inputs to the calculation of total installed cost include the cost of the product—which includes MSPs, 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 equipment 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 DPPP motor user samples. For this rulemaking, the Monte Carlo approach is implemented in MS Excel together with the Crystal Ball™ add-on.[66] The model calculated the LCC and PBP for equipment at each efficiency level for 10,000 consumers 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, equipment efficiency is chosen based on its probability. If the chosen equipment 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 equipment, DOE avoids overstating the potential benefits from increasing equipment efficiency.

DOE calculated the LCC and PBP for all consumers of DPPP motors as if each were to purchase a new equipment in the expected first full year of required compliance with new standards. New standards would apply to DPPP motor manufactured 2 years after the date on which any new or amended standard is published.[67] At this time, DOE estimates publication of a final rule in the second half of 2023. Therefore, for purposes of its analysis, DOE used 2026 as the first full year of compliance with any amended standards for DPPP motors.

Table IV.10 summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The

[66] Crystal Ball™ is commercially-available software tool to facilitate the creation of these types of models by generating probability distributions and summarizing results within Excel, available at *www.oracle.com/technetwork/middleware/crystalball/overview/index.html* (last accessed July 6, 2021).

[67] In the Electric Motors Final Rule, DOE was informed by the statutorily mandated rulemaking schedule (see 42 U.S.C. 6313(b)) in providing a two-year lead time between the finalized rule and required compliance. 79 FR 30934, 30944 (May 29, 2014). For the purposes of this analysis, DOE is following the same 2-year lead time.

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.

TABLE IV.10—SUMMARY OF INPUTS AND METHODS FOR THE LCC AND PBP ANALYSIS *

Inputs	Source/method
Equipment Cost	Derived by multiplying MSPs by distribution channel markups and sales tax, as appropriate. Used historical data to derive a price index to project equipment costs.
Installation Costs	Baseline installation cost determined using data from manufacturer gathered during the January 2017 Direct Final Rule.
Annual Energy Use	The daily energy consumption multiplied by the number of operating days per year. *Variability:* Based on the 2009 RECS, 2009 AHS, 2015 RECS and 2012 CBECS and other data sources.
Energy Prices	*Electricity:* Based on EEI data for 2020. *Variability:* Regional energy prices determined for 9 census divisions for pool pump motors in individual single-family homes and 9 census divisions for pool pump motors in community and commercial pool pump motors. Average and marginal prices used for electricity.
Energy Price Trends	Based on *AEO2021* price projections.
Repair and Maintenance Costs	Assumed no repair or maintenance on pool pump motors.
Equipment Lifetime	*Average:* 3.6 to 5 years depending on the DPPP applications. *Variability:* Based on Weibull distribution.
Discount Rates	*Residential:* 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. *Commercial:* Calculated as the weighted average cost of capital for entities purchasing pool pumps. Primary data source was Damodaran Online.
Compliance Date	2026 (first full year).

* 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. Equipment Cost

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

To project an equipment price trend, DOE derived an inflation-adjusted index of the Producer Price Index (PPI) for integral and fractional horsepower motors and generators manufacturing over the period 1967–2020.[68] For fractional horsepower motors, the data shows a slightly downward trend before early 2000s, and then the price index increases to a small degree. For integral horsepower motors, the trend is mostly flat before early 2000s, and then the price index increases slightly. The trend is found to align with the copper and steel deflated price indices to some extent, as they are the major material used in small electric motors. Given the degree of uncertainty, DOE decided to use a constant price assumption as the default price factor index to project future DPPP motor prices. For dual-speed DPPP motors, however, DOE assumed that the timer control portion of the installation cost would be affected by price learning. DOE used PPI data on ''Automatic environmental control manufacturing'' between 1980 and 2020 to estimate the historic price trend of the electronic components in the timer control.[69] The regression performed as an exponential trend line fit results in an R-square of 0.86, with an annual price decline rate of 0.4 percent. For variable-speed DPPP motors, DOE assumed that the controls portion of the DPPP motor would be affected by price learning. Similarly, DOE used PPI data on ''Semiconductors and related device manufacturing'' between 1967 and 2020 to estimate the historic price trend of electronic components in the control.[70] The regression performed as an exponential trend line fit results in an R-square of 0.99, with an annual price decline rate of 6 percent.

DOE seeks comment on the approach and inputs used to project an equipment price trend for DPPP motors.

2. Installation Cost

Installation cost includes labor, overhead, and any miscellaneous materials and parts needed to install the equipment. During the January 2017 Direct Final Rule, DOE simplified the calculation and only accounted for the difference of installation cost by efficiency levels. For two-speed pumps, DOE included the cost of a timer control and its installation where applicable, as recommended by the ASRAC DPPP Working Group. During the January 2017 Direct Final Rule, DOE used information obtained in the manufacturer interviews to calculate the supplemental installation labor costs for two-speed and variable-speed pumps.[71] DOE retained the same estimates for this NOPR as applied to two-speed and variable speed DPPP motors.[72]

DOE seeks comment on installation costs estimates used in the LCC analysis.

3. Annual Energy Consumption

For each sampled installation, DOE determined the energy consumption for a DPPP motor at different efficiency levels using the approach described in section IV.E 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, it 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 DPPP motor purchased in the no-new-standards case, and marginal electricity prices for the incremental

[68] Series ID PCU 3353123353121; *www.bls.gov/ppi/*.

[69] Automatic environmental control manufacturing PPI series ID: PCU334512334512; *www.bls.gov/ppi/*.

[70] Semiconductors and related device manufacturing PPI series ID: PCU334413334413; *www.bls.gov/ppi/*.

[71] For more details see chapter 8 of the dedicated-purpose pool pumps direct final rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105*.

[72] Adjusted to $2020 and compliance year.

change in energy use associated with the other efficiency levels considered.

DOE derived electricity prices in 2020 using data from EEI Typical Bills and Average Rates reports. Based upon comprehensive, industry-wide surveys, this semi-annual report presents typical monthly electric bills and average kilowatt-hour costs to the customer as charged by investor-owned utilities. For the residential sector, DOE calculated electricity prices using the methodology described in Coughlin and Beraki (2018).[73] For the commercial sector, DOE calculated electricity prices using the methodology described in Coughlin and Beraki (2019).[74]

DOE's methodology allows electricity prices to vary by sector, region and season. In the analysis, variability in electricity prices is chosen to be consistent with the way the consumer economic and energy use characteristics are defined in the LCC analysis. For DPPP motors, regional weighted-average values for both average and marginal prices were calculated for the nine census divisions. Each EEI utility in a region was assigned a weight based on the number of consumers it serves. Consumer counts were taken from the most recent EIA's Form EAI–861 data (2020).

To estimate energy prices in future years, DOE multiplied the 2020 average regional energy prices by a projection of annual change in national-average residential and commercial energy price in *AEO 2021,* which has an end year of 2050.[75] To estimate price trends after 2050, DOE used the average annual rate of change in prices from 2040 through 2050.

See chapter 8 of the NOPR TSD for details.

5. Maintenance and Repair Costs

Repair costs are associated with repairing or replacing components that have failed in an equipment; maintenance costs are associated with maintaining the operation of the equipment. Typically, small incremental increases in equipment efficiency produce no, or only minor, changes in repair and maintenance costs compared to baseline efficiency equipment. DOE assumed that for maintenance costs, there is no change with efficiency level, and therefore DOE did not include those costs in the model. In addition, DPPP motors are not repaired and DOE assumed no repair costs.

DOE seeks comment on its decision to not include DPPP motor repair and maintenance costs in the LCC analysis.

6. Equipment Lifetime

For DPPP motors used in residential applications, DOE calculated lifetime estimates using DPPP lifetime data and rates of repair from the January 2017 Direct Final Rule, which estimated that motor replacement occurs at the halfway point in a pump's lifetime, but only for those DPPPs whose lifetime exceeds the average lifetime for the relevant equipment class.[76] The data allowed DOE to develop a survival function, which provides a distribution of lifetime ranging from a minimum of 1 year based on warranty covered period, to a maximum of 10 years, with a mean value of 5 years for self-priming pumps, to a maximum of 8 years, with a mean value of 3.6 years for non-self-priming and pressure cleaner booster pumps. These values are applicable to DPPP motors in residential applications. For commercial applications, DOE adjusted the lifetimes to account for the higher operating hours compared to residential applications, resulting in a reduced average lifetime of 3.2 years for self-priming pumps and 3.5 years for pressure cleaner booster pumps. The resulting shipments-weighted average lifetime across all DPPP motor equipment classes is 4.5 years.

DOE seeks comment on the approach and inputs used to develop DPPP motor lifetime estimates.

7. Discount Rates

In the calculation of LCC, DOE applies discount rates appropriate to consumers to estimate the present value of future operating cost savings. DOE estimated a distribution of discount rates for DPPP motors based on the opportunity cost of consumer funds.

DOE applies weighted average discount rates calculated from consumer debt and asset data, rather than marginal or implicit discount rates.[77] The LCC analysis estimates net present value over the lifetime of the equipment, 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 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 [78] (''SCF'') for 1995, 1998, 2001, 2004, 2007, 2010, 2013 and 2016. 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 4.3 percent.

DOE applies weighted average discount rates calculated from consumer debt and asset data, rather than marginal or implicit discount rates.[79] DOE notes

[73] Coughlin, K. and B. Beraki. 2018. Residential Electricity Prices: A Review of Data Sources and Estimation Methods. Lawrence Berkeley National Lab. Berkeley, CA. Report No. LBNL–2001169. *https://ees.lbl.gov/publications/residential-electricity-prices-review.*

[74] Coughlin, K. and B. Beraki. 2019. Non-residential Electricity Prices: A Review of Data Sources and Estimation Methods. Lawrence Berkeley National Lab. Berkeley, CA. Report No. LBNL–2001203. *https://ees.lbl.gov/publications/non-residential-electricity-prices.*

[75] U.S. Department of Energy—Energy Information Administration. *Annual Energy Outlook 2021 with Projections to 2050.* Washington, DC. Available at *www.eia.gov/forecasts/aeo/.*

[76] For DPPPs that do not include a repair, the DPPP motor lifetime is equal to the DPPP lifetime. For DPPPs that are repaired, the DPPP motor lifetime is equal to half of the DPPP lifetime. *See* chapter 8 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

[77] 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.

[78] U.S. Board of Governors of the Federal Reserve System. *Survey of Consumer Finances.* 1995, 1998, 2001, 2004, 2007, 2010, 2013, and 2016. (Last accessed August 8, 2019) *www.federalreserve.gov/econresdata/scf/scfindex.htm.*

[79] The implicit discount rate is inferred from a consumer purchase decision between two otherwise

that the LCC does not analyze the appliance purchase decision, so the implicit discount rate is not relevant in this model. The LCC 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, 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 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 commercial discount rates for the small fraction of applications where businesses purchase and use DPPP motors, DOE estimated the weighted-average cost of capital using data from Damodaran Online.[80] The weighted-average cost of capital is commonly used to estimate the present value of cash flows to be derived from a typical company project or investment. Most companies use both debt and equity capital to fund investments, so their cost of capital is the weighted average of the cost to the firm of equity and debt financing. DOE estimated the cost of equity using the capital asset pricing model, which assumes that the cost of equity for a particular company is proportional to the systematic risk faced by that company. The average commercial discount rate is 9.8 percent.

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 equipment efficiencies under the no-new-standards case (*i.e.,* the case without amended or new energy conservation standards).

To estimate the efficiency distribution of DPPP motors for 2026, DOE first established efficiency distributions in 2021. Then, as it was done in the January 2017 Direct Final Rule, DOE projected the 2026 efficiency distribution by assuming a one percent market shift from EL0–EL2 (single-speed DPPP motors) to EL 6 (variable speed DPPP motors) where applicable.

To establish the efficiency distributions of DPPP motors in 2021, DOE considered two market segments: (1) DPPP motors incorporated in DPPPs and; (2) replacement DPPP motors sold alone.

For DPPP motors incorporated in DPPPs, DOE relied on the 2021 DPPP Database that included a total of 345 models of DPPPs with weighted-energy factor (''WEF'') ratings and on the ELs developed in the January 2017 Direct Final Rule, to establish the 2021 efficiency distributions of DPPPs. DOE also used the scenario of roll-up market response to the DPPP standards as presented in the January 2017 Direct Final Rule. DOE then assumed that the distributions of DPPP motors incorporated in DPPPs would be equivalent to the 2021 efficiency distributions of DPPPs, based on the equivalent structure of the ELs used in this NOPR and in the January 2017 Direct Final Rule (*See* section III.C.1). For representative units 4 (*i.e.,* DPPP motors used in non-self-priming pumps, extra small) and 7 (*i.e.,* DPPP motors used in pressure cleaner booster pumps), the 2021 DPPP Database did not include any information specific to these DPPPs. Instead, for these representative units, DOE relied on the efficiency distributions provided in the January 2017 Direct Final Rule and applied a scenario of roll-up market response to the upcoming DPPP standards.

For replacement DPPP motors sold alone, for the U.S., not including California[81], the DPPP standards would have no impact on the DPPP motor efficiency distributions. Therefore, to establish the efficiency distributions of replacement DPPP motors sold alone, DOE relied on the 2021 no-new-standards case efficiency distributions provided in the January 2017 Direct Final Rule, which reflect efficiency distributions prior to the compliance date of the DPPP standards. DOE then assumed that the efficiency distributions of replacement DPPP motors sold alone would be equivalent to the efficiency distributions of DPPPs, based on the equivalent structure of the ELs used in this NOPR and in the January 2017 Direct Final Rule. For California, DOE applied a scenario of roll-up market response to the upcoming California replacement DPPP motor standards.[82] DOE then relied on the market shares of replacement DPPP motor sold in California[83] and in the rest of the United-States to establish the nation-wide 2021 replacement DPPP motor efficiency distributions.

The projected 2026 market shares by EL for the no-new-standards case for DPPP motors are shown in Table IV.11 by market segment. See chapter 8 of the NOPR TSD for further information on the derivation of the efficiency distributions.

TABLE IV.11—DPPP MOTORS INCORPORATED IN DPPPS 2026 NO-NEW STANDARDS CASE EFFICIENCY DISTRIBUTIONS

Equipment class	Rep. Unit	THP	DPPP application	EL0 (%)	EL1 (%)	EL2 (%)	EL3 (%)	EL4 (%)	EL5 (%)	EL6 (%)
Extra-small-size	4	0.22	Non Self-priming Filter Pump, Extra-Small (0.09 hhp).	0	67	33	....	....	....	....
Small-size	1	0.75	Self-priming Filter Pump, Small-size (0.44 hhp)	0	0	29	1	1	2	66
Small-size	5	1	Non Self-priming Filter Pump, Small-size (0.52 hhp).	0	2	47	0	5	4	41
Small-size	*7	1.125	Pressure Cleaner Booster Pump	0	79	10	....	....	....	11

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.

[80] Damodaran Online, *Data Page: Costs of Capital by Industry Sector* (2020). (Last accessed February 1, 2021) *https://pages.stern.nyu.edu/~adamodar/*.

[81] DOE considered California separately in light of the July 2021 California standards for replacement DPPP motors adopted April 7, 2020 with an effective date July 19, 2021. See Docket #19–AAER–02 at *www.energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20/appliance-efficiency-proceedings-2.*

[82] For the purposes of this analysis, DOE considered EL1 (for motors below 0.5 THP) and EL6 (for motors above 0.5 THP) as equivalent levels to the California standards.

[83] California Energy Commission, Final Analysis of Efficiency Standards for Replacement Dedicated-Purpose Pool Pump Motors, February 20, 2020. Docket 9–AAER–02 *https://efiling.energy.ca.gov/GetDocument.aspx?tn=232151* (last accessed August 2021).

