DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[EERE–2014–BT–STD–0005]

RIN 1904–AD15

Energy Conservation Program: Energy Conservation Standards for Consumer Conventional Cooking Products

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

ACTION: Supplemental notice of proposed rulemaking and announcement of public meeting.

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

DATES:

Meeting: DOE will hold a public meeting via webinar on Tuesday, January 31, 2023, from 1:00 p.m. to 4:00 p.m. See section VII of this document, ''Public Participation,'' for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

Comments: DOE will accept comments, data, and information regarding this SNOPR no later than April 3, 2023.

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 March 3, 2023.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov,* under docket number EERE–2014–BT–STD–0005. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2014–BT–STD–0005, by any of the following methods:

Email: ConventionalCookingProducts2014STD0005@ee.doe.gov. Include the docket number EERE–2014–BT–STD–0005 in the subject line of the message.

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

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

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

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

The docket web page can be found at *www.regulations.gov/docket/EERE-2014-BT-STD-0005.* 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: Dr. Carl Shapiro, 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) 287–5649. Email: *ApplianceStandardsQuestions@ee.doe.gov.*

Ms. Melanie Lampton, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 287–6122. Email: *Melanie.Lampton@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.*

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I. Synopsis of the Proposed Rule

The Energy Policy and Conservation Act, Public Law 94–163, as amended (''EPCA''),[1] authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317). Title III, Part B of EPCA[2] established the Energy Conservation Program for Consumer Products Other Than Automobiles. (42 U.S.C. 6291–6309). These products include consumer conventional cooking products, the subject of this rulemaking.

Pursuant to EPCA, any new or amended energy conservation standard must be designed to achieve the maximum improvement in energy efficiency that DOE determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)). Furthermore, the new or amended standard must result in a significant conservation of energy. (42 U.S.C. 6295(o)(3)(B)). EPCA also provides that not later than six years after issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a notice of proposed rulemaking including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m)).

In accordance with these and other statutory provisions discussed in this document, DOE proposes new and amended energy conservation standards for consumer conventional cooking products. Per its authority in 42 U.S.C. 6295(h)(2), DOE proposes to remove the existing prescriptive standard for gas cooking tops prohibiting a constant burning pilot light. Instead, for conventional cooking tops, DOE proposes performance standards only, shown in Table I.1 which are the maximum allowable integrated annual energy consumption (''IAEC'') and expressed in kilowatt-hours per year (''kWh/year'') for electric cooking tops and thousand British thermal units per year (''kBtu/year'') for gas cooking tops. The IAEC includes active mode, standby mode, and off mode energy use. These proposed standards for conventional cooking tops, if adopted, would apply to all product classes listed in Table I.1 and manufactured in, or imported into, the United States starting on the date three years after the publication of any final rule for this rulemaking. DOE notes that constant burning pilot lights, which are currently prohibited under the existing prescriptive standard for gas cooking tops, 10 CFR 430.32(j), consume approximately 2,000 kBtu/year. While DOE's proposal would remove this prescriptive requirement from its regulations, DOE notes that, based on its review of the existing prescriptive standard prohibiting constant burning pilots for gas cooking tops, the proposed

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116–260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A–1 of EPCA.

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

performance standards of 1,204 kBtu per year for gas cooking tops would not be achievable by products if they were to incorporate a constant burning pilot.

TABLE I.1—PROPOSED ENERGY CONSERVATION PERFORMANCE STANDARDS FOR CONVENTIONAL COOKING TOPS

Product class	Maximum integrated annual energy consumption (IAEC)
Electric Open (Coil) Element Cooking Tops	199 *kWh/year.*
Electric Smooth Element Cooking Tops	207 *kWh/year.*
Gas Cooking Tops	1,204 *kBtu/year.*

For conventional ovens, the proposed standard is a prescriptive design requirement for the control system of the oven. Conventional ovens shall not be equipped with a control system that uses a linear power supply. (*See* Table I.2). These proposed standards, if adopted, would apply to all conventional ovens manufactured in, or imported into, the United States starting on the date three years after the publication of the final rule for this rulemaking. DOE also notes that the current prescriptive standards for conventional gas ovens prohibiting constant burning pilot lights would continue to be applicable. (10 CFR 430.32(j)). Table I.2 provides a summary of the proposed standards for conventional ovens.

TABLE I.2—PROPOSED PRESCRIPTIVE ENERGY CONSERVATION STANDARDS FOR CONVENTIONAL OVENS

Product class	Current standard	Current SNOPR proposed standards
Electric Standard, Freestanding Electric Standard, Built-In/Slide-In. Electric Self-Clean, Freestanding. Electric Self-Clean, Built-In/Slide-In.	None	Shall not be equipped with a control system that uses linear power supply.*
Gas Standard, Freestanding Gas Standard, Built-In/Slide-In. Gas Self-Clean, Freestanding. Gas Self-Clean, Built-In/Slide-In.	No constant burning pilot light	The control system for gas ovens shall: (1) Not be equipped with a constant burning pilot light; and (2) Not be equipped with a linear power supply.*

* A linear power supply produces unregulated as well as regulated power. The unregulated portion of a linear power supply typically consists of a transformer that steps alternating current (''AC'') line voltage down, a voltage rectifier circuit for AC to direct current (''DC'') conversion, and a capacitor to produce unregulated, direct current output. Linear power supplies are described in section IV.C.1.b of this SNOPR.

A. Benefits and Costs to Consumers

Table I.3 presents DOE's evaluation of the economic impacts of the proposed standards, represented by trial standard level (''TSL'') 2, on consumers of conventional cooking products, as measured by the average life-cycle cost (''LCC'') savings and the simple payback period (''PBP'').[3] The shipment-weighted average LCC savings are positive for all product classes, and the shipment-weighted PBP is less than the average lifetime of consumer conventional cooking products, which is estimated to be 16.8 years for electric cooking products and 14.5 years for gas cooking products (*see* section IV.F.6 of this document).

TABLE I.3—IMPACTS OF PROPOSED ENERGY CONSERVATION STANDARDS ON CONSUMERS OF CONVENTIONAL COOKING PRODUCTS

Product class	Average LCC savings (2021$)	Simple payback period (years)
Electric Open (Coil) Element Cooking Tops *	$0.00	n.a.
Electric Smooth Element Cooking Tops	13.29	0.6
Gas Cooking Tops	21.89	5.0
Electric Standard Ovens, Freestanding	0.99	1.7
Electric Standard Ovens, Built-In/Slide-In	0.95	1.8
Electric Self-Clean Ovens, Freestanding	1.02	1.7
Electric Self-Clean Ovens, Built-In/Slide-In	1.01	1.8
Gas Standard Ovens, Freestanding	0.65	1.9
Gas Standard Ovens, Built-In/Slide-In	0.59	2.0
Gas Self-Clean Ovens, Freestanding	0.70	1.9
Gas Self-Clean Ovens, Built-In/Slide-In	0.60	2.0
Shipment-weighted Average **	6.75	2.0

* The entry ''n.a.'' means not applicable because the standard at the proposed TSL is the baseline.
** Results are weighted by projected shipments of the compliance year (2027).