TABLE IV.11—DPPP MOTORS INCORPORATED IN DPPPS 2026 NO-NEW STANDARDS CASE EFFICIENCY DISTRIBUTIONS—Continued

Equipment class	Rep. Unit	THP	DPPP application	EL0 (%)	EL1 (%)	EL2 (%)	EL3 (%)	EL4 (%)	EL5 (%)	EL6 (%)
Standard-size	6	1.5	Non Self-priming Filter Pump (0.87 hhp)	0	2	47	0	5	4	41
Standard-size	2	1.65	Self-priming Filter Pump, Standard-size (0.95 hhp)	0	0	0	0	0	0	100
Standard-size	2A	1.65	Self-priming Filter Pump, Small-size (0.65 hhp)	0	0	29	1	1	2	66
Standard-size	3	3.45	Self-priming Filter Pump, Standard-size (1.88 hhp)	0	0	0	0	0	0	100

*For Pressure cleaner booster pumps EL3, EL4, and EL5 are equivalent to EL6.

TABLE IV.12—REPLACEMENTS DPPP MOTORS SOLD ALONE 2026 NO-NEW STANDARDS CASE EFFICIENCY DISTRIBUTIONS

Equipment Class	Rep. unit	THP	DPPP Application	EL0 (%)	EL1 (%)	EL2 (%)	EL3 (%)	EL4 (%)	EL5 (%)	EL6 (%)
Extra-small-size	4	0.22	Non Self-priming Filter Pump, Extra-Small (0.09 hhp).	29	38	33	....	....	....	....
Small-size	1	0.75	Self-priming Filter Pump, Small-size (0.44 hhp)	27	9	7	1	1	1	52
Small-size	5	1	Non Self-priming Filter Pump, Small-size (0.52 hhp).	23	23	28	2	1	1	23
Small-size	*7	1.125	Pressure Cleaner Booster Pump	8	50	7	....	....	....	35
Standard-size	6	1.5	Non Self-priming Filter Pump (0.87 hhp)	23	23	28	2	1	1	23
Standard-size	2	1.65	Self-priming Filter Pump, Standard-size (0.95 hhp)	27	9	7	1	1	1	52
Standard-size	2A	1.65	Self-priming Filter Pump, Small-size (0.65 hhp)	27	9	7	1	1	1	52
Standard-size	3	3.45	Self-priming Filter Pump, Standard-size (1.88 hhp)	27	9	7	1	1	1	52

*For Pressure cleaner booster pumps EL3, EL4, and EL5 are equivalent to EL6.

DOE seeks comment on the approach and inputs used to develop no-new standards case efficiency distributions in 2021. DOE seeks feedback on the approach used to project no-new standards case efficiency distributions in future years.

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 equipment, compared to baseline equipment, through energy cost savings. Payback periods are expressed in years. Payback periods that exceed the life of the equipment 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 equipment 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 an equipment 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 new standards would be required.

G. Shipments Analysis

DOE uses projections of annual equipment shipments to calculate the national impacts of potential new energy conservation standards on energy use, NPV, and future manufacturer cash flows.[84] The shipments model takes an accounting approach, tracking market shares of each equipment class and the vintage of units in the stock. Stock accounting uses equipment shipments as inputs to estimate the age distribution of in-service equipment stocks for all years. The age distribution of in-service equipment 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.

1. Base-Year Shipments

DOE estimated motor shipments by DPPP application and considered two pump pool motor market segments: (1) DPPP motors incorporated in DPPPs and; (2) replacement DPPP motors sold alone. For DPPP motors incorporated in DPPPs, DOE used the 2015 shipments of DPPPs by DPPP application from January 2017 Direct Final Rule, which were based on manufacturer interviews. For replacement DPPP motors sold alone, DOE used estimates of historical shipments of DPPPs for the period 2007–2014 and estimates of repair frequency as provided by ASRAC DPPP Working Group during the January 2017 Direct Final Rule to calculate the resulting number of failing DPPP motors each year, and corresponding replacement DPPP motor shipments by DPPP application.[85] DOE also used 2018 confidential DPPP motor shipments data and information from the 2021 DPPP database to estimate market shares of motor shipments by total horsepower and distribute DPPP motor shipments by representative unit. Table IV.13 provides the breakdown of DPPP motor shipments by market segment and representative unit.

[84] 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.

[85] DOE relied on a repair frequency of 40 percent as provided in the January 2017 Direct Final Rule. At the end-of-life of a motor, the motor is replaced (*i.e.,* pump repair) 40 percent of the time, and in the remaining 60 percent of the time, the pump is replaced by a new pump. For more details see chapter 9 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

TABLE IV.13—2021 SHIPMENTS OF DPPP MOTORS BY MARKET SEGMENT AND REPRESENTATIVE UNIT

Equipment class	Rep. unit*	THP	DPPP category	Represented THP range within the DPPP category	DPPP motors incorporated in pumps (thousand units)	Replacement DPPP motors sold alone (thousand units)
Small-size	1	0.75	Small Size Self-priming Filter Pump.	0.5 ≤ THP < 1.15	140.6	45.1
Standard-size	2A	1.65		1.15 ≤ THP ≤ 5	98.4	31.6
Standard-size	2	1.65	Standard Size Self-priming Filter Pump.	1.15 ≤ THP < 1.7	157.1	149.8
Standard-size	3	3.45		1.7 ≤ THP ≤ 5	246.1	234.6
Extra-small-size	4	0.22	Non Self-priming Filter Pump.	< 0.5	47.4	16.2
Small-size	5	1		0.5 ≤ THP < 1.15	279.9	95.5
Standard-size	6	1.5		1.15 ≤ THP ≤ 5	120.0	40.9
Small-size	7	1.125	Pressure Cleaner Booster Pump.	0.5 ≤ THP < 1.15	139.6	51.9

*Representative unit.

DOE seeks comment on the approach and inputs used to develop base year shipments and for DPPP motors.

2. No-New-Standards Case Shipment Projections

DOE projected shipments of DPPP motors incorporated in DPPPs and shipments of replacement DPPP motors sold alone separately.

In the no-new-standards case, DOE assumed the total shipments of DPPP motors incorporated in DPPPs was equal to the total shipments of DPPPs as projected in the January 2017 Direct Final Rule, at the trial standard level corresponding to the DPPP energy conservation standard.[86]

In the no-new-standards case, for replacement DPPP motors sold alone, DOE used the projected shipments of DPPPs and estimates of repair frequency to calculate the resulting number of failing motors each year and corresponding motor replacement sales. For replacement motors sold alone outside of California, DOE relied on repair frequency rates as provided in the January 2017 Direct Final Rule. For standard-size self-priming pump motors sold before 2021 and at efficiency levels below the DPPP standards, DOE assumed that the repair frequency would increase from 40 percent to 60 percent to calculate corresponding replacement DPPP motors sales.[87] For other categories of DPPPs, DOE relied on a 40 percent repair frequency as provided in January 2017 Direct Final Rule. These repair-replace rates were based on inputs from the ASRAC DPPP Working Group during the January 2017 Direct Final Rule. For replacement motors sold alone in California, DOE projects that with the California efficiency standards for replacement DPPP,[88] the repair frequency of standard-size self-priming pump motors will remain at its pre-2021 rate of 40 percent as estimated in the January 2017 Direct Final Rule rather than increasing to 60 percent due to the smaller price difference between replacing the entire pump and replacing the motor only.

DOE seeks comment on the approach and inputs used to develop no-new standards case shipments projections.

3. Standards-Case Shipment Projections

The standards-case shipments projections account for the effects of potential standards on shipments.

In the standards-cases for which the DPPP motor efficiency level are set below the level equivalent to the standard-size self-priming DPPP standards, DOE assumed the increase in repair frequency (*i.e.,* 60 percent) of standard-size self-priming pool pumps, which was accounted for in the no-new-standards case, was maintained for all U.S. except California (*i.e.* TSLs 1 to 5 as described in section V.A). In California, due to the California efficiency standards for replacement DPPP motors,[89] DOE estimated that the repair frequency of standard-size self-priming pump motors in California would remain at its pre-2021 rate of 40 percent in the standards-case, (same as in the no-new-standards case) because the California standards are at or above the levels equivalent to the DPPP standards at 10 CFR 431.465(f) for all equipment classes.

Outside of California, in the standards-cases for which the DPPP motor efficiency level of are set at or above the level equivalent to the standard-size self-priming DPPP standard, DOE assumed the increase in repair for standard-size self-priming pumps would no longer occur starting from the compliance year due to the smaller price difference between replacing the entire pump and replacing the motor only. Under these scenarios, DOE assumed the pumps were repaired 40 percent of the time, and new pumps were purchased 60 percent of the time to replace failed pumps (*i.e.* TSLs 6 to 8 as described in section V.A of this document).

In addition, DOE accounted for potential downsizing that could occur as a result of setting different efficiency levels that by equipment classes and THP. Specifically, DOE assumed that DPPP manufacturers may not want to incorporate variable-speed motors in DPPPs where the DPPP energy conservation standard level does not require the use of a variable speed motor. Therefore, at TSLs requiring a variable-speed motor for certain equipment classes with larger THP (*i.e.,* TSL 8, 7, 6. *See* section V.A), DOE

[86] These were calculated based on input from the ASRAC DPPP Working Group and using a repair-replace model, and accounted for price elasticity of demand. A price elasticity of −0.02 was used for standard-size self-priming pool pumps. For more details see chapter 9 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

[87] In the January 2017 Direct Final Rule, DOE assumed that users of standard-size self-priming pool pumps purchased before compliance year of the DPPP standards (*i.e.,* 2021), at efficiency levels below the upcoming DPPP standards, would seek to increase their pump's lifetime by performing an additional repair (*i.e.,* cheaper motor replacement with a non-variable speed motor), rather than replacing the entire pump with a more efficient and variable speed DPPP (due to the DPPP energy conversation standards at 10 CFR 431.465(f) which correspond to a variable-speed efficiency levels for these DPPPs). In the January 2017 Direct Final Rule, DOE therefore increased the repair frequency of these DPPPs from 40 percent to 60 percent. For more details see chapter 9 of the dedicated-purpose pool pumps January 2017 Direct Final Rule TSD, at *www.regulations.gov/document?D=EERE-2015-BT-STD-0008-0105.*

[88] Adopted April 7, 2020 with an effective date July 19, 2021. See Docket #19–AAER–02 at *www.energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20/appliance-efficiency-proceedings-2.*

[89] Adopted April 7, 2020 with an effective date July 19, 2021. *See* Docket #19–AAER–02 at *www.energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20/appliance-efficiency-proceedings-2.*

assumed that DPPP manufacturers might decide to use motors with smaller THP for DPPPs that were not required to comply with a DPPP standard level corresponding to a variable speed motor efficiency level.[90]

DOE analyzed DPPP motor THP size as a function of DPPP hydraulic horsepower in the 2021 DPPP database to estimate where such downsizing may occur. For TSL 8 and 7, DOE did not identify any possible downsizing from small-size DPPP motors to extra-small size DPPP motors. Furthermore, at TSL 8 and 7, small-size and standard-size DPPP motors are both set at EL6. Therefore, DOE did not consider any downsizing at these TSLs. At TSL 6, based on a review of the 2021 DPPP database, DOE identified representative unit 2A [91] as a candidate for downsizing.[92] Therefore at TSL 6, DOE assumed that the majority of shipments of standard-size DPPP motors used in small-size self-priming pool pumps (80 percent) would downsize to small-size DPPP motors. For standard-size DPPP motors used in standard size non-self priming pumps (*i.e.,* representative unit 5), DOE did not identify DPPP models with oversized DPPP motors in its 2021 DPPP database and did not assume any downsizing.[93]

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

DOE seeks comment on the approach and inputs used to develop the different standards case shipments projections. Specifically, at TSL 6. DOE requests information and feedback on the estimated fraction of standard-size DPPP motors used in small self-priming pool filter pumps and in non-self-priming pool filter pumps that will downsize to small-size DPPP motors.

H. National Impact Analysis

The NIA assesses the national energy savings (''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.[94] (''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 DPPP motors sold from 2026 through 2055.

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 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.14 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.14—SUMMARY OF INPUTS AND METHODS FOR THE NATIONAL IMPACT ANALYSIS

Inputs	Method
Shipments	Annual shipments from shipments model.
Compliance Date of Standard	2026.
Efficiency Trends	No-new-standards case: Standards cases:
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 a component-based 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	*AEO2021* projections to 2050 and extrapolation thereafter.
Energy Site-to-Primary and FFC Conversion	A time-series conversion factor based on *AEO 2021*.
Discount Rate	3 percent and 7 percent.
Present Year	2021.

1. Equipment 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.F.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 equipment classes for the first full year of anticipated compliance with an amended or new standard. To project the trend in efficiency absent amended standards for DPPP motors over the entire shipments projection period, DOE relied on the same approach described in section IV.F.8

[90] The DPPP energy conservations standards at 10 CFR 431.465(f) were set based on efficiency levels that correspond to variable speed motor DPPPs for standard size self-priming pumps. The energy conservations standards for other DPPP categories were set based on efficiency levels that correspond to single speed motor DPPPs.

[91] Representative unit 2A represents standard-size DPPP motors (*i.e.,* at or above 1.15THP) used in small-size self-priming pool filter pumps.

[92] DOE found that all DPPP models with standard-size DPPP motors in the database had a hydraulic horsepower less or equal to the hydraulic horsepower of DPPP models with small-size DPPP motors.

[93] The majority of non-self priming pool filter pump models with standards-size DPPP motors had a hydraulic horsepower greater than non-self priming pool filter pump models with small-size DPPP motors.

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

and shifted 1 percent per year of the market share in the single-speed levels to the variable-speed efficiency levels. 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 (2026). 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.

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 *AEO2021.* 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 find any data on the rebound effect specific to DPPP motors and did not apply a rebound effect.

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 [95] 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 and 13A 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 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.F.1 of this document, DOE developed equipment price trends based on historical PPI data. DOE applied the same trends to project prices for each equipment class at each considered efficiency level. By 2055, which is the end date of the projection period, the average DPPP motor price is projected to drop between 0 to 51 percent depending on the efficiency level relative to 2026. DOE's projection of product prices is described in appendix 10C of the NOPR TSD.

To evaluate the effect of uncertainty regarding the price trend estimates, DOE investigated the impact of different equipment price projections on the consumer NPV for the considered TSLs for DPPP motors. In addition to the default price trend, DOE considered two equipment price sensitivity cases: (1) a high price decline case and (2) a low price decline case based on historical PPI data. The derivation of these price trends and the results of these sensitivity cases are 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 *AEO2021,* which has an end year of 2050. To estimate price trends after 2050, DOE used the average annual rate of change in prices from 2020 through 2050. As part of the NIA, DOE also analyzed scenarios that used inputs from variants of the *AEO2021* Reference case that have lower and higher economic growth. Those cases have lower and higher energy price trends compared to the Reference case. NIA results based on these cases are presented in appendix 10C of the NOPR TSD.

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

I. 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

[95] For more information on NEMS, refer to *The National Energy Modeling System: An Overview 2009,* DOE/EIA–0581(2009), October 2009. Available at *www.eia.gov/analysis/pdfpages/0581(2009)index.php* (last accessed September 2, 2021).

[96] United States Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. Section E. Available at *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed September 23, 2021).

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:[97] senior-only households. The analysis used subsets of the RECS 2015 sample composed of households that meet the criteria for the subgroup. DOE used the LCC and PBP spreadsheet model to estimate the impacts of the considered efficiency levels on this subgroup. Chapter 11 in the NOPR TSD describes the consumer subgroup analysis.