[3] The average LCC savings refer to consumers that are affected by a standard and are measured relative to the efficiency distribution in the no-new-standards case, which depicts the market in the compliance year in the absence of new or amended standards (*see* section IV.F.9 of this document). The simple PBP, which is designed to compare specific efficiency levels, is measured relative to the baseline product (*see* section IV.C of this document).

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 (2022–2056). Using a real discount rate of 9.1 percent, DOE estimates that the INPV for manufacturers of consumer conventional cooking products in the case without new and amended standards is $1,607 million in 2021 dollars. Under the proposed standards, the change in INPV is estimated to range from –9.6 percent to –9.4 percent, which is approximately −$154.8 million to −$150.4 million. In order to bring products into compliance with new and amended standards, it is estimated that the industry would incur total conversion costs of $183.4 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 [4]

DOE's analyses indicate that the proposed energy conservation standards for consumer conventional cooking products would save a significant amount of energy. Relative to the case without new and amended standards, the lifetime energy savings for consumer conventional cooking products purchased in the 30-year period that begins in the anticipated year of compliance with the new and amended standards (2027–2056) amount to 0.46 quadrillion British thermal units (''Btu''), or quads.[5] This represents a savings of 3.4 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 consumer conventional cooking products ranges from $0.65 billion (at a 7-percent discount rate) to $1.71 billion (at a 3-percent discount rate). This NPV expresses the estimated total value of future operating-cost savings minus the estimated increased product and installation costs for consumer conventional cooking products purchased in 2027–2056.

In addition, the proposed standards for consumer conventional cooking products 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 21.9 million metric tons (''Mt'')[6] of carbon dioxide (''CO_2''), 2.2 thousand tons of sulfur dioxide (''SO_2''), 51.8 thousand tons of nitrogen oxides (''NO_X''), 244.9 thousand tons of methane (''CH_4''), 0.1 thousand tons of nitrous oxide (''N_2O''), and 0.01 tons of mercury (''Hg'').[7]

DOE estimates the value of climate benefits from a reduction in greenhouse gases (''GHG'') using four different estimates of the social cost of CO_2 (''SC-CO_2''), the social cost of methane (''SC-CH_4''), and the social cost of nitrous oxide (''SC-N_2O''). Together these represent the social cost of GHG (''SC-GHG'').[8] DOE used interim SC-GHG values developed by an Interagency Working Group on the Social Cost of Greenhouse Gases (''IWG'').[9] 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 $1.17 billion. DOE does not have a single central SC-GHG point estimate and it emphasizes the importance and value of considering the benefits calculated using all four SC-GHG estimates.

DOE estimated the monetary health benefits from SO_2 and NO_X emissions reductions using benefit per ton estimates from the scientific literature, as discussed in section IV.L of this document. DOE estimated the present value of the health benefits would be $0.61 billion using a 7-percent discount rate, and $1.63 billion using a 3-percent discount rate.[10] 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.

Table I.4 summarizes the economic benefits and costs expected to result from the proposed standards for consumer conventional cooking products. There are other important unquantified effects, including certain unquantified climate benefits, unquantified public health benefits from the reduction of toxic air pollutants, direct $PM_{2.5}$ and other emissions that affect both indoor and outdoor air quality, unquantified energy security benefits, and distributional effects, among others.

[4] All monetary values in this document are expressed in 2021 dollars.

[5] The quantity refers to full-fuel-cycle (''FFC'') energy savings. FFC energy savings includes the energy consumed in extracting, processing, and transporting primary fuels (*i.e.,* coal, natural gas, petroleum fuels), and, thus, presents a more complete picture of the impacts of energy efficiency standards. For more information on the FFC metric, see section IV.H.1 of this document.

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

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

[8] On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22–30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana* v. *Biden,* No. 21–cv–1074–JDC–KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in the 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. As reflected in this rule, DOE has reverted to its approach prior to the injunction and presents monetized benefits where appropriate and permissible under law.

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

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

TABLE I.4—SUMMARY OF MONETIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS

[TSL 2]

	Billion 2021$
3% discount rate	
Consumer Operating Cost Savings	2.28
Climate Benefits *	1.17
Health Benefits **	1.63
Total Monetized Benefits †	5.08
Consumer Incremental Product Costs ‡	0.56
Net Monetized Benefits	4.51
7% discount rate	
Consumer Operating Cost Savings	0.95
Climate Benefits * (3% discount rate)	1.17
Health Benefits **	0.61
Total Monetized Benefits †	2.74
Consumer Incremental Product Costs ‡	0.31
Net Monetized Benefits	2.43

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

* Climate benefits are calculated using four different estimates of the 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) (see section IV.L of this document). 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 DOE does not have a single central SC-GHG point estimate. On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22–30087) granted the Federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana* v. *Biden,* No. 21–cv–1074–JDC–KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the Federal government's appeal of that injunction or a further court order. Among other things, the preliminary injunction enjoined the defendants in that case from ''adopting, employing, treating as binding, or relying upon'' the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. As reflected in this rule, DOE has reverted 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 DOE 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.

‡ Costs include incremental equipment costs as well as installation costs.

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 reductions, all annualized.[11]

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 consumer conventional cooking products shipped in 2027–2056. The benefits associated with reduced emissions achieved as a result of the proposed standards are also calculated based on the lifetime of consumer conventional cooking products shipped in 2027–2056. 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 are presented for all four discount rates in section IV.L of this document.

Table I.5 presents the total estimated monetized benefits and costs associated with the proposed standard, expressed in terms of annualized values. 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, 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 $32.5 million per year in increased equipment costs, while the estimated annual benefits are $100.8 million in reduced equipment operating costs, $67.0 million in climate benefits, and $64.9 million in health benefits. In this case, the net benefit would amount to $200.3 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards is $32.2 million per year in increased equipment costs, while the estimated annual benefits are $130.7 million in reduced operating costs, $67.0 million in climate benefits, and $93.8 million in health benefits. In this case, the net benefit would amount to $259.2 million per year.