J. Manufacturer Impact Analysis

1. Overview

DOE performed an MIA to estimate the financial impacts of amended energy conservation standards on manufacturers of DPPP motors 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, and impacts on manufacturer subgroups. The complete MIA is outlined in chapter 12 of the NOPR TSD.

DOE conducted the MIA for this proposed rulemaking in three phases. In Phase 1 of the MIA, DOE prepared a profile of the DPPP motors manufacturing industry based on the market and technology assessment, preliminary manufacturer interviews, and publicly-available information. This included a top-down analysis of DPPP motors 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 DPPP motors manufacturing industry, including company filings of form 10–K from the SEC,[98] corporate annual reports, the U.S. Census Bureau's *Economic Census,*[99] and reports from D&B Hoovers.[100]

In Phase 2 of the MIA, DOE prepared a framework industry cash-flow analysis to quantify the potential impacts of 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 addition, during Phase 2, DOE developed interview guides to distribute to manufacturers of DPPP motors in order to develop other key GRIM inputs, including product and capital conversion costs, and to gather additional information on the anticipated effects of energy conservation standards on revenues, direct employment, capital assets, industry competitiveness, and subgroup impacts.

In Phase 3 of the MIA, DOE conducted structured, detailed interviews with representative manufacturers. During these interviews, DOE discussed engineering, manufacturing, procurement, and financial topics to validate assumptions used in the GRIM and to identify key issues or concerns. See section IV.J.3 of this document for a description of the key issues raised by manufacturers during the interviews. As part of Phase 3, DOE also evaluated subgroups of manufacturers that may be disproportionately impacted by amended standards or that may not be accurately represented by the average cost assumptions used to develop the industry cash flow analysis. Such manufacturer subgroups may include small business manufacturers, low-volume manufacturers, 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, ''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 spreadsheet uses the inputs to arrive at a series of annual cash flows, beginning in 2021 (the reference year of the analysis) and continuing to 2055. DOE calculated INPVs by summing the stream of annual discounted cash flows during this period. For manufacturers of residential central air conditioners and heat pumps, DOE used a real discount rate of 7.2 percent, which was derived from industry financials and then modified according to feedback received during manufacturer interviews.

[97] DOE did not evaluate low-income consumer subgroup impacts because the sample size of the subgroup is too small for meaningful analysis.

[98] *See www.sec.gov/edgar.shtml.*

[99] *See www.census.gov/programs-surveys/asm/data.html.*

[100] *See https://app.dnbhoovers.com.*

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 number of sources, including publicly available data, results of the engineering analysis, and information gathered from industry stakeholders during the course of manufacturer interviews and subsequent Working Group meetings. 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.

DOE used data from the January 2017 Direct Final Rule to determine the MSP of DPPP motors. Specifically, DOE used Table 5.7.1 of the January 2017 Direct Final Rule TSD, which estimated the MSPs of DPPP motors used in the analysis.[101] DOE adjusted the MSPs used in the January 2017 Direct Final Rule from 2015$ into 2020$. DOE also conducted physical teardowns to determine updated DPPP motor controller costs for variable-speed motors. However, DOE did not include these costs in the MIA as the motor controller costs are typically manufactured by the DPPP manufacturers not by the DPPP motor manufacturers. The MPCs and MSPs used in this MIA only account for the DPPP motors covered by this proposed rulemaking.

For a complete description of the MPCs, see 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 2021 (the reference year) to 2055 (the end year of the analysis period). See chapter 9 of the NOPR TSD for additional details.

c. Product and Capital Conversion Costs

Energy conservation standards could cause manufacturers to incur conversion costs to bring their production facilities and equipment 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 assumed that DPPP motor manufacturers would not incur any capital conversion costs for efficiency levels that single-speed or dual-speed motors would be able to meet. The same production equipment currently used to manufacture single-speed and dual-speed motors would still be able to be used to manufacture more efficient single- and dual-speed motors. However, DOE did assume that DPPP motor manufacturers would incur capital conversion costs at efficiency levels that variable-speed motors would be needed to meet the analyzed energy conservation standards.

Additional production equipment would be needed to manufacture both additional variable-speed motor models and a larger production volume of variable-speed motors than are currently being produced. DOE used feedback from manufacturer interviews to estimate the cost of adding a production line to manufacture variable-speed motors. DOE then estimated the number of additional variable-speed production lines needed at each TSL, based on the increase in variable-speed shipments estimated at the analyzed TSL and the number of DPPP motor manufacturers that would need to introduce variable-speed motor models to meet the analyzed TSL.

DOE assumed that DPPP motor manufacturers would not incur any additional product conversion costs for the standard size equipment classes. All DPPP motor manufacturers currently manufacture multiple variable-speed motor models in the standard size equipment classes. Additionally, the current DOE energy conservation standard for DPPPs[102] that most commonly use the standard size DPPP motors use variable-speed motors to meet those efficiency requirements. Therefore, almost all standard size DPPP motors sold as part of a new DPPP are already variable-speed motors. However, DOE did assume that DPPP motor manufacturers would incur product conversion costs for the other equipment classes at each analyzed efficiency level.

Additional DPPP motor models would need to be introduced for the extra small-size and small-size DPPP motor equipment classes at each efficiency level analyzed. To evaluate the level of product conversion costs manufacturers would likely incur to comply with the analyzed energy conservation standards for these equipment classes, DOE used a model database to estimate the number of DPPP motor models that would have to be redesigned at each efficiency level for each equipment class. DOE estimated a redesign effort of 2 months of engineering time per model to redesign a less efficient single-speed DPPP motor into a single-speed DPPP motor capable of meeting the analyzed energy conservation standards. DOE estimated a redesign effort of 6 months of engineering time per model to redesign a single-speed or less efficient dual-speed DPPP motor into a dual-speed DPPP motor capable of meeting the analyzed energy conservation standards. Lastly, DOE estimated a redesign effort of 24 months of four engineers for DPPP motor manufacturers that do not currently produce small-size DPPP variable-speed motors to introduce one variable-speed DPPP motor model, for the analyzed energy conservation standards that would require variable-speed DPPP motor for the small-size equipment classes.

In general, DOE assumes all conversion-related investments occur between the year of publication of the final rule and the year by which manufacturers must comply with the new standard. The conversion cost figures used in the GRIM can be found in Table IV.15 and Table IV.16 and in

[101] Table 5.7.1 of the January 2017 Direct Final Rule lists DPPP motor prices as MPCs. This is because the January 2017 Direct Final Rule was for DPPPs, not DPPP motors. In the January 2017 Direct Final Rule, the selling price of the DPPP motors was part of the production costs for DPPP manufacturers. However, in this analysis the selling price of the DPPP motors is the MSP for DPPP motor manufacturers.

[102] 82 FR 5650 (January 18, 2017), compliance date of July 19, 2021.

section V.B.2.a of this document. For additional information on the estimated capital and product conversion costs, see chapter 12 of the NOPR TSD.

TABLE IV.15—DPPP MOTOR MANUFACTURER CAPITAL CONVERSION COSTS

	Equipment class	Efficiency level					
		EL 1	EL 2	EL 3	EL 4	EL 5	EL 6
Capital Conversion Costs (2020$ millions)	Extra Small (<0.5 THP)	....	....	....	....	....	....
	Small (0.5 ≤ THP < 1.15)	....	....	....	....	....	20.0
	Standard (1.15 ≤ THP)	....	....	....	....	....	17.5

TABLE IV.16—DPPP MOTOR MANUFACTURER PRODUCT CONVERSION COSTS

	Equipment class	Efficiency level					
		EL 1	EL 2	EL 3	EL 4	EL 5	EL 6
Product Conversion Costs *(2020$ millions)*.	Extra Small (<0.5 THP)	0.0	0.2	....	....	....	....
	Small (0.5 ≤ THP < 1.15)	0.1	0.6	3.9	4.0	4.3	8.7
	Standard (1.15 ≤ THP)	....	....	....	....	....	....

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 percentage markup scenario; and (2) a preservation of per-unit operating profit markup scenario. These scenarios lead to different markup values that, when applied to the MPCs, result in varying revenue and cash flow impacts.

Under the preservation of gross margin percentage scenario, DOE applied a single uniform ''gross margin percentage'' markup across all efficiency levels, 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. Based on publicly available financial information for DPPP motor manufacturers and information obtained during manufacturer interviews, DOE assumed the non-production cost manufacturer markup—which includes SG&A expenses, R&D expenses, interest, and profit—to be 1.37. This manufacturer markup is consistent with the manufacturer markup DOE used in the engineering analysis (see section IV.C). Therefore, DOE assumes that this scenario represents the upper bound to industry profitability under energy conservation standards.

Under the preservation of per-unit operating profit markup scenario, DOE modeled a situation in which manufacturers are not able to increase per-unit operating profit in proportion to increases in manufacturer production costs. Under this scenario, as the MPCs increase, manufacturers are generally required to reduce the manufacturer markup to maintain a cost competitive offering in the market. Therefore, gross margin (as a percentage) shrinks in the standards cases. This manufacturer markup scenario represents the lower bound to industry profitability under new energy conservation standards.

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

3. Manufacturer Interviews

DOE conducted manufacturer interviews prior to the publication of this NOPR. In these interviews, DOE asked manufacturers to describe their major concerns regarding this rulemaking. The following section highlights manufacturer concerns that helped inform the projected potential impacts of new energy conservation standards on the industry. Manufacturer interviews are conducted under non-disclosure agreements (''NDAs''), so DOE does not document these discussions in the same way that it does public comments in the comment summaries and DOE's responses throughout the rest of this document.

Some manufacturers stated they only produce single-speed and dual-speed motors within the small-size equipment class (0.5 ≤ THP < 1.15) and no longer supply DPPP motors used in new DPPP in that range to the California market after the CEC standard took effect. These manufacturers stated that they would need to design variable-speed motor models to meet any energy conservation standard that would require a variable-speed motor for the small-size equipment class. Additionally, these manufacturers would need to build additional production lines or make significant changes to existing single-speed or dual-speed production lines to be able to meet energy conservation standards requiring variable-speed DPPP motors for this equipment class. DOE included the capital and product conversion costs necessary for these DPPP motor manufacturers to introduce variable-speed DPPP motor models for the small-size equipment class.

K. 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 proposed rulemaking uses projections from *AEO2021.* Power sector emissions of CH_4 and N_2O from fuel combustion are estimated using Emission Factors for Greenhouse Gas Inventories published by the EPA.[103]

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. *AEO2021* generally represents current legislation and environmental regulations, including recent government actions, that were in place at the time of preparation of *AEO2021,* including the emissions control programs discussed in the following paragraphs.[104]

SO_2 emissions from affected electric generating units (''EGUs'') are subject to nationwide and regional emissions cap-and-trade programs. Title IV of the Clean Air Act sets an annual emissions cap on SO_2 for affected EGUs in the 48 contiguous States and the District of Columbia (DC). (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.[105] *AEO2021* 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 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 *AEO2021.*

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 *AEO2021* 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 *AEO2021,* which incorporates the MATS.

L. 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)

[103] Available at *www.epa.gov/sites/production/files/2021-04/documents/emission-factors_apr2021.pdf* (last accessed July 12, 2021).

[104] For further information, see the Assumptions to *AEO2021* 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 July 6, 2020).

[105] 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).

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 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. 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 CH4 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–N_2O estimates were developed by Marten *et al.*[106] 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).[107] 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'' (E.O. 13783, Section 5(c)). Benefit-cost analyses following E.O. 13783 used SC–GHG estimates that attempted to focus on the 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

[106] 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.

[107] 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.

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 E.O. 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, and 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 to U.S. citizens and residents does not currently exist in the literature. As explained in the February 2021 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 (IWG 2010, 2013, 2016a, 2016b),[108] 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% and 7% 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 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% discount rate is not appropriate to apply to value the social cost of greenhouse gases in the analysis presented in this analysis. In this analysis, 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

[108] Interagency Working Group on Social Cost of Carbon. *Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866.* 2010. United States Government. (Last accessed April 15, 2022.) *www.epa.gov/sites/default/files/2016-12/documents/scc_tsd_2010.pdf*; 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. (Last accessed January 18, 2022.) *www.epa.gov/sites/default/files/2016-12/documents/sc_co2_tsd_august_2016.pdf*; 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. (Last accessed January 18, 2022.) *www.epa.gov/sites/default/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf.*

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 this 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 to revert to the same set of four values drawn from the SC–GHG distributions based on three discount rates as were used in regulatory analyses between 2010 and 2016 and 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.[109] 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 final rule likely underestimate the damages from GHG emissions. DOE concurs with this assessment.

DOE's derivations of the SC–GHG (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 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 generated using the values presented in the 2021 update from the IWG's February 2021 SC–GHG TSD. Table IV.17 shows the updated sets of SC–CO_2 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 14–A 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.[110]

TABLE IV.17—ANNUAL SC–CO_2 VALUES FROM 2021 INTERAGENCY UPDATE, 2020–2050

[2020$ per metric ton CO_2]

Year	Discount rate and statistic			
	5%	3%	2.5%	3%
	Average	Average	Average	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

[109] 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 13990. February. United States Government. Available at: <*https://www.whitehouse.gov/briefing-room/blog/2021/02/26/a-return-to-science-evidence-based-estimates-of-the-benefits-of-reducing-climate-pollution/*.

[110] 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.

In calculating the potential global benefits resulting from reduced CO_2 emissions, DOE used the values from the February 2021 SC–GHG TSD, adjusted to 2020$ using the implicit price deflator for gross domestic product (''GDP'') from the Bureau of Economic Analysis. DOE derived values from 2051 to 2070 based on estimates published by EPA.[111] These estimates are based on methods, assumptions, and parameters identical to the 2020–2050 estimates published by the IWG. DOE derived values after 2070 based on the trend in 2060–2070 in each of the four cases (see appendix 14A).

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. 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 SC–GHG TSD. Table IV.18 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 14–A 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.18—ANNUAL SC–CH_4 AND SC–N_2O VALUES FROM 2021 INTERAGENCY UPDATE, 2020–2050
[2020$ 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	1,500	2,000	3,900	5,800	18,000	27,000	48,000
2025	800	1,700	2,200	4,500	6,800	21,000	30,000	54,000
2030	940	2,000	2,500	5,200	7,800	23,000	33,000	60,000
2035	1,100	2,200	2,800	6,000	9,000	25,000	36,000	67,000
2040	1,300	2,500	3,100	6,700	10,000	28,000	39,000	74,000
2045	1,500	2,800	3,500	7,500	12,000	30,000	42,000	81,000
2050	1,700	3,100	3,800	8,200	13,000	33,000	45,000	88,000

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. 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 from the EPA's Benefits Mapping and Analysis Program.[112] DOE used EPA's values for $PM_{2.5}$-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 DPPP motors using a method described in appendix 14B of the NOPR TSD.

DOE multiplied the site emissions reduction (in tons) in each year by the associated $/ton values, and then discounted each series using discount rates of 3 percent and 7 percent as appropriate.

M. 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 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 *AEO2021.* 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 *AEO2021* 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.

N. 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

[111] See EPA, *Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis,* Washington, DC, December 2021. Available at: *https://www.epa.gov/system/files/documents/2021-12/420r21028.pdf* (last accessed January 13, 2022).

[112] *Estimating the Benefit per Ton of Reducing $PM_{2.5}$ Precursors from 21 Sectors.* December 2 2021. *www.epa.gov/benmap/estimating-benefit-ton-reducing-pm25-precursors-21-sectors.*

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.[113] 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.