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

TABLE I.5—ANNUALIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS

[TSL 2]

	Million 2021$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
3% discount rate			
Consumer Operating Cost Savings	130.7	124.7	137.9
Climate Benefits *	67.0	65.3	68.4
Health Benefits **	93.8	91.4	95.6
Total Monetized Benefits †	291.5	281.4	301.8
Consumer Incremental Product Costs ‡	32.2	36.1	31.4
Net Monetized Benefits	259.2	245.2	270.4
7% discount rate			
Consumer Operating Cost Savings	100.8	96.5	105.8
Climate Benefits * (3% discount rate)	67.0	65.3	68.4
Health Benefits **	64.9	63.4	66.0
Total Monetized Benefits †	232.8	225.3	240.2
Consumer Incremental Product Costs ‡	32.5	35.8	31.8
Net Monetized Benefits	200.3	189.5	208.4

Note: This table presents the costs and benefits associated with consumer conventional cooking products shipped in 2027–2056. These results include benefits to consumers which accrue after 2056 from the products shipped in 2027–2056. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the *AEO2022* 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.3 of 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. Aa reflected in this rule, DOE has reverted 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) $PM_{2.5}$ 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 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.

‡ Costs include incremental equipment costs as well as installation costs.

DOE's analysis of the national impacts of the proposed standards is described in sections IV.H, 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 product 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. That conclusion remains true under any reasonable analytical assumption—*i.e.,* the proposed standards are net beneficial under any discount rate (both for climate and non-climate benefits and costs), any cost scenario, and any other scenario DOE analyzed. Moreover, because consumer operating cost savings and health benefits alone greatly exceed costs under all such assumptions and scenarios, DOE noted that this conclusion does not depend on climate benefits (though DOE's estimates of climate benefits remain important and robust).

Using a 7-percent discount rate for consumer benefits and costs and NO_X and SO_2 reduction benefits, and a 3-percent discount rate case for GHG social costs, the estimated cost of the proposed standards for consumer conventional cooking products is $32.5 million per year in increased product costs, while the estimated annual benefits are $100.8 million in reduced product operating costs, $67.0 million in climate benefits and $64.9 million in health benefits. The net monetized benefit amounts to $200.3 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.[12] For example, some covered products and equipment have substantial 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

[12] 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).

relatively constant demand. Accordingly, DOE evaluates the significance of energy savings on a case-by-case basis.

As previously mentioned, the standards are projected to result in estimated national energy savings of 0.46 quads FFC, the equivalent of the electricity use of 19 million residential homes in one year. The NPV of consumer benefit for these projected energy savings is $0.65 billion using a discount rate of 7 percent, and $1.71 billion using a discount rate of 3 percent. The cumulative emissions reductions associated with these energy savings are 21.9 Mt of CO_2, 2.2 thousand tons of SO_2, 51.8 thousand tons of NO_X, 0.01 tons of Hg, 244.9 thousand tons of CH_4, and 0.1 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) is $1.17 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions is $0.61 billion using a 7-percent discount rate and $1.63 billion using a 3-percent discount rate. As such, 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). A more detailed discussion of the basis for these tentative conclusions is contained in the remainder of this document and the accompanying technical support document (''TSD'').[13]

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

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

II. Introduction

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

A. Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part B of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles. These products include consumer conventional cooking products, the subject of this document. (42 U.S.C. 6292(a)(10)). EPCA prescribed energy conservation standards for these products (42 U.S.C. 6295(h)(1)), and directs DOE to conduct future rulemakings to determine whether to amend these standards. (42 U.S.C. 6295(h)(2)). EPCA further provides that, not later than six years after the issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a notice of proposed rulemaking (''NOPR'') including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m)(1)).

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

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

Subject to certain criteria and conditions, DOE is required to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of each covered product. (42 U.S.C. 6295(r)). Manufacturers of covered products must use the prescribed DOE test procedure as the basis for certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA and when making representations to the public regarding the energy use or efficiency of those products. (42 U.S.C. 6293(c) & 42 U.S.C. 6295(s)) Similarly, DOE must use these test procedures to determine whether the products comply with standards adopted pursuant to EPCA. (42 U.S.C. 6295(s)) The DOE test procedures for conventional cooking tops appear at title 10 of the Code of Federal Regulations (''CFR'') part 430, subpart B, appendix I1 (''appendix I1''). There are currently no DOE test procedures for conventional ovens.

DOE must follow specific statutory criteria for prescribing new or amended standards for covered products, including consumer conventional cooking products. 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 (''Secretary'') determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A) & 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. 6295(o)(3))

Moreover, DOE may not prescribe a standard if DOE determines by rule that the standard is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)(B)). In deciding whether a proposed standard is economically justified, DOE must determine whether the benefits of the standard exceed its burdens. (42 U.S.C. 6295(o)(2)(B)(i)). DOE must make this determination after receiving comments on the proposed standard, and by considering, to the greatest extent practicable, the following seven statutory factors:

(1) The economic impact of the standard on the manufacturers and on the consumers of the products subject to such 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 of, or in the initial charges for, or maintenance expenses of, the covered products which are likely to result from the imposition of the standard;

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

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

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

[13] The TSD is available in the docket for this rulemaking at *www.regulations.gov/docket/EERE-2014-BT-STD-0005/document.*

result from the imposition of the standard;

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

(7) Other factors the Secretary considers relevant.

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

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

Additionally, EPCA specifies requirements when promulgating an energy conservation standard for a covered product that has two or more subcategories. DOE must specify a different standard level for a type or class of product that has the same function or intended use, if DOE determines that products within such group: (A) consume a different kind of energy from that consumed by other covered products within such type (or class); or (B) have a capacity or other performance-related feature which other products within such type (or class) do not have and such feature justifies a higher or lower standard. (42 U.S.C. 6295(q)(1)). In determining whether a performance-related feature justifies a different standard for a group of products, DOE must consider 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. 6295(q)(2)).

Finally, pursuant to the amendments contained in the Energy Independence and Security Act of 2007 (''EISA 2007''), Public Law 110–140, any final rule for new or amended energy conservation standards promulgated after July 1, 2010, is required to address standby mode and off mode energy use. (42 U.S.C. 6295(gg)(3)). Specifically, when DOE adopts a standard for a covered product after that date, it must, if justified by the criteria for adoption of standards under EPCA (42 U.S.C. 6295(o)), incorporate standby mode and off mode energy use into a single standard, or, if that is not feasible, adopt a separate standard for such energy use for that product. (42 U.S.C. 6295(gg)(3)(A)–(B)). DOE's current test procedures for conventional cooking tops address standby mode and off mode energy use. In this rulemaking, DOE intends to incorporate such energy use into any amended energy conservation standards for conventional cooking tops that it may adopt. As discussed in section III.C of this document, DOE does not have a current test procedure for conventional ovens. As a result, a performance standard that addresses standby mode and off mode energy use is not feasible for conventional ovens. However, in this SNOPR, DOE is proposing to adopt prescriptive design requirements for the control system of conventional ovens that would address standby mode and off mode energy use.

B. Background

1. Current Standards

In a final rule published on April 8, 2009 (''April 2009 Final Rule''), DOE prescribed the current energy conservation standards for consumer conventional cooking products that prohibits constant burning pilots for all gas cooking products (*i.e.,* gas cooking products both with or without an electrical supply cord) manufactured on and after April 9, 2012. 74 FR 16040. These standards are set forth in DOE's regulations at 10 CFR 430.32(j)(1)–(2).

2. History of Standards Rulemaking for Consumer Conventional Cooking Products

The National Appliance Energy Conservation Act of 1987 (''NAECA''), Public Law 100–12, amended EPCA to establish prescriptive standards for gas cooking products, requiring gas ranges and ovens with an electrical supply cord that are manufactured on or after January 1, 1990, not to be equipped with a constant burning pilot light. (42 U.S.C. 6295(h)(1)). NAECA also directed DOE to conduct two cycles of rulemakings to determine if more stringent or additional standards were justified for kitchen ranges and ovens. (42 U.S.C. 6295(h)(2)).

DOE undertook the first cycle of these rulemakings and published a final rule on September 8, 1998, which found that no standards were justified for conventional electric cooking products at that time. 63 FR 48038. In addition, partially due to the difficulty of conclusively demonstrating at that time that elimination of standing pilots for conventional gas cooking products without an electrical supply cord was economically justified, DOE did not include amended standards for conventional gas cooking products in the final rule. 63 FR 48038, 48039–48040. For the second cycle of rulemakings, DOE published the April 2009 Final Rule amending the energy conservation standards for consumer conventional cooking products to prohibit constant burning pilots for all gas cooking products (*i.e.,* gas cooking products both with or without an electrical supply cord) manufactured on or after April 9, 2012. DOE decided to not adopt energy conservation standards pertaining to the cooking efficiency of conventional electric cooking products because it determined that such standards would not be technologically feasible and economically justified at that time. 74 FR 16040, 16085.[14]

As noted, EPCA requires that, not later than six years after the issuance of a final rule establishing or amending a standard, DOE publish a NOPR proposing new standards or a notification of determination that the existing standards do not need to be amended. (42 U.S.C. 6295(m)(1)). On February 12, 2014, DOE published a request for information (''RFI'') document (''February 2014 RFI'') to initiate the mandatory review process imposed by EPCA. 79 FR 8337. In making this determination, DOE must evaluate whether new or amended standards would (1) yield a significant savings in energy use and (2) be both technologically feasible and economically justified. (42 U.S.C. 6295(m)(1)(B) and 42 U.S.C. 6295(o)(3)(B))

On June 10, 2015, DOE published a NOPR (''June 2015 NOPR'') proposing

[14] As part of the April 2009 Final Rule, DOE decided not to adopt energy conservation standards pertaining to the cooking efficiency of microwave ovens. DOE has since published a final rule on June 17, 2013, adopting energy conservation standards for microwave oven standby mode and off mode. 78 FR 36316. DOE is not considering energy conservation standards for microwave ovens as part of this proposed rule. A separate rulemaking is underway addressing energy conservation standards for microwave ovens. See *www.regulations.gov/docket/EERE-2017-BT-STD-0023/document.*

new and amended energy conservation standards for consumer conventional ovens. 80 FR 33030. In the June 2015 NOPR, DOE noted that it was deferring its decision regarding whether to adopt amended energy conservation standards for conventional cooking tops, pending further study. 80 FR 33030, 33038–33040.

On September 2, 2016, DOE published an SNOPR (''September 2016 SNOPR'') proposing new and amended energy conservation standards for conventional cooking tops based on the amendments to the test procedure as proposed in a test procedure SNOPR published on August 22, 2016 (''August 2016 TP SNOPR;'' 81 FR 57374). 81 FR 60784. In the September 2016 SNOPR, DOE also revised its proposal from the June 2015 NOPR for conventional ovens from a performance-based standard to a prescriptive standard given that DOE had proposed to repeal the test procedure for conventional ovens in the August 2016 TP SNOPR. 81 FR 60784, 60793–60794. (The history of the test procedures for conventional cooking tops and conventional ovens is discussed in greater detail in section III.C of this document.)

On December 14, 2020, DOE published a notification of proposed determination (''NOPD'') proposing not to amend the energy conservation standards for consumer conventional cooking products (''December 2020 NOPD''). 85 FR 80982. In the December 2020 NOPD, DOE initially determined that amended energy conservation standards for consumer conventional cooking products would not be economically justified and would not result in a significant conservation of energy.

DOE held a public meeting on January 28, 2021, to solicit feedback from stakeholders concerning the December 2020 NOPD, and received comments in response to the December 2020 NOPD from the interested parties listed in Table II.1.

TABLE II—DECEMBER 2020 NOPD WRITTEN COMMENTS

Commenter(s)	Abbreviation	Docket No.	Commenter type
Henry Adkins	Adkins	81	Individual.
Association of Home Appliance Manufacturers	AHAM	84	Trade Association.
Lamis Ahmad	Ahmad	82	Individual.
Pacific Gas and Electric Company, San Diego Gas and Electric, Southern California Edison, collectively, the California Investor-Owned Utilities.	CA IOUs	89	Utilities.
GE Appliances	GEA	85	Manufacturer.
Appliance Standards Awareness Project, Consumer Federation of America, Natural Resources Defense Council.	Joint Commenters	87	Energy Organizations.
American Public Gas Association, American Gas Association	Joint Gas Associations.	86	Utility and Trade Association.
Northwest Energy Efficiency Alliance	NEEA	88	Efficiency Organization.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[15] To the extent that interested parties have provided written comments that are substantively consistent with any oral comments provided during the January 28, 2021, public meeting, DOE cites the written comments throughout this SNOPR. Any oral comments provided during the webinar that are not substantively addressed by written comments are summarized and cited separately throughout this document.

3. Basis for This Proposed Rule

In the December 2020 NOPD, the tentative determination that amended energy conservation standards for consumer conventional cooking products would not be economically justified and would not result in a significant conservation of energy hinged, in significant part, on DOE's proposal to screen out all identified technology options that would improve the performance of gas cooking tops to efficiencies above the baseline efficiency level. 85 FR 80982, 81003–81004. DOE noted in the December 2020 NOPD that the estimates for energy savings associated with a specific technology option for gas cooking tops, optimized burner and grate design, may vary depending on the test procedure, and thus DOE screened out this technology options from further analysis of gas cooking tops. *Id.* at 85 FR 81004. As discussed in section III.C of this document, at the time of the December 2020 NOPD, DOE had withdrawn its test procedure for conventional cooking tops. However, DOE additionally stated in the December 2020 NOPD that it would reevaluate the energy savings associated with this technology option if it considered performance standards in a future rulemaking. *Id.*

On August 22, 2022, DOE published a final rule (''August 2022 TP Final Rule'') establishing a test procedure for conventional cooking tops, at 10 CFR part 430, subpart B, appendix I1, ''Uniform Test Method for the Measuring the Energy Consumption of Conventional Cooking Products.'' 87 FR 51492. As a result, in this SNOPR, DOE is reevaluating the energy savings associated with the optimized burner and grate design technology option for conventional gas cooking tops and has tentatively found that amended energy conservation standards for consumer conventional cooking products are economically justified and would result in a significant conservation of energy.