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'').[114] 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 there are 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 (2026–2031), where these uncertainties are reduced. For more details on the employment impact analysis, see chapter 16 of the NOPR TSD.

V. Analytical Results and Conclusions

The following section addresses the results from DOE's analyses with respect to the considered energy conservation standards for DPPP motors. It addresses the TSLs examined by DOE, the projected impacts of each of these levels if adopted as energy conservation standards for DPPP motors, 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 equipment 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 eight TSLs for DPPP motors. DOE developed TSLs that combine specific efficiency levels for each of the DPPP motor equipment classes analyzed by DOE. The TSLs that were chosen in the NOPR represent DPPPM at maximum technologically feasible (''max-tech'') energy efficiency levels and similar performance (*i.e.,* variable-speed, 2-speed, multi-speed and/or single-speed). 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 DPPP motors. TSL 8 represents the maximum technologically feasible (''max-tech'') energy efficiency for all equipment classes, and freeze protection control requirements for DPPP motors greater than and equal to 0.5 THP. TSL 7 represents the California CEC standards[115] and includes a variable speed requirement for DPPP motors at or above 0.5 THP, an EL1 efficiency requirement below 0.5 THP, and freeze protection control requirements for DPPP motors greater than and equal to 0.5 THP. TSL 6 represents the performance requirements included in UL 1004–10:2022, which ensures DPPP motors operate similarly to motors in DPPPs that comply with the DOE standards at 10 CFR 431.465(f) and includes a variable speed requirement for DPPP motors at or above 1.15 THP, an EL1 efficiency requirement below 1.15 THP, and freeze protection control requirements for DPPP motors greater than and equal to 1.15 THP. TSL 5 represents the 2-speed/multi-speed DPPP motor EL 5 level DPPP motor for applicable equipment classes and freeze protection control requirements for DPPP motors greater than and equal to 0.5 THP. TSL 4 represents the 2-speed/multi-speed DPPP motor EL 4 level for applicable equipment classes and freeze protection control requirements for DPPP motors greater than and equal to 0.5 THP. TSL 3 represents the 2-speed/multi-speed DPPP motor EL 3 level for applicable equipment classes and freeze protection control requirements for DPPP motors greater than and equal to 0.5 THP. TSL 2 represents the highest efficiency single-speed DPPP motor level for all equipment classes. TSL 1 represents the medium efficiency single-speed DPPP motor level for all equipment classes.

[113] See U.S. Department of Commerce–Bureau of Economic Analysis. *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II).* 1997. U.S. Government Printing Office: Washington, DC. Available at *www.bea.gov/scb/pdf/regional/perinc/meth/rims2.pdf* (last accessed July 6, 2021).

[114] 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.

[115] Best approximation based on the efficiency level analyzed.

TABLE V.1–TRIAL STANDARD LEVELS FOR DPPP MOTORS

TSL	TSL1	TSL2	TSL3	TSL4	TSL5	TSL6	TSL7	TSL8
Extra Small (<0.5 THP)	EL 1	EL 2	EL 2	EL 2	EL 2	EL 1	EL 1	EL 2.
Small Size (0.5 ≤ THP < 1.15)	EL 1	EL 2	EL 3 *	EL 4 *	EL 5 *	EL 1	EL 6 *	EL 6.*
Standard Size (1.15 ≤ THP ≤ 5)	EL 1	EL 2	EL 3 *	EL 4 *	EL 5 *	EL 6 *	EL 6 *	EL 6.*

* Includes freeze protection control requirements.

B. Economic Justification and Energy Savings

1. Economic Impacts on Individual Consumers

DOE analyzed the economic impacts on DPPP motor consumers by considering the effects that potential 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 equipment affects 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.,* equipment 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.

Table V.2 through Table V.7 of this NOPR show the LCC and PBP results for the TSLs considered for the three DPPP motor equipment classes. In the first of each pair of tables, the simple payback is measured relative to the baseline equipment. In the second table, impacts are measured relative to the efficiency distribution in the no-new-standards case in the compliance year (see section IV.F.8 of this document). Because some consumers purchase products with higher efficiency in the no-new-standards case, the average savings are less than the difference between the average LCC of the baseline equipment and the average LCC at each TSL. 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.

TABLE V.2–AVERAGE LCC AND PBP RESULTS FOR EXTRA SMALL-SIZE DPPP MOTORS

TSL	Efficiency level	Average costs (2020$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
1, 6, 7	1	$61	$58	$192	$253	0.7	3.6
2–5, 8	2	92	53	175	267	2.1	3.6

Note: The results for each TSL are calculated assuming that all consumers use products at that efficiency level. The PBP is measured relative to the baseline product.

TABLE V.3—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR EXTRA SMALL-SIZE DPPP MOTORS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2020$)	Percent of consumers that experience net cost (%)
1,6,7	1	$3	0
2–5,8	2	(6)	54

* The savings represent the average LCC for affected consumers.

TABLE V.4–AVERAGE LCC AND PBP RESULTS FOR SMALL-SIZE DPPP MOTORS

TSL	Efficiency level	Average costs (2020$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
1, 6	1	$131	$205	$726	$857	0.3	4.5
2	2	162	186	660	822	0.7	4.5
3	3	308	199	721	1,029	3.3	4.5
4	4	330	171	620	950	2.5	4.5
5	5	354	162	586	940	2.5	4.5

TABLE V.4–AVERAGE LCC AND PBP RESULTS FOR SMALL-SIZE DPPP MOTORS—Continued

TSL	Efficiency level	Average costs (2020$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
7, 8	6	493	92	358	852	2.3	4.5

Note: The results for each TSL are calculated assuming that all consumers use products at that efficiency level. The PBP is measured relative to the baseline product.

TABLE V.5—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR SMALL-SIZE DPPP MOTORS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2020$)	Percent of consumers that experience net cost (%)
1, 6	1	$11	0
2	2	20	11
3	3	(38)	42
4	4	3	36
5	5	7	38
7,8	6	69	30

* The savings represent the average LCC for affected consumers.

TABLE V.6—AVERAGE LCC AND PBP RESULTS FOR STANDARD-SIZE DPPP MOTORS

TSL	Efficiency level	Average costs (2020$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
1	1	$251	$576	$2,406	$2,657	0.4	4.5
2	2	282	531	2,218	2,500	0.5	4.5
3	3	444	358	1,515	1,958	0.7	4.5
4	4	472	317	1,341	1,813	0.7	4.5
5	5	502	286	1,210	1,712	0.7	4.5
6–8	6	609	246	1,086	1,695	0.9	4.5

Note: The results for each TSL are calculated assuming that all consumers use products at that efficiency level. The PBP is measured relative to the baseline product.

TABLE V.7—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR STANDARD-SIZE DPPP MOTORS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2020$)	Percent of consumers that experience net cost
1	1	$32	0
2	2	50	0
3	3	120	15
4	4	156	13
5	5	176	13
6–8	6	292	2

* The savings represent the average LCC for affected consumers.

b. Consumer Subgroup Analysis

In the consumer subgroup analysis, DOE estimated the impact of the considered TSLs on senior-only households. Table V.8 through Table V.13 compare the average LCC savings and PBP at each efficiency level for the consumer subgroup, with similar metrics for the entire consumer sample for DPPP motors. The average LCC savings and PBP for senior-only 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 subgroup.

TABLE V.8—COMPARISON OF AVERAGE LCC SAVINGS AND PBP FOR CONSUMER SUBGROUP AND ALL HOUSEHOLDS FOR EQUIPMENT CLASS 1 EXTRA SMALL MOTORS

TSL	Average life-cycle cost savings (2020$)		Simple payback period (years)	
	Senior-only households	All households	Senior-only households	All households
1, 6, 7	$3	$3	0.7	0.7
2–5, 8	−6	−6	2.1	2.1

TABLE V.9—COMPARISON OF FRACTION OF CONSUMERS EXPERIENCING NET BENEFIT AND NET COST FOR CONSUMER SUBGROUP AND ALL HOUSEHOLDS FOR EQUIPMENT CLASS 1 EXTRA SMALL MOTORS

TSL	Percent of consumers that experience net cost (%)		Percent of consumers that experience net benefit (%)	
	Senior-only households	All households	Senior-only households	All households
1, 6, 7	0	0	8	8
2–5, 8	54	54	11	12

TABLE V.10—COMPARISON OF AVERAGE LCC SAVINGS AND PBP FOR CONSUMER SUBGROUP AND ALL HOUSEHOLDS FOR EQUIPMENT CLASS 2 SMALL MOTORS

TSL	Average life-cycle cost savings (2020$)		Simple payback period (years)	
	Senior-only households	All households	Senior-only Households	All households
1, 6	$11	$11	0.3	0.3
2	18	20	0.7	0.7
3	(40)	(38)	3.7	3.3
4	(2)	3	2.7	2.5
5	1	7	2.7	2.5
7,8	53	69	2.4	2.3

TABLE V.11—COMPARISON OF FRACTION OF CONSUMERS EXPERIENCING NET BENEFIT AND NET COST FOR CONSUMER SUBGROUP AND ALL HOUSEHOLDS FOR EQUIPMENT CLASS 2 SMALL MOTORS

TSL	Percent of consumers that experience net cost (%)		Percent of consumers that experience net benefit (%)	
	Senior-only households	All households	Senior-only households	All households
1, 6	0	0	6	6
2	11	11	25	25
3	42	42	10	10
4	36	36	16	16
5	38	38	18	18
7, 8	31	30	25	26

TABLE V.12—COMPARISON OF AVERAGE LCC SAVINGS AND PBP FOR CONSUMER SUBGROUP AND ALL HOUSEHOLDS FOR EQUIPMENT CLASS 3 STANDARD SIZE MOTORS

TSL	Average life-cycle cost savings (2020$)		Simple payback period (years)	
	Senior-only households	All households	Senior-only households	All households
1	$28	$32	0.4	0.4
2	45	50	0.5	0.5
3	108	120	0.8	0.7
4	140	156	0.8	0.7
5	157	176	0.8	0.7
6–8	259	292	1.0	0.9

TABLE V.13—COMPARISON OF FRACTION OF CONSUMERS EXPERIENCING NET BENEFIT AND NET COST FOR CONSUMER SUBGROUP AND ALL HOUSEHOLDS FOR EQUIPMENT CLASS 3 STANDARD SIZE MOTORS

TSL	Percent of consumers that experience net cost (%)		Percent of consumers that experience net benefit (%)	
	Senior-only households	All households	Senior-only households	All households
1	0	0	8	8
2	0	0	12	12
3	15	15	18	18
4	13	13	21	21
5	13	13	22	23
6–8	2	2	18	19

c. Rebuttable Presumption Payback

As discussed in section III.E.2 of this document, 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 DPPP motors. In contrast, the PBPs presented in section V.B.1.a were calculated using distributions that reflect the range of energy use in the field.

Table V.14 presents the rebuttable-presumption payback periods for the considered TSLs for DPPP motors. 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, thereby supporting or rebutting the results of any preliminary determination of economic justification.

TABLE V.14—REBUTTABLE-PRESUMPTION PAYBACK PERIODS

[years]

Equipment class	Trial standard level							
	1	2	3	4	5	6	7	8
Extra-Small	0.8	2.4	2.4	2.4	2.4	0.8	0.8	2.4
Small-Size	0.3	0.7	3.0	2.4	2.4	0.3	2.9	2.9
Standard-Size	0.4	0.5	0.7	0.7	0.7	1.1	1.1	1.1

2. Economic Impacts on Manufacturers

DOE performed an MIA to estimate the impact of amended energy conservation standards on manufacturers of DPPP motors. The following section describes the expected impacts on manufacturers at each considered TSL. 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. Table V.15 and Table V.16 summarize the estimated financial impacts (represented by changes in INPV) of potential amended energy conservation standards on manufacturers of DPPP motors, as well as the conversion costs that DOE estimates manufacturers of DPPP motors would incur at each TSL.

As discussed in section IV.J.2.d of this document, DOE modeled two manufacturer markup scenarios to evaluate a range of cash flow impacts on the DPPP motor industry: (1) the preservation of gross margin percentage markup scenario and (2) the preservation of operating profit. DOE considered the preservation of gross margin percentage scenario by applying a ''gross margin percentage'' markup for each product class across all efficiency levels. As MPCs increase with efficiency, this scenario implies that the absolute dollar markup will increase. DOE assumed a manufacturer markup of 1.37 for DPPP motors. This manufacturer markup is with the same as the one DOE assumed in the engineering analysis and the no-new-standards case of the GRIM. Because this scenario assumes that a manufacturer's absolute dollar markup would increase as MPCs increase in the standards cases, it represents the upper-bound to industry profitability under potential new energy conservation standards.

The preservation of operating profit scenario reflects manufacturers' concerns about their inability to maintain margins as MPCs increase to reach more-stringent efficiency levels. In this scenario, while manufacturers make the necessary investments required to convert their facilities to produce compliant products, operating profit does not change in absolute dollars and decreases as a percentage of revenue.

Each of the modeled manufacturer markup scenarios results in a unique set of cash-flows and corresponding industry values at each TSL. In the following discussion, the INPV results refer to the difference in industry value between the no-new-standards case and each standards case resulting from the sum of discounted cash-flows from 2021 through 2055. To provide perspective on the short-run cash-flow impact, DOE includes in the discussion of results a comparison of free cash flow between the no-new-standards case and the standards case at each TSL in the year before new standards are required.

TABLE V.15—MANUFACTURER IMPACT ANALYSIS FOR DPPP MOTORS UNDER THE PRESERVATION OF GROSS MARGIN MARKUP SCENARIO

	Units	No-new-standards case	Trial standard level *							
			1	2	3	4	5	6	7	8
INPV	2020$ millions	798	800	804	823	829	835	826	901	901
Change in INPV	2020$ millions		1.8	6.3	25.3	31.1	37.7	28.4	102.9	103.6
	%		0.2	0.8	3.2	3.9	4.7	3.6	12.9	13.0
Product Conversion Costs	2020$ millions		0.1	0.8	6.2	6.2	6.5	0.1	8.7	8.8
Capital Conversion Costs	2020$ millions				6.4	6.4	6.4	15.4	37.5	37.5
Total Investment Required **	2020$ millions		0.1	0.8	12.6	12.6	12.9	15.5	46.2	46.3

* Numbers in parentheses indicate a negative number.
** Numbers may not sum exactly due to rounding.

TABLE V.16—MANUFACTURER IMPACT ANALYSIS FOR DPPP MOTORS UNDER THE PRESERVATION OF GROSS MARGIN MARKUP SCENARIO

	Units	No-new-standards case	Trial standard level *							
			1	2	3	4	5	6	7	8
INPV	2020$ millions	798	797	795	770	768	765	704	608	608
Change in INPV	2020$ millions		(0.6)	(3.0)	(28.0)	(30.1)	(32.8)	(93.4)	(189.3)	(189.7)
	%		(0.1)	(0.4)	(3.5)	(3.8)	(4.1)	(11.7)	(23.7)	(23.8)
Product Conversion Costs	2020$ millions		0.1	0.8	6.2	6.2	6.5	0.1	8.7	8.8
Capital Conversion Costs	2020$ millions				6.4	6.4	6.4	15.4	37.5	37.5
Total Investment Required **	2020$ millions		0.1	0.8	12.6	12.6	12.9	15.5	46.2	46.3

* Numbers in parentheses indicate a negative number.
** Numbers may not sum exactly due to rounding.