As discussed in section III.C of this document, this SNOPR specifically further differs from the September 2016 SNOPR in that the performance standards evaluated for conventional cooking tops are based on the new appendix I1 test procedure, rather than on the now-withdrawn former appendix I.

C. Deviation From Appendix A

In accordance with section 3(a) of 10 CFR part 430, subpart C, appendix A (''appendix A''), DOE notes that it is deviating from the provision in appendix A regarding the NOPR stage for an energy conservation standard rulemaking. Section 6(f)(2) of appendix A specifies that the length of the public comment period for a NOPR will vary depending upon the circumstances of the particular rulemaking, but will not be less than 75 calendar days. For this SNOPR, DOE has opted to instead

[15] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop energy conservation standards for consumer conventional cooking products. (Docket NO. EERE–2014–BT–STD–0005, which is maintained at *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

provide a 60-day comment period. DOE requested comment in the February 2014 RFI on the technical and economic analyses and provided stakeholders a 60-day comment period, after publishing the comment period extension. Additionally, DOE provided a 30-day comment period for the September 2016 SNOPR with an extension to 60 days, and a 75-day comment period for the December 2020 NOPD. 81 FR 60784, 81 FR 67219, 85 FR 80982. DOE has relied on many of the same analytical assumptions and approaches as used in the September 2016 SNOPR and December 2020 NOPD. As such, DOE believes a 60-day comment period is appropriate and will provide interested parties with a meaningful opportunity to comment on the proposed rule.

III. General Discussion

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

A. General Comments

This section summarizes general comments received from interested parties regarding rulemaking timing and process.

GEA supported the comments submitted by AHAM and incorporated them by reference. (GEA, No. 85 at p. 1).

AHAM stated that the 2017 statutory deadline to publish a final rule regarding consumer conventional cooking product energy conservation standards has passed, and that DOE should not hold this rule open and should finalize a determination not to amend the standard. (AHAM, No. 84 at p. 4). AHAM commented that it is disingenuous of other commenters to simultaneously challenge DOE for failing to timely meet an obligation while also urging it to further delay meeting that same obligation. (*Id.*) AHAM added that, should DOE believe energy conservation standards based on measured efficiency could be justified once a reliable test procedure exists, DOE can propose a rule at any time after the publication of the determination not to amend the standard, although AHAM questioned whether such a standard would be justified under EPCA. (*Id.*) AHAM further noted that EPCA requires that DOE re-evaluate its determination not to amend the standard within 3 years of the issuance of that determination. 42 U.S.C. 6295(m)(3)(B). (*Id.*)

GEA commented that DOE's actions on this standard are long past due. (GEA, No. 85 at p. 2).

The CA IOUs urged DOE to consider the implications of the December 2020 NOPD on the Executive Order 13990 and the announcement that the DOE would be re-examining the withdrawal of the cooking top test procedure. (CA IOUs, No. 89 at p. 5)

In the most recent stage of this rulemaking, DOE published the December 2020 NOPD in which it tentatively concluded that new and amended energy conservation standards for consumer conventional cooking products would not be economically justified and would not result in a significant conservation of energy, in part because it was unable to evaluate certain technology options for gas cooking tops in the absence of a test procedure for these products. 85 FR 80982. The test procedure established in the August 2022 TP Final Rule, discussed in more detail in section III.C of this document, provides testing results upon which these SNOPR analyses for conventional cooking tops were based. DOE reevaluated its analyses as quickly as possible once the test procedure was finalized. President Biden's Executive Order 13990, which addresses the social cost of carbon and other greenhouse gases, are discussed in section IV.L of this document.

The Joint Gas Associations agreed with the DOE's tentative determination in the December 2020 NOPD that no new standards are justified. (Joint Gas Associations, No. 86 at pp. 2–3). The Joint Gas Associations further supported the December 2020 NOPD's tentative determination that neither of the February 2020 Process Rule's thresholds for significant energy savings are met for TSL 2 or TSL 1 for consumer conventional cooking products. (*Id.*)

The Joint Commenters expressed concern that DOE indicated it was in the process of revising the Process Rule, yet the Department cited the energy savings thresholds from the February 2020 Process Rule to justify the proposed determination of no amended standards. (Joint Commenters, No. 87 at p. 1). The Joint Commenters added that with billions of consumer savings at risk, DOE should not move forward with this determination until DOE completed the indicated revisions to the Process Rule. (*Id.*) The Joint Commenters further commented that DOE should eliminate the energy savings thresholds as part of the Process Rule revision in order to ensure that critical energy and utility bill savings are not lost. (Joint Commenters, No. 87 at p. 2).

In evaluating the significance of the estimated energy savings for the December 2020 NOPD, DOE applied a two-part numeric threshold test that was then applicable under section 6(b) of appendix A to 10 CFR part 430 subpart C (Jan. 1, 2021 edition).[16] Specifically, the threshold required that an energy conservation standard result in a 0.30 quads reduction in site energy use over a 30-year analysis period or a 10-percent reduction in site energy use over that same period. *See* 85 FR 8626, 8670 (Feb. 14, 2020). In the December 2020 NOPD, DOE stated that the estimated site energy savings at the max-tech level evaluated at that time was 0.57 quads, which exceeded the 0.3-quads threshold, but expressed concern that this TSL might result in the unavailability of certain product types for conventional ovens because there would be significant uncertainty as to whether commercial-style manufacturers would be able to test their products in the absence of a DOE test procedure for conventional ovens. 85 FR 80982, 81053. (*See* section III.C of this document for discussion of the repeal of the conventional oven test procedure.) DOE then evaluated the next lower TSL than max-tech and estimated that it would save an estimated 0.22 quads of site energy over the evaluation period, which would represent a 4.9-percent decrease in the site energy use of the evaluated products. *Id.* That estimated site energy savings would not reach the 0.3 quad-threshold or the 10-percent site energy saving threshold enumerated in section 6(b) of appendix A to 10 CFR part 430 subpart C (Jan. 1, 2021 edition). Accordingly, DOE tentatively determined in the December 2020 NOPD that new or amended energy conservation standards for consumer conventional cooking products would not result in significant conservation of energy and be economically justified. *Id.*

On December 13, 2021, DOE published in the **Federal Register**, a final rule that amended appendix A. 86 FR 70892 (''December 2021 Final Rule''). The December 2021 Final Rule, in part, removed the numeric threshold in section 6(b) of appendix A for determining when the significant energy savings criterion is met, reverting to DOE's prior practice of making such determinations on a case-by-case basis. 86 FR 70892.