At TSL 1, DOE estimates that impacts on INPV will range from −$0.6 million to $1.8 million, or a change in INPV of −0.1 to 0.2 percent. At TSL 1, industry free cash-flow is $33.8 million, which is a decrease of less than $0.1 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 1 would set the energy conservation standard for all equipment classes at EL 1. DOE estimates that 93 percent of extra small size DPPP motors, 95 percent of small size DPPP motors, and 87 percent of standard size DPPP motors already meet or exceed the efficiency levels analyzed at TSL 1. At TSL 1, DOE estimates that manufacturers will incur approximately $0.1 million in product conversion costs, as some single speed DPPP motor models will need to be redesigned to comply with the standard. DOE also estimates that DPPP motor manufacturers will incur minimal to no capital conversion costs at TSL 1.

At TSL 1, the shipment-weighted average MPC for all DPPP motors increases by 1.0 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, manufacturers are able to fully pass on this slight cost increase to consumers. The slight increase in shipment-weighted average MPC for DPPP motors outweighs the $0.1 million in conversion costs, causing a slightly positive change in INPV at TSL 1 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup 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. In this scenario, the 1.0 percent shipment-weighted average MPC increase results in a reduction in the manufacturer markup after the analyzed compliance year. This reduction in the manufacturer markup and the $0.1 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 1 under the preservation of operating profit markup scenario.

At TSL 2, DOE estimates that impacts on INPV will range from −$3.0 million to $6.3 million, or a change in INPV of −0.4 percent to 0.8 percent. At TSL 2, industry free cash-flow is $33.6 million, which is a decrease of approximately $0.3 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 2 would set all equipment classes at EL 2, which is max-tech for the extra small size DPPP motors. DOE estimates 33 percent of extra small size DPPP motors, 73 percent of small size DPPP motors, and 81 percent of standard size DPPP motors already meet or exceed the efficiency levels analyzed at TSL 2. At TSL 2, DOE estimates that manufacturers will incur approximately $0.8 million in product conversion costs, as many single speed DPPP motor models will need to be redesigned to comply with the set efficiency level. DOE also estimates that DPPP motor manufacturers will incur minimal to no capital conversion costs at TSL 2.

At TSL 2, the shipment-weighted average MPC for all DPPP motors increases by 2.8 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, the slight increase in shipment-weighted average MPC for DPPP motors outweighs the $0.8 million in conversion costs, causing a slightly positive change in INPV at TSL 2 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the 2.8 percent shipment-weighted average MPC increase results in a reduction in the manufacturer markup after the analyzed compliance year. This reduction in the manufacturer markup and the $0.8 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 2 under the preservation of operating profit markup scenario.

At TSL 3, DOE estimates that impacts on INPV will range from −$28.0 million to $25.3 million, or a change in INPV of −3.5 percent to 3.2 percent. At TSL 3, industry free cash-flow is $28.8 million, which is a decrease of approximately $5.1 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 3 would set extra small size DPPP motors at EL 2 (max-tech) and set EL 3 for small and standard size DPPP motors. DOE estimates that 33 percent of extra small size DPPP motors, 44 percent of small size DPPP motors, and 70 percent of standard size DPPP motors already meet or exceed the efficiency levels analyzed at TSL 3. At TSL 3, DOE estimates that manufacturers will incur approximately $6.2 million in product conversion costs, as small and standard sized single speed DPPP motors will most likely be unable to comply with the standard and would need to be redesigned into dual-speed or variable-speed DPPP motor models. DOE also estimates that DPPP motor manufacturers will incur $6.4 million in capital conversion costs at TSL 3, to accommodate this increase in dual-speed and variable-speed DPPP motor manufacturing production capacity.

At TSL 3, the shipment-weighted average MPC for all DPPP motors increases by 11.5 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, the moderate increase in shipment-weighted average MPC for DPPP motors outweighs the $12.6 million in conversion costs, causing a slightly positive change in INPV at TSL 3 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the moderate 11.5 percent shipment-weighted average MPC increase results in a reduction in the manufacturer markup after the analyzed compliance year. This reduction in the manufacturer markup and the $12.6 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 3 under the preservation of operating profit markup scenario.

At TSL 4, DOE estimates that impacts on INPV will range from −$30.1 million to $31.1 million, or a change in INPV of −3.8 percent to 3.9 percent. At TSL 4, industry free cash-flow is $28.8 million, which is a decrease of approximately $5.1 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 4 would set extra small size DPPP motors at EL 2 (max-tech), and small size and standard size DPPP motors at EL 4. DOE estimates that 33 percent of extra small DPPP motors, 43 percent of small size DPPP motors, and 69 percent already meet or exceed the efficiency levels analyzed at TSL 4. At TSL 4, DOE estimates that manufacturers will incur approximately $6.2 million in product conversion costs as, in addition to single-speed motors most likely not being able to comply with the standards, some dual-speed DPPP motor models will need to be redesigned for higher efficiency. DOE also estimates that DPPP motor manufacturers will incur $6.4 million in capital conversion costs at TSL 4, to accommodate this increase in dual-speed and variable-speed DPPP motor manufacturing production capacity.

At TSL 4, the shipment-weighted average MPC for all DPPP motors increases by 13.5 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, the moderate increase in shipment-weighted average MPC for DPPP motors outweighs the $12.6 million in conversion costs, causing a slightly positive change in INPV at TSL 4 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the moderate 13.5 percent shipment-weighted average MPC increase results in a reduction in the manufacturer markup after the analyzed compliance year. This reduction in the manufacturer markup and the $12.6 million in conversion costs incurred by manufacturers causing a slightly negative change in INPV at TSL 4 under the preservation of operating profit markup scenario.

At TSL 5, DOE estimates that impacts on INPV will range from −$32.8 million to $37.7 million, or a change in INPV of −4.1 percent to 4.7 percent. At TSL 5, industry free cash-flow is $28.7 million, which is a decrease of approximately $5.2 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 5 would set extra small size DPPP motors at EL 2 (max-tech), and small and standard size DPPP motors at EL 5. DOE estimates that 33 percent of extra small size DPPP motors, 41 percent of small size DPPP motors, and 67 percent of standard size DPPP motors already meet or exceed the efficiency levels analyzed at TSL 5. At TSL 5, DOE estimates that manufacturers will incur approximately $6.5 million in product conversion costs as, in addition to single-speed motors not being able to comply with the standard, many dual-speed DPPP motor models will need to be redesigned for higher efficiency. DOE also estimates that DPPP motor manufacturers will incur $6.4 million in capital conversion costs at TSL 5, to accommodate this increase in dual-speed and variable-speed DPPP motor manufacturing production capacity.

At TSL 5, the shipment-weighted average MPC for all DPPP motors increases by 15.7 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2025. In the preservation of gross margin markup scenario, the moderate increase in shipment-weighted average MPC for DPPP motors outweighs the $12.9 million in conversion costs, causing a slightly positive change in INPV at TSL 5 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the 15.7 percent shipment-weighted average MPC increase results in a reduction in the manufacturer markup after the analyzed compliance year. This reduction in manufacturer markup and the $12.9 million in conversion costs incurred by manufacturers cause a slightly negative change in INPV at TSL 5 under the preservation of operating profit markup scenario.

At TSL 6, DOE estimates that impacts on INPV will range from −$93.4 million to $28.4 million, or a change in INPV of −11.7 percent to 3.6 percent. At TSL 6, industry free cash-flow is $26.9 million, which is a decrease of approximately $7.0 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 6 would set extra small size and small size DPPP motors at EL 1 and standard size DPPP motors at EL 6 (max-tech). DOE estimates 93 percent of extra small size DPPP motors, 95 percent of small size DPPP motors, and 66 percent of standard size DPPP motors already meet the efficiency levels analyzed at TSL 6. At TSL 6, DOE estimates that manufacturers will incur approximately $0.1 million in product conversion costs as some pool filter pumps that use standard size motors downsize to a smaller sized single speed motors—necessitating redesign costs for standard size motor models. DOE also estimates that DPPP motor manufacturers will incur $15.4 million in capital conversion costs at TSL 6, to accommodate this increase in variable-speed DPPP motor manufacturing production capacity, for the standard size DPPP motors.

At TSL 6, the shipment-weighted average MPC for all DPPP motors significantly increases by 18.9 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, the large increase in shipment-weighted average MPC for DPPP motors outweighs the $15.5 million in conversion costs, causing a slightly positive change in INPV at TSL 6 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the 18.9 percent shipment-weighted average MPC increase results in a reduction in the manufacturer markup after the analyzed compliance year. This reduction in manufacturer markup and the $15.5 million in conversion costs incurred by manufacturers cause a moderately negative change in INPV at TSL 6 under the preservation of operating profit markup scenario.

At TSL 7, DOE estimates that impacts on INPV will range from −$189.3 million to $102.9 million, or a change in INPV of −23.7 percent to 12.9 percent. At TSL 7, industry free cash-flow is $13.9 million, which is a decrease of approximately $20.0 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 7 would set extra small size DPPP motors at EL 1; and small and standard size DPPP motors at EL 6, which is max-tech for both equipment classes. DOE estimates 93 percent of extra small size DPPP motors, 39 percent of small size DPPP motors, and 66 percent of standard size DPPP motors already meet the efficiency levels analyzed at TSL 7. At TSL 7, DOE estimates that manufacturers will incur approximately $8.7 million in product conversion costs. At TSL 7, most DPPP motor manufacturers would need to introduce variable-speed small size DPPP motor models into the market. DOE also estimates that DPPP motor manufacturers will incur $37.5 million in capital conversion costs at TSL 7, to accommodate a significant increase in variable-speed DPPP motor manufacturing production capacity for both the small size and standard size DPPP motors.

At TSL 7, the shipment-weighted average MPC for all DPPP motors significantly increases by 45.0 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, the large increase in shipment-weighted average MPC for DPPP motors outweighs the $46.2 million in conversion costs, causing a moderately positive change in INPV at TSL 7 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the 45.0 percent shipment-weighted average MPC increase results in a significant reduction in the manufacturer markup after the analyzed compliance year. This large reduction in manufacturer markup and the significant $46.2 million in conversion costs incurred by manufacturers cause a significantly negative change in INPV at TSL 7 under the preservation of operating profit markup scenario.

At TSL 8, DOE estimates that impacts on INPV will range from −$189.7 million to $103.6 million, or a change in INPV of −23.8 percent to 13.0 percent. At TSL 8, industry free cash-flow is $13.9 million, which is a decrease of approximately $20.0 million compared to the no-new-standards case value of $33.9 million in 2025, the year leading up to the proposed standards.

TSL 8 would set extra small size DPPP motors at EL 2 (max-tech); and small and standard size DPPP motors at EL 6, which is max-tech for both equipment classes. DOE estimates 33 percent of extra small size DPPP motors, 39 percent of small size DPPP motors, and 66 percent of standard size DPPP motors already meet the efficiency levels analyzed at TSL 8. At TSL 8, DOE estimates that manufacturers will incur approximately $8.8 million in product conversion costs. At TSL 8, most DPPP motor manufacturers would need to introduce variable-speed small size DPPP motor models into the market. DOE also estimates that DPPP motor manufacturers will incur $37.5 million in capital conversion costs at TSL 8, to accommodate a significant increase in variable-speed DPPP motor manufacturing production capacity for both the small size and standard size DPPP motors.

At TSL 8, the shipment-weighted average MPC for all DPPP motors significantly increases by 45.2 percent relative to the no-new-standards case shipment-weighted average MPC for all DPPP motors in 2026. In the preservation of gross margin markup scenario, the large increase in shipment-weighted average MPC for DPPP motors outweighs the $46.3 million in conversion costs, causing a moderately positive change in INPV at TSL 8 under the preservation of gross margin markup scenario.

Under the preservation of operating profit markup scenario, the 45.2 percent shipment-weighted average MPC increase results in a significant reduction in the manufacturer markup after the analyzed compliance year. This large reduction in manufacturer markup and the significant $46.3 million in conversion costs incurred by manufacturers cause a significantly negative change in INPV at TSL 8 under the preservation of operating profit markup scenario.

b. Direct Impacts on Employment

To quantitatively assess the potential impacts of new energy conservation standards on direct employment in the DPPP motors industry, DOE used the GRIM to estimate the domestic labor expenditures, number of direct employees, and non-production employees in the no-new-standards case and in each of the standards cases during the analysis period.

Production employees are those who are directly involved in fabricating and assembling products within an original equipment manufacturer facility. Workers performing services that are closely associated with production operations, such as materials handling tasks using forklifts, are included as production labor, as well as line supervisors.

DOE used the GRIM to calculate the number of production employees from labor expenditures. DOE used statistical data from the U.S. Census Bureau's 2019 Annual Survey of Manufacturers (''ASM'') and the results of the engineering analysis to calculate industry-wide labor expenditures. Labor expenditures related to product manufacturing depend on the labor intensity of the product, the sales volume, and an assumption that wages remain fixed in real terms over time. The total labor expenditures in the GRIM were then converted to domestic production employment levels by dividing production labor expenditures by the annual payment per production worker.

Non-production employees account for those workers that are not directly engaged in the manufacturing of the covered product. This could include sales, human resources, engineering, and management. DOE estimated non-production employment levels by multiplying the number of DPPP motor production workers by a scaling factor. The scaling factor is calculated by taking the ratio of the total number of employees, and the total number of production workers associated with the industry NAICS code 335312, which covers DPPP motor manufacturing.

Using the GRIM, DOE estimates that there would be approximately 675 domestic production workers and approximately 352 non-production workers for DPPP motors in 2026 in the absence of new energy conservation standards. Table V.17 shows the range of the impacts of energy conservation standards on U.S. production of DPPP motors.

TABLE V.17—TOTAL NUMBER OF DOMESTIC DPPP MOTOR WORKERS IN 2026

	No-new-standards case	Trial standard level							
		1	2	3	4	5	6	7	8
Domestic Production Workers in 2026	675	678	684	728	736	746	757	904	905
Production Workers in 2026	352	354	357	380	384	389	395	472	472
Total Direct Employment in 2026	1,027	1,032	1,041	1,108	1,120	1,135	1,152	1,376	1,377
Potential Changes in Total Direct Employment in 2026		0–5	0–14	0–81	0–93	0–108	(169)–125	(279)–349	(279)–350

The direct employment impacts shown in Table V.17 represent the potential changes in direct employment that could result following the compliance date for the DPPP motors covered in this proposed rulemaking. Employment could increase or decrease due to the labor content of the equipment being manufactured domestically or if manufacturers decided to move production facilities abroad because of the new standards. At the less severe end of the range, DOE assumes that all manufacturers continue to manufacture the same scope of the equipment domestically after compliance with the analyzed new standards. The other end of the range assumes that some domestic manufacturing either is eliminated or moves abroad due to the analyzed new standards.

DOE assumes that for DPPP motors, manufacturing is only potentially negatively impacted at TSLs that would most likely require variable-speed DPPP motors. At these TSLs, the maximum number of employees that could be eliminated are the number of domestic employees that would be manufacturing single-speed and dual-speed DPPP motors in the absence of new energy conservation standards. DOE estimated that there would be approximately 72 domestic production employees involved in the production of single-speed and dual-speed small-size DPPP motors and 38 non-production employees (for a total of 110 total employees) in 2026 in the absence of new DPPP motor standards. DOE also estimated that there would be approximately 111 domestic production employees involved in the production of single-speed and dual-speed standard-size DPPP motors and 58 non-production employees (for a total of 169 total employees) in 2026 in the absence of new DPPP motor standards. However, DOE notes that motors used in DPPPs are frequently used in other non-DPPP applications and motor manufacturers may choose to continue to manufacture single-speed and dual-speed motors (even at TSL 6, TSL 7, and TSL 8) that would be allowed to be used in other non-DPPP applications. If manufacturers choose to do this there would likely not be a significant impact on the overall domestic motor employment.

c. Impacts on Manufacturing Capacity

DOE did not identify any significant capacity constraints for the design options being evaluated for this NOPR. The design options evaluated for this NOPR are available as equipment that is on the market currently. The materials used to manufacture DPPP motor models at all efficiency levels are widely available on the market. While there were a limited number of small size variable-speed DPPP motor models currently on the market, all manufacturers are capable of manufacturing standard size variable-speed DPPP motor models and would be able to manufacture small size variable-speed DPPP motor models if they choose to make the investments described in section IV.J.2.c of this document. As a result, DOE does not anticipate that the industry will likely experience any capacity constraints directly resulting from energy conservation standards at any of the TSLs considered.

d. Impacts on Subgroups of Manufacturers

As discussed in section IV.J.1 of this document, using average cost assumptions to develop an industry cash-flow estimate may not be adequate for assessing differential impacts among manufacturer subgroups. Small manufacturers, niche manufacturers, and manufacturers exhibiting a cost structure substantially different from the industry average could be affected disproportionately. DOE used the results of the industry characterization to group manufacturers exhibiting similar characteristics. Consequently, DOE identified small business manufacturers as a subgroup for a separate impact analysis.