Adkins commented that many consumer cooking products are already

[16] DOE established the numeric threshold test in section 6(b) of appendix A to 10 CFR part 430 subpart C in a final rule published on February 14, 2020. 85 FR 8626.

operating at near peak capabilities and added that introducing stronger regulations on consumer cooking products would increase the cost of these products for consumers, lowering consumption with little to no positive environmental impact. (Adkins, No. 81 at p. 1)

Ahmad commented that DOE's tentative determination of no economic justification for cooking products may still be valid because of a lack of significant technological advancements since the September 2016 SNOPR. (Ahmad, No. 82 at p. 1)

AHAM stated that no significant changes have occurred to justify new standards since the April 2009 Final Rule that determined that energy conservation standards for consumer conventional cooking products were not justified. (AHAM, No. 84 at p. 4)

GEA stated that consumer conventional cooking products use little energy compared to other DOE regulated products and therefore DOE's limited resources are better served on products for whom greater energy savings is feasible. (GEA, No. 85 at p. 2) GEA supported DOE's proposed determination not to amend standards. (*Id.*)

The Joint Gas Associations agreed with DOE's tentative determination in the December 2020 NOPD that a potential amended standard based on TSL 3 would result in a negative net present value, a negative INPV range, a potential unavailability of certain product types for conventional ovens, and a loss of certain functions that provide utility to customers, and that a potential standard at TSL 3 is not economically justified. (Joint Gas Associations, No. 86 at p. 3) The Joint Gas Associations further stated that any potential positive impacts from an amended standard at TSL 3 are not outweighed by these estimated negative impacts. (*Id.*)

The Joint Commenters commented that, without the February 2020 Process Rule thresholds, adopting standards at TSL 2 from the December 2020 NOPD could provide full-fuel cycle savings of 0.6 quads and consumer savings of up to $3.7 billion. (Joint Commenters, No. 87 at p. 2) The Joint Commenters added that adopting standards at the TSL 2 from the December 2020 NOPD would provide full-fuel-cycle energy savings of 0.28 quads and NPV savings of up to $2 billion for electric smooth element cooking tops with an incremental cost of only $3, and would achieve full-fuel-cycle energy savings of 0.1 quads and NPV savings of up to $730 million for self-cleaning freestanding conventional electric ovens with an incremental cost of $1. (*Id.* referencing 85 FR 80982, 81049–81050).

NEEA commented that according to the 2015 RECS, while cooking represents a small amount of overall home energy use (1.4 percent in residential electricity use and 2.9 percent in residential gas use), when combined with the potential individual unit savings for cooking tops shown in the December 2020 NOPD and external testing, performance-based standards for cooking tops could lead to significant national energy savings. (NEEA, No. 88 at p. 3) NEEA noted that DOE's testing showed that conventional gas cooking tops with similar average burner input rates can vary in annual energy use by as much as 27 percent, and conventional oven efficiency for units with similar input rates varied by 11 percent and 19 percent for gas and electric units, respectively. (*Id.* referencing 85 FR 80982, 81008–81009) NEEA also noted that DOE found potential energy savings on average of 24 percent for induction electric cooking tops compared to a baseline smooth element electric cooking top. NEEA commented that this is in line with recent testing conducted by the Food Service Technology Center,[17] which found a 23-percent efficiency improvement. (*Id.* referencing 85 FR 80982, 81035) NEEA recommended that DOE proceed with updated standards for cooking tops and conventional ovens once the test procedure has been updated, commenting that this would allow DOE to consider performance-based standards for cooking tops and conventional ovens that harness energy efficiency opportunities, which could not be fully achieved through the prescriptive standards considered in the December 2020 NOPD (*Id.*).

The CA IOUs commented that, given the recent shift in consumer behavior, there is a high likelihood that a reanalysis of the TSL 2 defined in the December 2020 NOPD based on more recent cooking frequency data would lead to site savings greater than 0.3 quads, exceeding the February 2020 Process Rule's significant energy savings threshold. (CA IOUs, No. 89 at pp. 3–4)

EPCA requires that any new or amended energy conservation standards prescribed by DOE for any type (or class) of covered product be designed to achieve the maximum improvement in energy efficiency (or for certain products, water efficiency) which the Secretary determines is technologically feasible and economically justified. Upon the finalization of a new test procedure for consumer conventional cooking products, DOE reevaluated its analysis from the December 2020 NOPD, including its tentative determination at that time to screen out the technology option for improved burner and grate design. DOE is updating its tentative conclusions in this SNOPR to reflect the use of optimized burners and grates on gas cooking tops to achieve higher efficiencies. See section IV.A.2 and section IV.B of this document, as well as chapters 3 and 4 of the TSD for this SNOPR for additional information on this technology option and screening analysis. DOE also updated its information regarding the prevalence of baseline technologies in conventional ovens on the market. See section IV.F.8 of this document and chapter 7 of the TSD for this SNOPR. Pursuant to these updates and others outlined in this SNOPR, DOE revised its analysis regarding the technological feasibility and economic justification of new and amended energy conservation standards for consumer conventional cooking products and presents a summary of the results in section V of this SNOPR.

B. Product Classes and Scope of Coverage

When evaluating and establishing energy conservation standards, DOE divides covered products into product classes by the type of energy used 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. 6295(q))

As discussed in section II.A of this document, 42 U.S.C. 6292(a)(10) of EPCA covers kitchen ranges and ovens, or ''cooking products.'' DOE's regulations define ''cooking products'' as consumer products that are used as the major household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: Gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing one or more surface units[18] and/or one or more heating compartments. 10 CFR 430.2. DOE is not considering energy

[17] Frontier Energy. *Residential Cooktop Performance and Energy Comparison Study.* July 2019. Page 11. Available at *www.buildingdecarb.org/uploads/3/0/7/3/30734489/induction_report.pdf.*

[18] The term surface unit refers to burners for gas cooking tops and electric resistance heating elements or inductive heating elements for electric cooking tops.

conservation standards for microwave ovens as part of this proposed rulemaking.[19]

DOE defines a combined cooking product as a household cooking appliance that combines a conventional cooking top and/or conventional oven with other appliance functionality, which may or may not include another cooking product (10 CFR part 430, subpart B, appendix I). In this analysis, DOE is not treating combined cooking products as a distinct product category and is not basing its product classes on such a category. Instead, DOE is evaluating energy conservation standards for conventional cooking tops and conventional ovens separately. Because combined cooking products consist, in part, of a cooking top and/or oven, the cooking top and oven standards would continue to apply to the individual components of the combined cooking product.

As part of the 2009 standards rulemaking for consumer conventional cooking products, DOE did not consider energy conservation standards for consumer conventional gas cooking products with higher burner input rates, including products marketed as ''commercial-style'' or ''professional-style,'' due to a lack of available data for determining efficiency characteristics of those products. DOE considered such products to be gas cooking tops with burner input rates greater than 14,000 British thermal units per hour (''Btu/h'') and gas ovens with burner input rates greater than 22,500 Btu/h. 74 FR 16040, 16054 (Apr. 8, 2009); 72 FR 64432, 64444–64445 (Nov. 15, 2007). DOE also stated that the DOE cooking products test procedures at that time may not adequately measure performance of gas cooking tops and ovens with higher burner input rates. 72 FR 64432, 64444–64445 (Nov. 15, 2007).

As part of the February 2014 RFI, DOE stated that it tentatively planned to consider energy conservation standards for all consumer conventional cooking products, including commercial-style gas cooking products with higher burner input rates. In addition, DOE stated that it may consider developing test procedures for these products and determine whether separate product classes are warranted. 79 FR 8337, 8340 (Feb. 12, 2014).

As discussed in section III.C of this document, DOE's new test procedure for conventional cooking tops in appendix I1 measures the energy use of commercial-style gas cooking tops with high burner input rates. DOE also repealed the conventional oven test procedure in a final rule published on December 16, 2016 (''December 2016 TP Final Rule''). 81 FR 91418.

In the December 2020 NOPD, in the absence of Federal test procedures to measure the energy use or energy efficiency of conventional cooking tops and conventional ovens, DOE evaluated prescriptive design requirements for the control system of conventional electric smooth element cooking tops and conventional ovens, including commercial-style ovens with higher burner input rates. 85 FR 80982, 80988. In the December 2020 NOPD, DOE stated that it would maintain the existing prescriptive design requirements for all conventional gas cooking products, noting that the current definitions for ''conventional cooking top'' and ''conventional oven'' in 10 CFR 430.2 already cover commercial-style gas cooking products with higher burner input rates, as these products are household cooking appliances with surface units or compartments intended for the cooking or heating of food by means of a gas flame. *Id.* In the December 2020 NOPD, DOE did not propose a separate product class for gas cooking tops and ovens with higher burner input rates that are marketed as ''commercial-style'' and did not propose separate definitions for these products. *Id.*

Adkins supported higher standards for industrial cooking equipment and stated that the degree of energy saved by an individual consumer is minimal when compared to that of an entire business or corporation. (Adkins, No. 81 at p. 1)

Ahmad commented that microwave ovens should be the subject of amended energy conservation standards due to widespread use in the U.S. (Ahmad, No. 82 at p. 1)

The scope of this rulemaking is limited to cooking products. As defined in 10 CFR 430.2, ''cooking products'' are consumer products that are used as the major household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: Gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing one or more surface units and/or one or more heating compartments. Industrial cooking equipment and microwave ovens are not in the scope of this proposed rule.

In this SNOPR, DOE is proposing to define a portable conventional cooking top as a conventional cooking top designed to be moved from place to place. Using this definition, DOE is proposing that the proposed standards for conventional cooking tops would apply to portable models according to their means of heating (gas, electric open (coil) element, or electric smooth element).

DOE requests comment on its proposed definition for portable conventional cooking top and DOE's proposal to include portable conventional cooking tops in the existing product classes. DOE also seeks data and information on its initial determination not to differentiate conventional cooking tops on the basis of portability when considering product classes for this SNOPR analysis.

C. Test Procedure

EPCA sets forth generally applicable criteria and procedures for DOE's adoption and amendment of test procedures. (42 U.S.C. 6293) Manufacturers of covered products must use these test procedures to certify to DOE that their product complies with energy conservation standards and to quantify the efficiency of their product. DOE's current energy conservation standards for consumer conventional cooking products are prescriptive standards that prohibits constant burning pilots for all gas cooking products (*i.e.,* gas cooking products both with or without an electrical supply cord) manufactured on and after April 9, 2012. 74 FR 16040. (*See* 10 CFR 430.32(j)(2).)

DOE established test procedures for consumer conventional cooking products in a final rule published in the **Federal Register** on May 10, 1978. 43 FR 20108, 20120–20128. DOE revised its test procedures for cooking products to more accurately measure their efficiency and energy use, and published the revisions as a final rule in 1997. 62 FR 51976 (Oct. 3, 1997). These test procedure amendments included: (1) A reduction in the annual useful cooking energy; (2) a reduction in the number of self-clean oven cycles per year; and (3) incorporation of portions of International Electrotechnical Commission (''IEC'') Standard 705–1988, ''Methods for measuring the performance of microwave ovens for household and similar purposes,'' and Amendment 2–1993 for the testing of microwave ovens. *Id.* The test procedures for consumer conventional cooking products established provisions for determining estimated annual operating cost, cooking efficiency (defined as the ratio of cooking energy output to cooking energy input), and energy factor (defined as the ratio of annual useful cooking energy output to total annual energy input). 10 CFR 430.23(i); appendix I. These provisions

[19] See *www.regulations.gov/docket/EERE-2017-BT-STD-0023/document.*

for consumer conventional cooking products were not used for compliance with any energy conservation standards because the standards to date have been design requirements; in addition, there is no EnergyGuide [20] labeling program for cooking products.

DOE subsequently conducted a rulemaking to address standby and off mode energy consumption, as well as certain active mode (*i.e.,* fan-only mode) testing provisions, for consumer conventional cooking products, satisfying the EPCA requirement that DOE include measures of standby mode and off mode power in its test procedures for residential products, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)). DOE published a final rule on October 31, 2012 (''October 2012 TP Final Rule''), adopting standby and off mode provisions. 77 FR 65942.

Prior to the June 2015 NOPR, DOE issued two notices requesting comment on the test procedures for cooking products. On January 30, 2013, DOE published a NOPR (''January 2013 TP NOPR'') proposing amendments to the cooking products test procedure in appendix I that would allow for the testing of active mode energy consumption of induction cooking tops; *i.e.,* conventional cooking tops equipped with induction heating technology for one or more surface units on the cooking top. 78 FR 6232. DOE proposed to incorporate induction cooking tops by amending the definition of ''conventional cooking top'' to include induction heating technology. Furthermore, DOE proposed to require for all cooking tops the use of test equipment compatible with induction technology. Specifically, DOE proposed to replace the solid aluminum test blocks specified at that time in the test procedure for cooking tops with hybrid test blocks comprising two separate pieces: an aluminum body and a stainless-steel base. 78 FR 6232, 6234.

On December 3, 2014, DOE issued a second notice requesting comment on the test procedures for cooking products (''December 2014 TP SNOPR''). 79 FR 71894. In the December 2014 TP SNOPR, DOE modified its proposal from the January 2013 TP NOPR in response to comments from interested parties to specify different test equipment that would allow for measuring the energy efficiency of induction cooking tops, and would include an additional test block size for electric surface units with large diameters (both induction and electric resistance). *Id.* In addition, DOE proposed methods to test non-circular electric surface units, electric surface units with flexible concentric cooking zones, and full-surface induction cooking tops. *Id.* In the December 2014 TP SNOPR, DOE also proposed amendments to add a larger test block size to test gas cooking top burners with higher input rates. *Id.*

In the December 2014 TP SNOPR, DOE also proposed methods for measuring conventional oven volume, clarification that the existing oven test block must be used to test all ovens regardless of input rate, and a method to measure the energy consumption and efficiency of conventional ovens equipped with an oven separator. 79 FR 71894.