For the small business subgroup analysis, DOE applied the small business size standards published by the Small Business Administration (''SBA'') to determine whether a company is considered a small business. The size standards are codified at 13 CFR part 121. To be categorized as a small business under NAICS code 335312, ''Motor and Generator Manufacturing,'' a DPPP motor manufacturer and its affiliates may employ a maximum of 1,250 employees. The 1,250-employee threshold includes all employees in a business's parent company and any other subsidiaries. Based on this classification, DOE identified one potential manufacturers that could qualify as domestic small businesses.

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.

DOE is aware that DPPP motor manufacturers produce other products or equipment that are subject to DOE's energy conservation standards. DOE has ongoing rulemakings for some of these other products or equipment that DPPP motor manufactures produce, including electric motors [116] and distribution transformers.[117] None of these equipment have proposed or adopted energy conservation standards that require compliance within 3 years of the estimated compliance date (2026) for DPPP motors in this NOPR. If DOE proposes or finalizes any energy conservation standards for this equipment prior to finalizing energy conservation standards for DPPP motors, DOE will include the energy conservation standards for these other equipment as part of the cumulative regulatory burden for this DPPP motor proposed rulemaking.

DOE requests information regarding the impact of cumulative regulatory burden on manufacturers of DPPP motors 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 DPPP motors, 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 first full year of anticipated compliance with amended standards (2026–2055). Table V.18 presents DOE's projections of the national energy savings for each TSL considered for DPPP motors. The savings were calculated using the approach described in section IV.H of this document.

TABLE V.18—CUMULATIVE NATIONAL ENERGY SAVINGS FOR DPPP MOTORS; 30 YEARS OF SHIPMENTS

[2026–2055]

	Trial standard levels							
	1	2	3	4	5	6	7	8
	(quads)							
Primary energy	0.09	0.15	0.41	0.53	0.61	0.65	0.95	0.95
FFC energy	0.09	0.15	0.43	0.55	0.63	0.67	0.99	0.99

OMB Circular A–4 [118] 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 proposed rulemaking, DOE undertook a sensitivity analysis using 9 years, rather than 30 years of 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.[119] The review timeframe established in EPCA is generally not synchronized with the equipment lifetime, product manufacturing cycles, or other factors specific to DPPP motors. 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.19. The impacts are counted over the lifetime of DPPP motors purchased in 2026–2034.

TABLE V.19—CUMULATIVE NATIONAL ENERGY SAVINGS FOR DPPP MOTORS; 9 YEARS OF SHIPMENTS

[2026–2034]

	Trial standard levels							
	1	2	3	4	5	6	7	8
	(quads)							
Primary energy	0.03	0.05	0.14	0.18	0.20	0.20	0.29	0.29
FFC energy	0.03	0.05	0.15	0.19	0.21	0.20	0.30	0.30

[116] *www.regulations.gov/docket/EERE-2020-BT-STD-0007.*

[117] *www.regulations.gov/docket/EERE-2019-BT-STD-0018.*

[118] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed July 6, 2021).

[119] 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.

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 DPPP motors. In accordance with OMB's guidelines on regulatory analysis,[120] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table V.20 shows the consumer NPV results with impacts counted over the lifetime of products purchased in 2026–2055.

TABLE V.20 CUMULATIVE NET PRESENT VALUE OF CONSUMER BENEFITS FOR DPPP MOTORS; 30 YEARS OF SHIPMENTS

[2026–2055]

Discount rate	Trial standard level							
	1	2	3	4	5	6	7	8
	(billion 2020$)							
3 percent	0.7	1.1	1.4	2.3	2.7	5.4	6.3	6.3
7 percent	0.4	0.6	0.7	1.1	1.3	2.7	3.0	3.0

The NPV results based on the aforementioned 9-year analytical period are presented in Table V.21. The impacts are counted over the lifetime of products purchased in 2026–2034. 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.

TABLE V.21—CUMULATIVE NET PRESENT VALUE OF CONSUMER BENEFITS FOR DPPP MOTORS; 9 YEARS OF SHIPMENTS

[2026–2034]

Discount rate	Trial standard level							
	1	2	3	4	5	6	7	8
	(billion 2020$)							
3 percent	0.3	0.5	0.6	1.0	1.2	2.0	2.1	2.1
7 percent	0.22	0.3	0.4	0.7	0.8	1.4	1.3	1.3

The previous results reflect the use of a default trend to estimate the change in price for DPPP motors over the analysis period (see section IV.F.1 of this document). DOE also conducted a sensitivity analysis that considered one scenario with a lower rate of price decline than the reference case and one scenario with a higher rate of price decline than the reference case. The results of these alternative cases are presented in appendix 10C of the NOPR TSD. In the high-price-decline case, the NPV of consumer benefits is higher than in the default case. In the low-price-decline case, the NPV of consumer benefits is lower than in the default case.

c. Indirect Impacts on Employment

It is estimated that that amended energy conservation standards for DPPP Motors 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.N 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 (2026–2031), 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.1.b of this document, DOE has tentatively concluded that the standards proposed in this NOPR would not lessen the utility or performance of the DPPP motors under consideration in this rulemaking. Manufacturers of these products currently offer units that meet or exceed the proposed standards.

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.E.1.e of this NOPR, 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

[120] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *www.whitehouse.gov/omb/circulars_a004_a-4/* (last accessed July 6, 2021).

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 DPPP motors is expected to yield environmental benefits in the form of reduced emissions of certain air pollutants and greenhouse gases. Table V.22 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.K. of this document. DOE reports annual emissions reductions for each TSL in chapter 13 of the NOPR TSD.

TABLE V.22—CUMULATIVE EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055

	Trial standard level							
	1	2	3	4	5	6	7	8
Power Sector Emissions								
CO_2 (million metric tons)	3.1	5.3	14.9	19.2	21.8	23.0	33.8	33.9
CH_4 (thousand tons)	0.3	0.4	1.2	1.6	1.8	1.9	2.8	2.8
N_2O (thousand tons)	0.04	0.06	0.17	0.22	0.25	0.26	0.39	0.39
NO_X (thousand tons)	1.3	2.3	6.4	8.3	9.4	9.9	14.5	14.5
SO_2 (thousand tons)	1.4	2.4	6.9	8.9	10.1	10.7	15.6	15.7
Hg (tons)	0.01	0.01	0.04	0.05	0.06	0.06	0.10	0.10
Upstream Emissions								
CO_2 (million metric tons)	0.2	0.4	1.0	1.3	1.5	1.6	2.4	2.4
CH_4 (thousand tons)	21.5	36.2	102.4	132.1	150.5	159.9	234.4	234.9
N_2O (thousand tons)	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
NO_X (thousand tons)	3.2	5.5	15.4	19.9	22.7	24.1	35.4	35.4
SO_2 (thousand tons)	0.02	0.03	0.08	0.11	0.12	0.13	0.19	0.19
Hg (tons)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total FFC Emissions								
CO_2 (million metric tons)	3.3	5.6	15.9	20.5	23.4	24.7	36.2	36.3
CH_4 (thousand tons)	21.7	36.6	103.7	133.6	152.3	161.8	237.2	237.7
N_2O (thousand tons)	0.04	0.06	0.18	0.23	0.26	0.27	0.40	0.40
NO_X (thousand tons)	4.6	7.7	21.9	28.2	32.1	34.0	49.9	50.0
SO_2 (thousand tons)	1.5	2.5	7.0	9.0	10.2	10.8	15.8	15.9
Hg (tons)	0.01	0.01	0.04	0.05	0.06	0.07	0.10	0.10

As part of the analysis for this proposed 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 DPPP motors. Section IV.L of this document discusses the SC–CO_2 values that DOE used. Table V.23 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.23—PRESENT VALUE OF CO_2 EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055

TSL	SC–CO_2 case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th Percentile
	(Million 2020$)			
1	34	140	216	427
2	58	237	366	721
3	165	671	1,034	2,040
4	212	863	1,331	2,626
5	241	983	1,516	2,990
6	250	1,028	1,587	3,128

TABLE V.23—PRESENT VALUE OF CO_2 EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055—Continued

TSL	SC–CO_2 case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th Percentile
	(Million 2020$)			
7	367	1,508	2,329	4,590
8	367	1,511	2,334	4,599

As discussed in section IV.L.2, DOE estimated the climate benefits likely to result from the reduced emissions of CH_4 and N_2O that DOE estimated for each of the considered TSLs for DPPP motors. Table V.24 presents the value of the CH_4 emissions reduction at each TSL, and Table V.25 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.24—PRESENT VALUE OF METHANE EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055

TSL	SC–CH_4 case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th Percentile
	(Million 2020$)			
1	10	28	38	74
2	17	47	64	124
3	48	132	181	351
4	62	170	234	453
5	70	194	266	516
6	73	205	282	546
7	108	301	414	800
8	108	301	415	802

TABLE V.25—PRESENT VALUE OF NITROUS OXIDE EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055

TSL	SC–N_2O case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th Percentile
	(Million 2020$)			
1	0.1	0.5	0.8	1.4
2	0.2	0.9	1.4	2.4
3	0.7	2.6	3.9	6.8
4	0.9	3.3	5.0	8.7
5	1.0	3.7	5.7	10.0
6	1.0	3.9	6.0	10.4
7	1.5	5.7	8.8	15.3
8	1.5	5.8	8.8	15.3

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 world economy continues to evolve rapidly. Thus, any value placed on reduced GHG emissions in this proposed rulemaking is subject to change. That said, because of omitted damages, DOE agrees with the IWG that these estimates most likely underestimate the climate benefits of greenhouse gas reductions. 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 emissions reductions anticipated to result from the considered TSLs for DPPP motors. The dollar-per-ton values that DOE used are discussed in section IV.L of this document. Table V.26 presents the present value for NO_X emissions reduction for each TSL calculated using 7-percent and 3-percent discount rates.

TABLE V.26—PRESENT VALUE OF NO_X EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055

TSL	3% Discount rate	7% Discount rate
	(Million 2020$)	
1	107	214
2	182	363
3	514	1,026
4	659	1,321
5	750	1,504
6	761	1,575
7	1,118	2,312
8	1,120	2,316

DOE also estimated the monetary value of the health benefits associated with SO_2 emissions reductions anticipated to result from the considered TSLs for DPPP motors. The dollar-per-ton values that DOE used are discussed in section IV.L of this document. Table V.27 presents the present value for SO_2 emissions reduction for each TSL calculated using 7-percent and 3-percent discount rates.

TABLE V.27—PRESENT VALUE OF SO_2 EMISSIONS REDUCTION FOR DPPP MOTORS SHIPPED IN 2026–2055

TSL	3% Discount rate	7% Discount rate
	(Million 2020$)	
1	46	91
2	79	155
3	222	437
4	285	562
5	324	640
6	327	666
7	480	977
8	481	979

The benefits of reduced CO_2, CH_4, and N_2O emissions are collectively referred to as climate benefits. The benefits of reduced SO_2 and NO_X emissions are collectively referred to as health benefits. For the time series of estimated monetary values of reduced emissions, see chapter 14 of the NOPR TSD.

DOE has not considered the monetary benefits of the reduction of Hg for this final rule. Not all the public health and environmental benefits from the reduction of greenhouse gases, NO_X, and SO_2 are captured in the values above, and additional unquantified benefits from the reductions of those pollutants as well as from the reduction of Hg, direct PM, and other co-pollutants may be significant.

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))

8. Summary of Economic Impacts

Table V.28 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 proposed rulemaking. The consumer benefits are domestic U.S. monetary savings that occur as a result of purchasing the covered DPPP motors, and are measured for the lifetime of products shipped in 2026–2055. The climate benefits associated with reduced GHG emissions resulting from the adopted standards are global benefits, and are also calculated based on the lifetime of DPPP motors shipped in 2026–2055.

TABLE V.28—CONSUMER NPV COMBINED WITH PRESENT VALUE OF CLIMATE AND HEALTH BENEFITS

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7	TSL 8
3% discount rate for Consumer NPV and Health Benefits (billion 2020$)								
5% Average SC–GHG case	1.1	1.7	3.1	4.4	5.1	8.0	10.1	10.0
3% Average SC–GHG case	1.2	1.9	3.7	5.2	6.0	8.9	11.4	11.4
2.5% Average SC–GHG case	1.3	2.0	4.1	5.7	6.6	9.5	12.3	12.3
3% 95th percentile SC–GHG case	1.5	2.4	5.3	7.2	8.3	11.3	15.0	15.0
7% discount rate for Consumer NPV and Health Benefits (billion 2020$)								
5% Average SC–GHG case	0.6	0.9	1.6	2.4	2.7	4.1	5.1	5.1

TABLE V.28—CONSUMER NPV COMBINED WITH PRESENT VALUE OF CLIMATE AND HEALTH BENEFITS—Continued

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7	TSL 8
3% Average SC–GHG case	0.7	1.1	2.2	3.1	3.6	5.0	6.4	6.4
2.5% Average SC–GHG case	0.8	1.3	2.6	3.6	4.2	5.7	7.4	7.4
3% 95th percentile SC–GHG case	1.0	1.7	3.8	5.2	5.9	7.5	10.0	10.0

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. 6316(a); 42 U.S.C. 6295(o)(2)(A)) In determining whether a standard is economically justified, the Secretary must determine whether the benefits of the standard exceed its burdens by, to the greatest extent practicable, considering the seven statutory factors discussed previously. (42 U.S.C. 6316(a); 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. 6316(a); 42 U.S.C. 6295(o)(3)(B))

For this NOPR, DOE considered the impacts of potential new standards for DPPP motors 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.[121]

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.[122] 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 DPPP Motors Standards

Table V.29 and Table V.30 summarize the quantitative impacts estimated for each TSL for DPPP motors. The national impacts are measured over the lifetime of DPPP motors purchased in the 30-year period that begins in the anticipated first full year of compliance with amended standards (2026–2055). The energy savings, emissions reductions, and value of emissions reductions refer to full-fuel-cycle results. DOE exercises its own judgment in presenting monetized climate benefits as recommended in applicable Executive orders and DOE would reach the same conclusion presented in this notice 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. The efficiency levels contained in each TSL are described in section V.A of this document.

[121] 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.*

[122] Sanstad, A.H. *Notes on the Economics of Household Energy Consumption and Technology Choice.* 2010. Lawrence Berkeley National Laboratory. Available at: *www1.eere.energy.gov/buildings/appliance_standards/pdfs/consumer_ee_theory.pdf (last accessed April 15, 2021).*

TABLE V.29—SUMMARY OF ANALYTICAL RESULTS FOR DPPP MOTORS TSLS: NATIONAL IMPACTS

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7	TSL 8
Cumulative FFC National Energy Savings								
Quads	0.09	0.15	0.43	0.55	0.63	0.67	0.99	0.99
Cumulative FFC Emissions Reduction								
CO_2 (million metric tons)	3.3	5.6	15.9	20.5	23.4	24.7	36.2	36.3
CH_4 (thousand tons)	21.7	36.6	103.7	133.6	152.3	161.8	237.2	237.7
N_2O (thousand tons)	0.04	0.06	0.18	0.23	0.26	0.27	0.40	0.40
SO_2 (thousand tons)	4.6	7.7	21.9	28.2	32.1	34.0	49.9	50.0
NO_X (thousand tons)	1.5	2.5	7.0	9.0	10.2	10.8	15.8	15.9
Hg (tons)	0.01	0.01	0.04	0.05	0.06	0.07	0.10	0.10
Present Value of Benefits and Costs (3% discount rate, billion 2020$)								
Consumer Operating Cost Savings	0.8	1.4	3.9	5.0	5.7	5.9	8.8	8.8
Climate Benefits *	0.2	0.3	0.8	1.0	1.2	1.2	1.8	1.8
Health Benefits **	0.3	0.5	1.5	1.9	2.1	2.2	3.3	3.3
Total Benefits †	1.3	2.2	6.2	7.9	9.0	9.4	13.9	13.9
Consumer Incremental Product Costs	0.1	0.3	2.5	2.8	3.1	0.5	2.5	2.5
Consumer Net Benefits	0.7	1.1	1.4	2.3	2.7	5.4	6.3	6.3
Total Net Benefits	1.2	1.9	3.7	5.2	6.0	8.9	11.4	11.4
Present Value of Benefits and Costs (7% discount rate, billion 2020$)								
Consumer Operating Cost Savings	0.4	0.7	2.1	2.7	3.1	3.1	4.6	4.6
Climate Benefits *	0.2	0.3	0.8	1.0	1.2	1.2	1.8	1.8
Health Benefits **	0.2	0.3	0.7	0.9	1.1	1.1	1.6	1.6
Total Benefits †	0.8	1.3	3.6	4.7	5.3	5.4	8.0	8.0
Consumer Incremental Product Costs	0.1	0.2	1.4	1.6	1.7	0.4	1.5	1.6
Consumer Net Benefits	0.4	0.6	0.7	1.1	1.3	2.7	3.0	3.0
Total Net Benefits	0.7	1.1	2.2	3.1	3.6	5.0	6.4	6.4

Note: This table presents the costs and benefits associated with DPPP motors shipped in 2026–2055. These results include benefits to consumers which accrue after 2055 from the products shipped in 2026–2055.

* Climate benefits are calculated using four different estimates of the social cost of carbon (SC–CO_2), methane (SC–CH_4), and nitrous oxide (SC–N_2O) (model average at 2.5 percent, 3 percent, and 5 percent discount rates; 95th percentile at 3 percent discount rate), as shown in Table V.23 through Table V.25. Together these represent the global SC–GHG. 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. See section IV.L of this document for more details. 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 presents 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.L 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.

TABLE V.30—SUMMARY OF ANALYTICAL RESULTS FOR DPPP MOTORS TSLS: MANUFACTURER AND CONSUMER IMPACTS

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6	TSL 7	TSL 8
Manufacturer Impacts								
Industry NPV (million 2020$) (No-new-standards case INPV = 798)	797–800	795–804	770–823	768–829	765–835	704–826	608–901	608–901
Industry NPV *(% change)*	(0.1)–0.2	(0.4)–0.8	(3.5)–3.2	(3.8)–3.9	(4.1)–4.7	(11.7)–3.6	(23.7)–12.9	(23.8)–13.0
Consumer Average LCC Savings (2020$)								
Extra Small-Size	3	(6)	(6)	(6)	(6)	3	3	(6)
Small-Size	11	20	(38)	3	7	11	69	69
Standard-Size	32	50	120	156	176	292	292	292
Shipment-Weighted Average *	19	32	30	68	78	129	161	161
Consumer Simple PBP (years)								
Extra Small-Size	0.7	2.1	2.1	2.1	2.1	0.7	0.7	2.1
Small-Size	0.3	0.7	3.3	2.5	2.5	0.3	2.3	2.3
Standard-Size	0.4	0.5	0.7	0.7	0.7	0.9	0.9	0.9
Shipment-Weighted Average *	0.4	0.6	2.2	1.7	1.8	0.6	1.7	1.7
Percent of Consumers that Experience a Net Cost								
Extra Small-Size	0%	54%	54%	54%	54%	0%	0%	54%
Small-Size	0%	11%	42%	36%	38%	0%	30%	30%
Standard-Size	0%	0%	15%	13%	13%	2%	2%	2%
Shipment-Weighted Average *	0%	8%	31%	27%	28%	1%	17%	19%

Parentheses indicate negative (−) values.

* Weighted by shares of each equipment class in total projected shipments in 2026.

DOE first considered TSL 8, which represents the max-tech efficiency levels. TSL 8 would save an estimated 0.99 quads of FFC energy, an amount DOE considers significant. Under TSL 8, the NPV of consumer benefit would be $3.0 billion using a discount rate of 7 percent, and $6.3 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 8 are 36.3 Mt of CO_2, 15.9 thousand tons of SO_2, 50.0 thousand tons of NO_X, 0.1 ton of Hg, 237.7 thousand tons of CH_4, and 0.4 thousand tons of N_2O. 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 8 is $1.8 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 8 is $1.6 billion using a 7-percent discount rate and $3.3 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 8 is $6.4 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 8 is $11.4 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 8, the average LCC impact is a savings of −$6 for extra small-size DPPP motors, $69 for small size DPPP motors, and $292 for standard-size DPPP motors. The simple payback period is 2.1 years for extra small-size DPPP motors, 2.3 years for small-size DPPP motors, and 0.9 years for standard-size DPPP motors. The fraction of consumers experiencing a net LCC cost is 54 percent for extra small-size DPPP motors, 30 percent for small-size DPPP motors, and 2 percent for standard-size DPPP motors.

At TSL 8, the projected change in manufacturer INPV ranges from a decrease of $189.7 million to an increase of $103.6 million, which correspond to a decrease of 23.8 percent and an increase of 13.0 percent, respectively. DOE estimates that industry must invest $46.3 million to comply with standards set at TSL 8. DOE estimates that approximately 33 percent of extra-small size DPPP motor shipments, 39 percent of small size DPPP motor shipments, and 66 percent of standard size DPPP motor shipments would meet the efficiency levels analyzed at TSL 8.

The Secretary tentatively concludes that at TSL 8 for DPPP motors, 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 some consumers, including average negative LCC for extra small-size DPPP motors, including those consumers in senior-only households. Consequently, the Secretary has tentatively concluded that TSL 8 is not economically justified.

DOE then considered TSL 7, which would save an estimated 0.99 quads of FFC energy, an amount DOE considers significant. Under TSL 7, the NPV of consumer benefit would be $3.0 billion using a discount rate of 7 percent, and $6.3 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 7 are 36.2 Mt of CO_2, 15.8 thousand tons of SO_2, 49.9 thousand tons of NO_X, 0.1 tons of Hg, 237.2 thousand tons of CH_4, and 0.4 thousand tons of N_2O. 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 7 is $1.8 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 7 is $1.6 billion using a 7-percent discount rate and $3.3 billion using a 3-percent discount rate.

Using a 7-percent discount rate for consumer benefits and costs and 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 7 is $6.4 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 7 is $11.4 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 7, the average LCC impact is a savings of $3 for extra small-size DPPP motors, $69 for small size DPPP motors, and $292 for standard-size DPPP motors. The simple payback period is 0.7 years for extra small-size DPPP motors, 2.3 years for small-size DPPP motors, and 0.9 years for standard-size DPPP motors. The fraction of consumers experiencing a net LCC cost is zero percent for extra small-size DPPP motors, 30 percent for small-size DPPP motors, and 2 percent for standard-size DPPP motors.

At TSL 7, the projected change in manufacturer INPV ranges from a decrease of $193.3 million to an increase of $102.9 million, which represent a decrease of 23.7 percent and an increase of 12.9 percent, respectively. DOE estimates that industry must invest $46.2 million to comply with standards set at TSL 7. DOE estimates that approximately 93 percent of extra-small size DPPP motor shipments, 39 percent of small size DPPP motor shipments, and 66 percent of standard size DPPP motor shipments would meet the efficiency levels analyzed at TSL 7.

After considering the analysis and weighing the benefits and burdens, the Secretary has tentatively concluded that at TSL 7 for DPPP motors, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, the estimated monetary value of the emissions reductions, and positive average LCC savings would outweigh the negative impacts on some consumers and on manufacturers, including the $46.2 million in conversion costs that could result in a reduction in INPV for manufacturers of up to 23.8 percent.

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 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 at TSL 7, average LCC savings are positive for all equipment classes which is not the case at TSL 8.

Although DOE considered proposed amended standard levels for DPPP motors by grouping the efficiency levels for each equipment category into TSLs, DOE evaluates all analyzed efficiency levels in its analysis. TSL 8 represents the max-tech energy efficiency for all equipment classes. As discussed previously, the max-tech level for extra small DPPPM would lead to average negative LCC for extra small-size DPPP motors, including those consumers in senior-only households. The benefits of max-tech efficiency levels for extra small DPPPM do not outweigh the negative impacts to consumers. DOE has tentatively concluded that TSL 8 is not economically justified.

Therefore, based on the previous considerations, DOE proposes to adopt the energy conservation standards for DPPP motors at TSL 7. The proposed amended energy conservation standards for DPPP motors, which are expressed as performance and design requirements are shown in Table V.31 of this document.

TABLE V.31—PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS

Motor total horsepower (THP)	Performance standard: full-load efficiency (%)	Design requirement: speed capability	Design requirement: freeze protection
THP < 0.5	69	None	None.
0.5 ≤ THP < 1.15		Variable speed control	Only for DPPP motors with freeze protection controls.
1.15 ≤ THP ≤ 5		Variable speed control	Only for DPPP motors with freeze protection controls.

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 2020$) 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.32 shows the annualized values for DPPP motors under TSL 7, expressed in 2020$. 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 SO_2 and NO_X 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 $163.5 million per year in increased equipment costs, while the estimated annual benefits are $482.3 million in reduced equipment operating costs, $104.2 million in climate benefits, and $168.7 million in health benefits. In this case, the net benefit would amount to $591.6 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards is $142.9 million per year in increased equipment costs, while the estimated annual benefits are $504.2 million in reduced operating costs $104.2 million in climate benefits, and $188.9 million in health benefits. In this case, the net benefit would amount to $654.4 million per year.

TABLE V.32—ANNUALIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS

[TSL 7]

	Million 2020$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
3% discount rate			
Consumer Operating Cost Savings	504.2	436.2	580.9
Climate Benefits *	104.2	92.6	115.6
Health Benefits **	188.9	168.1	209.3
Total Benefits †	797.3	696.9	905.9
Consumer Incremental Equipment Costs	142.9	110.0	178.0
Net Benefits	654.4	587.0	727.9
7% discount rate			
Consumer Operating Cost Savings	482.3	424.8	546.8
Climate Benefits * (3% discount rate)	104.2	92.6	115.6
Health Benefits **	168.7	152.0	185.0
Total Benefits †	755.2	669.5	847.5
Consumer Incremental Equipment Costs	163.5	129.2	199.0
Net Benefits	591.6	540.3	648.5

Note: This table presents the costs and benefits associated with DPPP motors shipped in 2026–2055. These results include benefits to consumers which accrue after 2055 from the products shipped in 2026–2055. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the AEO2021 Reference case, Low Economic Growth case, and High Economic Growth case, respectively. In addition, incremental equipment costs reflect a medium decline rate in the Primary Estimate, a low decline rate in the Low Net Benefits Estimate, and a high decline rate in the High Net Benefits Estimate. The methods used to derive projected price trends are explained in sections IV.F.1 and IV.H.1of this document. Note that the Benefits and Costs may not sum to the Net Benefits due to rounding.

* Climate benefits are calculated using four different estimates of the SC–GHG). 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, and it emphasizes the importance and value of considering the benefits calculated using all four SC–GHG estimates. 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 presents 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.L of this document for more details.

† Total 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.

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, OIRA 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 regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit ''significant regulatory actions'' to the Office of Information and Regulatory Affairs (''OIRA'') for review. OIRA has determined that this proposed regulatory action constitutes a ''significant regulatory action'' under section 3(f) 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. A summary of the potential costs and benefits of the regulatory action is presented in Table VI.1.

TABLE VI.1—ANNUALIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS

[TSL 7]

	Million 2020$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
3% discount rate			
Consumer Operating Cost Savings	504.2	436.2	580.9
Climate Benefits *	104.2	92.6	115.6
Health Benefits **	188.9	168.1	209.3
Total Benefits †	797.3	696.9	905.9
Consumer Incremental Equipment Costs	142.9	110.0	178.0
Net Benefits	654.4	587.0	727.9
7% discount rate			
Consumer Operating Cost Savings	482.3	424.8	546.8
Climate Benefits * (3% discount rate)	104.2	92.6	115.6
Health Benefits **	168.7	152.0	185.0

TABLE VI.1—ANNUALIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR DPPP MOTORS—Continued

[TSL 7]

	Million 2020$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
Total Benefits †	755.2	669.5	847.5
Consumer Incremental Equipment Costs	163.5	129.2	199.0
Net Benefits	591.6	540.3	648.5

Note: This table presents the costs and benefits associated with DPPP motors shipped in 2026–2055. These results include benefits to consumers which accrue after 2055 from the products shipped in 2026–2055. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the AEO2021 Reference case, Low Economic Growth case, and High Economic Growth case, respectively. In addition, incremental equipment costs reflect a medium decline rate in the Primary Estimate, a low decline rate in the Low Net Benefits Estimate, and a high decline rate in the High Net Benefits Estimate. The methods used to derive projected price trends are explained in sections IV.F.1 and IV.H.1of this document. Note that the Benefits and Costs may not sum to the Net Benefits due to rounding.

* Climate benefits are calculated using four different estimates of the global SC–GHG (see section IV.L 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, and it emphasizes the importance and value of considering the benefits calculated using all four SC–GHG estimates. 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 presents 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.L of this document for more details.

† Total 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.

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 rulemaking.

For manufacturers of DPPP motors, 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, listed by respective North American Industry Classification System Codes (''NAICS'') and industry descriptions, are available at *www.sba.gov/document/support—table-size-standards.* Manufacturing of DPPP motors is classified under NAICS 335312, ''Motor and Generator Manufacturing.'' The SBA sets a threshold of 1,250 employees or fewer for an entity in this category to be considered as a small business. This threshold includes employees of the entity itself as well as any parent, subsidiary, or sister organizations.

1. Description of Reasons Why Action Is Being Considered

On January 18, 2017, DOE published a direct final rule establishing energy conservation standards for DPPPs. (82 FR 5650) Following this, DOE received feedback from manufacturers in support of regulating DPPP motors that would serve as replacement motors to the regulated pool pumps. On August 14, 2018, DOE received a petition submitted by a variety of entities (collectively, the ''Joint Petitioners'') requesting that DOE issue a direct final rule to establish prescriptive standards and a labeling requirement for DPPP motors (''Joint Petition'').[123] On February 5, 2019, the Association of Pool & Spa Professionals (''APSP''), National Electrical Manufacturers Association (''NEMA''), Hayward, Pentair, Nidec Motors, Regal Beloit, WEG Commercial Motors, and Zodiac Pool Systems met with DOE to present an alternative approach to the Joint Petition, suggesting DOE propose a labeling requirement for DPPP motors. (February 2019 *Ex Parte* Meeting, No. 43 at p. 1)

On October 5, 2020, in response to the Joint Petition and the alternative recommendation, DOE published a NOPR proposing to establish a test procedure and an accompanying labeling requirement for DPPP motors. Following this, on July 29, 2021, DOE published a final rule adopting a test procedure for DPPP motors. 86 FR 40765. DOE did not establish a labeling requirement and stated that it intends to address any such labeling and/or energy conservation standards requirement in a separate notification.

2. Objectives of, and Legal Basis for, Rule

As discussed previously in section II.A, EPCA authorizes DOE to regulate

[123] The Joint Petition is available at *www.regulations.gov/document?D=EERE-2017-BT-STD-0048-0014.*

the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part C of EPCA, added by Public Law 95–619, Title IV, section 441(a) (42 U.S.C. 6311–6317, as codified), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This equipment includes those electric motors that are DPPP motors, the subject of this document. (42 U.S.C. 6311(1)(A))

DOE must follow specific statutory criteria for prescribing new or amended standards for covered equipment, including those electric motors that are DPPP motors. 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. 6316(a); 42 U.S.C. 6295(o)(2)(A) and 42 U.S.C. 6295(o)(3)(B)) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6316(a); 42 U.S.C. 6295(o)(3))

3. Description on Estimated Number of Small Entities Regulated

DOE reviewed the potential standard levels considered in this NOPR under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. During its market survey, DOE used publicly available information to identify potential small manufacturers. DOE's research involved industry trade association membership directories (*e.g.,* AHRI), information from previous rulemakings, individual company websites, and market research tools (*e.g.,* D&B Hoover's reports) to create a list of companies that manufacture DPPP motors.

As previously stated, manufacturing of DPPP motors is classified under NAICS 335312, ''Motor and Generator Manufacturing,'' for which the SBA sets a threshold of 1,250 employees or fewer for an entity to be considered as a small business. DOE screened out companies that do not offer products impacted by this rulemaking, do not meet the definition of a ''small business,'' or are foreign owned and operated.

DOE identified five companies manufacturing DPPP motors for the domestic market, of those DOE determined that one company met the SBA definition of a small business. DOE contacted this small business regarding a discussion of potential DPPP motor standards, but the small business was not interested in discussing potential impacts of energy conservation standards on DPPP motors.

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

DOE reviewed the website and catalog offerings of the identified small business and determined that the manufacturer offers extra small sized DPPP motors that would meet requirements under the proposed standards as well as standard sized DPPP motors that are capable of variable speed. The small business is expected to need to introduce one variable speed, small sized DPPP motor model in order to comply with the energy conservation standards proposed in this NOPR.

There are two types of costs the small business could incur due to the proposed standards for DPPP motors: product conversion costs and capital conversion costs. Product conversion costs are investments in R&D, testing, marketing, and other non-capitalized costs necessary to make equipment designs comply with new 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 equipment designs can be fabricated and assembled.

DOE anticipates that the small business will incur approximately $1.1 million in product conversion costs—accounting for the compensation of four full-time engineers for 24 months of product design and testing work—and approximately $2.5 million in capital conversion costs to build a suitable production line to manufacture one small size DPPP motor model that would comply with the energy conservation standards for the small size DPPP motors proposed in this NOPR. Therefore, this small business would incur a total of approximately $3.6 million in conversion costs. DOE was able to identify an annual revenue estimate of approximately $28.2 million for the small business.[124] The $3.6 million in conversion cost represents 12.8 percent of the estimated annual revenue of the small business.

DOE assumes that all DPPP motor manufacturers would spread these costs over the five-year compliance timeframe, as standards are expected to require compliance approximately five years after the publication of a final rule. Therefore, DOE assumes that this small business would incur on average about $720,000 or approximately 2.6 percent of its annual revenue in each of the five years leading up to the compliance date.

DOE requests comment on its findings that there is one domestic small business that manufactures DPPP motors and on its estimate of the potential impacts on this small business.

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

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

DOE has established test procedures, labeling requirements, and energy conservation standards for certain electric motors (10 CFR part 431 subpart B), but those requirements do not apply to DPPP motors subject to the proposed energy conservation standards requirements because they do not fall within any of the specific classes of electric motors that are currently regulated by DOE.

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 7. In reviewing alternatives to the proposed rule, DOE examined energy conservation standards set at lower efficiency levels. While TSL 1 through TSL 6 would reduce the impacts on small business manufacturers, it would come at the expense of a reduction in energy savings. TSL 1 through TSL 6 achieve 91 percent to 32 percent lower energy savings compared to the energy savings at TSL 7.

Based on the presented discussion, establishing standards at TSL 7 balances the benefits of the energy savings at TSL 7 with the potential burdens placed on DPPP motor manufacturers, including small business manufacturers. 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

[124] The small business's annual revenue estimate is taken from D&B Hoovers (*app.avention.com*).

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

DOE's certification and compliance activities ensure accurate and comprehensive information about the energy and water use characteristics of covered products and covered equipment sold in the United States. Manufacturers of all covered products and covered equipment with applicable standards must submit a certification report before a basic model is distributed in commerce, annually thereafter, and if the basic model is redesigned in such a manner to increase the consumption or decrease the efficiency of the basic model such that the certified rating is no longer supported by the test data. Additionally, manufacturers must report when production of a basic model has ceased and is no longer offered for sale as part of the next annual certification report following such cessation. DOE requires the manufacturer of any covered product or covered equipment to establish, maintain, and retain the records of certification reports, of the underlying test data for all certification testing, and of any other testing conducted to satisfy the requirements of 10 CFR part 429, 10 CFR part 430, and/or 10 CFR part 431. Certification reports provide DOE and consumers with comprehensive, up-to date efficiency information and support effective enforcement.

DOE is not proposing certification or reporting requirements for DPPPM in this NOPR. Were DOE to establish energy conservation standards for DPPPM, certification of compliance would not be required until such time as DOE establishes such energy conservation standards and manufacturers are required to comply with those standards. DOE may consider proposals to establish certification requirements and reporting for DPPPM under a separate rulemaking regarding appliance and equipment certification.

DOE will address changes to OMB Control Number 1910–1400 at that time, as necessary. 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 proposed 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 equipment 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. 6316(a) and (b); 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. Public Law 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 DPPPM 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 DPPPM, 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(o)(A) through 42 U.S.C. 6316(a), this proposed rule would establish energy conservation standards for DPPPM that are designed to achieve the maximum improvement in energy efficiency that DOE has determined to be both technologically feasible and economically justified. A full discussion of the alternatives considered by DOE is presented in 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 proposes energy conservation standards for DPPPM, 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.[125]

[125] 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 10/27/21).

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, 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.[126]

M. Description of Materials Incorporated by Reference

In this NOPR, DOE is proposing to incorporate by reference the standard published by UL, titled, Standard For Pool Pump Motors, UL 1004–10:2022. UL 1004–10:2022 establishes definitions for certain pool pump motors, and includes test requirements to verify variable-speed capability and applicable freeze protection design requirements. UL 1004–10 is readily available at UL's website at *https://www.shopulstandards.com/ProductDetail.aspx?productId=UL1004-10_1_S_20200228.*

VII. Public Participation

A. Participation in the Webinar

The time and date of the webinar meeting are listed in the **DATES** section at the beginning of this document. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website: *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 an interest in the topics addressed in this document, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Such persons may submit to *ApplianceStandardsQuestions@ee.doe.gov.* Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

Persons requesting to speak should briefly describe the nature of their interest in this rulemaking and provide a telephone number for contact. DOE requests persons selected to make an oral presentation to submit an advance copy of their statements at least two weeks before the webinar. At its discretion, DOE may permit persons who cannot supply an advance copy of their statement to participate, if those persons have made advance alternative arrangements with the Building Technologies Office. As necessary, requests to give an oral presentation should ask for such alternative arrangements.

C. Conduct of the Webinar

DOE will designate a DOE official to preside at the webinar 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 webinar. 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 webinar and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The public meeting will be conducted in an informal, conference style. DOE will present a general overview of the topics addressed in this proposed rulemaking, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this proposed 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 proposed 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* web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

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

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

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. Comments and documents submitted via email 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. 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, 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 seeks comment on updating the UL 1004–10 reference from the 2020 version to the 2022 version.

(2) DOE seeks comment on the proposed equipment classes for DPPP motors based on motor THP thresholds.

(3) DOE seeks comment on the technologies considered for higher DPPP motor efficiency. DOE seeks comment on whether other motor topologies should be considered as applicable in pool pumps.

(4) DOE seeks comment on the proposed representative units and associated DPPP applications used for the engineering analysis.

(5) DOE seeks comment on the efficiency levels, including the associated full load efficiencies and design requirements evaluated in the engineering analysis.

(6) DOE seeks comment on using a 1.37 manufacturer markup for the cost analysis.

(7) DOE seeks comment on the cost methodology and associated costs for each of efficiency levels evaluated in the engineering analysis, including any associated costs for the proposed freeze protection controls requirement.

(8) DOE seeks comment on the distribution channels identified for DPPP motors and fraction of sales that go through each of these channels.

(9) DOE seeks comment on the overall methodology to develop consumer samples and on the fraction of DPPP motor existing stock across the five following markets: (1) single-family homes with a swimming pool; (2) indoor swimming pools in commercial applications; (3) single-family community swimming pools; (4) multi-family community swimming pools; and (5) outdoor swimming pools in commercial applications.

(10) DOE seeks comment on the overall methodology and inputs used to estimate DPPP motor energy use. Specifically, DOE seeks feedback on the average daily operating hours and annual days of operation used in the energy use analysis.

(11) DOE seeks comment on the approach and inputs used to project an equipment price trend for DPPP motors.

(12) DOE seeks comment on installation costs estimates used in the LCC analysis.

(13) DOE seeks comment on its decision to not include DPPP motor repair and maintenance costs in the LCC analysis.

(14) DOE seeks comment on the approach and inputs used to develop DPPP motor lifetime estimates.

(15) DOE seeks comment on the approach and inputs used to develop no-new standards case efficiency distributions in 2021. DOE seeks feedback on the approach used to project no-new standards case efficiency distributions in future years.

(16) DOE seeks comment on the approach and inputs used to develop base year shipments and for DPPP motors.

(17) DOE seeks comment on the approach and inputs used to develop no-new standards case shipments projections.

(18) DOE seeks comment on the approach and inputs used to develop the different standards case shipments projections. Specifically, at TSL 6. DOE requests information and feedback on the estimated fraction of standard-size DPPP motors used in small self-priming pool filter pumps and in non-self-priming pool filter pumps that will downsize to small-size DPPP motors.

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

(20) DOE requests comment on its findings that there is one domestic small business that manufactures DPPP motors and on its estimate of the potential impacts on this small business.

Additionally, DOE welcomes comments on other issues relevant to the conduct of this proposed 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

10 CFR Part 429

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Incorporation by reference, Reporting and recordkeeping requirements.

10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation test procedures, Incorporation by reference, and Reporting and recordkeeping requirements.

Signing Authority

This document of the Department of Energy was signed on May 25, 2022, by Kelly J. Speakes-Backman, Principal Deputy 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 May 26, 2022.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

For the reasons set forth in the preamble, DOE proposes to amend parts 429 and 431 of chapter II, title 10 of the Code of Federal Regulations, as set forth below:

PART 429—CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT

■ 1. The authority citation for part 429 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 2. Amend § 429.4 by revising paragraph (a) and adding paragraph (g) to read as follows:

§ 429.4 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the **Federal Register** and the material must be available to the public. All approved material is available for inspection at DOE, and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586–9127, *Buildings@ee.doe.gov, www.energy.gov/eere/buildings/building-technologies-office.* For information on the availability of this material at NARA, email: *fr.inspection@nara.gov,* or go to: *www.archives.gov/federal-register/cfr/ibr-locations.html.* The material may be obtained from the sources in the following paragraphs of this section:

* * * * *

(g) *UL.* Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062, (841) 272–8800, or go to *https://www.ul.com.*

(1) UL 1004–10:2022, ''Standard for Safety for Pool Pump Motors,'' First Edition, Dated February 28, 2020, including revisions through March 24, 2022; IBR approved for § 429.134.

(2) [Reserved]

■ 3. Amend § 429.134 by adding paragraph (s) to read as follows:

§ 429.134 Product-specific enforcement provisions.

* * * * *

(s) *Dedicated-purpose pool pump motors.*

(1) To verify the dedicated-purpose pool pump motor variable speed capability, a test in accordance with Section 5 of UL 1004–10:2022 (incorporated by reference, see § 429.4) will be conducted.

(2) To verify that dedicated-purpose pool pump motor comply with the applicable freeze protection design requirements, a test in accordance with Section 6 of UL 1004–10:2022 will be conducted.

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

■ 4. The authority citation for part 431 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 5. Section 431.481(b) is revised to read as follows:

§ 431.481 Purpose and scope.

* * * * *

(b) *Scope.* The requirements of this subpart apply to dedicated-purpose pool pump motors, as specified in paragraphs 1.2, 1.3 and 1.4 of UL 1004–10:2022 (incorporated by reference, see § 431.482).

* * * * *

■ 6. Section 431.482 is amended by revising paragraphs (a) and (c)(1) to read as follows:

§ 431.482 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the **Federal Register** and the material must be available to the public. All approved material is available for inspection at DOE, and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586–9127, *Buildings@ee.doe.gov, https://www.energy.gov/eere/buildings/building-technologies-office.* For information on the availability of this material at NARA, email: *fr.inspection@nara.gov,* or go to: *www.archives.gov/federal-register/cfr/ibr-locations.html.* The material may be obtained from the sources in the following paragraphs of this section:

* * * * *

(c) * * *

(1) UL 1004–10 (1004–10:2022), ''Standard for Safety for Pool Pump Motors,'' First Edition, Dated February 28, 2020, including revisions through March 24, 2022; IBR approved for §§ 431.481 and 431.483.

* * * * *

■ 7. Section 431.483 is revised to read as follows:

§ 431.483 Definitions.

The definitions applicable to this subpart are defined in Section 2 ''Glossary'' of UL 1004–10:2022 (incorporated by reference, see § 431.482). In addition, the following definition applies:

Basic model means all units of dedicated purpose pool pump motors manufactured by a single manufacturer, that are within the same equipment class, have electrical characteristics that are essentially identical, and do not have any differing physical or functional characteristics that affect energy consumption or efficiency.

■ 8. Section 431.485 is added to subpart Z to read as follows:

§ 431.485 Energy conservation standards.

(a) For the purpose of paragraph (b) of this section, ''THP'' means dedicated-purpose-pool pump motor total horsepower.

(b) Each dedicated-purpose pool pump motor manufactured starting on [*date 24 months after date of final rule publication in the* **Federal Register**] with a THP less than 0.5 THP, must have a full-load efficiency that is not less than 69 percent.

(c) All dedicated-purpose pool pump motors manufactured starting on [*date 24 months after date of final rule publication in the* **Federal Register**] with a THP greater than or equal to 0.5 THP must be a variable speed control dedicated-purpose pool pump motor.

(d) For all dedicated-purpose pool pump motors with a THP greater than or equal to 0.5 THP, distributed in commerce with freeze protection controls, the motor must be shipped with freeze protection disabled or with the following default, user-adjustable settings:

(1) The default dry-bulb air temperature setting is no greater than 40 °F;

(2) The default run time setting shall be no greater than 1 hour (before the temperature is rechecked); and

(3) The default motor speed (in revolutions per minute, or rpm) in freeze protection mode shall not be more than half of the maximum operating speed.

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