On July 2, 2015, DOE published a test procedure final rule (''July 2015 TP Final Rule'') adopting the test procedure amendments discussed above for conventional ovens only. 80 FR 37954.

As discussed in the June 2015 NOPR for conventional ovens, DOE received a significant number of comments raising issues with the repeatability and reproducibility of the proposed hybrid test block test method for cooking tops in response to the December 2014 TP SNOPR and in separate interviews conducted with consumer conventional cooking product manufacturers in February and March of 2015. 80 FR 33030, 33039–33040. A number of manufacturers that produce and sell products in Europe supported the use of a water-heating test method and harmonization with IEC Standard 60350–2 Edition 2, ''Household electric appliances—Part 2: Hobs—Method for measuring performance'' [21] (''IEC Standard 60350–2'') for measuring the energy consumption of electric cooking tops. These manufacturers stated that the test methods in IEC Standard 60350–2 are compatible with all electric cooking top types, specify additional cookware diameters to account for the variety of surface unit sizes on the market, and use test loads that represent real-world cooking top loads. Efficiency advocates also recommended that DOE require water-heating test methods to produce a measure of cooking efficiency for conventional cooking tops that is more representative of actual cooking performance than the hybrid test block method. 80 FR 33030, 33039–33040. For these reasons, DOE decided to defer its decision regarding adoption of energy conservation standards for conventional cooking tops until a representative, repeatable and reproducible test method for cooking tops was finalized. 80 FR 33030, 33040.

DOE published an SNOPR on August 22, 2016 (''August 2016 TP SNOPR'') that proposed amendments to the test procedures for conventional cooking tops. 81 FR 57374. Given the feedback from interested parties discussed above and based on the additional testing and analysis conducted for the test procedure rulemaking, in the August 2016 TP SNOPR, DOE withdrew its proposal for testing conventional cooking tops with a hybrid test block. Instead, DOE proposed to amend its test procedure to incorporate by reference the relevant sections of European Standard EN 60350–2:2013 ''Household electric cooking appliances Part 2: Hobs—Methods for measuring performance'' [22] (''EN 60350–2:2013''), which provide a water-heating test method to measure the energy consumption of electric cooking tops. The test method specifies the quantity of water to be heated in a standardized test vessel whose size is selected based on the diameter of the surface unit under test. The test vessels specified in EN 60350–2:2013 are compatible with all cooking top technologies and surface unit diameters available on the U.S. market. 81 FR 57374, 57381–57384.

DOE also proposed to extend the test methods provided in EN 60530–2:2013 to measure the energy consumption of gas cooking tops by correlating test equipment diameter to burner input rate, including input rates that exceed 14,000 Btu/h. 81 FR 57374, 57385–57386. In addition, DOE also proposed in the August 2016 TP SNOPR to include methods for both electric and gas cooking tops to calculate the annual energy consumption (''AEC'') and integrated annual energy consumption (''IAEC'') to account for the proposed water-heating test method. 81 FR 57374, 57387–57388. In the August 2016 TP SNOPR, DOE proposed to repeal the conventional oven test procedure. DOE determined that the conventional oven test procedure may not accurately represent consumer use as it favors conventional ovens with low thermal mass and does not capture cooking performance-related benefits due to increased thermal mass of the oven cavity. 81 FR 57374, 57378–57379.

[20] For more information on the EnergyGuide labeling program, see: *consumer.ftc.gov/articles/how-use-energyguide-label-shop-home-appliances.*

[21] Hob is the British English term for cooking top.

[22] The test methods in EN 60350–2:2013 are based on the same test methods in the draft version of IEC 60350–2 available at the time of the December 2016 TP Final Rule. As noted in that final rule, based on the few comments received during the development of the draft, DOE expected that the IEC procedure, once finalized, would retain the same basic test method as contained in EN 60350–2:2013. 81 FR 91418, 91421.

As discussed previously, for the September 2016 SNOPR, DOE evaluated its proposed energy conservation standards for conventional cooking tops based on the cooking top test procedure proposed in the August 2016 TP SNOPR. 81 FR 60784, 60797. For conventional ovens, due to the uncertainties in analyzing a performance-based standard using oven testing provisions that DOE proposed to remove from the test procedure, as discussed previously, DOE proposed in the September 2016 SNOPR prescriptive design requirements for the control system of conventional ovens. 81 FR 60784, 60794.

On December 16, 2016, DOE published a final rule repealing the test procedures for conventional ovens, and adopting the test procedure amendments for conventional cooking tops proposed in the August 2016 TP SNOPR, with the following modifications:

- Aligning the test methods for electric surface units with flexible concentric cooking zones (also referred to as multi-ring surface units) with the provisions in EN 60350–2:2013; [23]
- Clarifying the simmering temperature requirements, temperature sensor requirements, and surface unit diameter measurement; and
- Maintaining the existing installation requirements in appendix I. 81 FR 91418.

The Administrative Procedure Act (''APA''), 5 U.S.C. 551 *et seq.,* provides among other things, that ''[e]ach agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule.'' (5 U.S.C. 553(e)) DOE received a petition from AHAM requesting that DOE reconsider its December 2016 TP Final Rule. In its petition, AHAM requested that DOE undertake a rulemaking to withdraw the test procedure for conventional cooking tops, while maintaining the repeal of the oven test procedure that was part of the December 2016 TP Final Rule. In the interim, AHAM sought an immediate stay of the effectiveness of the December 2016 TP Final Rule, including the requirement that manufacturers use the final test procedure to make energy-related claims. In its petition, AHAM claimed that its analyses showed that the test procedure is not representative for gas cooking tops and, for gas and electric cooking tops, has such a high level of variation it will not produce accurate results for certification and enforcement purposes and will not assist consumers in making purchasing decisions based on energy efficiency. DOE published AHAM's petition on April 25, 2018, and requested comments and information on whether DOE should undertake a rulemaking to consider the proposal contained in the petition. 80 FR 17944.

On August 18, 2020, DOE published a final rule (''August 2020 TP Final Rule'') withdrawing the test procedure for conventional cooking tops after evaluating new information and data produced by AHAM and other interested parties that suggested that the test procedure yields inconsistent results that are indicative of the test not being representative of energy use or efficiency during an average use cycle. 85 FR 50757. Testing conducted by DOE and outside parties using the test procedure yielded inconsistent results. 85 FR 50757, 50763. DOE had not identified the cause of the inconsistencies and noted that its data to date was limited. *Id.* DOE concluded, therefore, that the test procedure was not representative of energy use or efficiency during an average use cycle. *Id.* DOE also determined that it would be unduly burdensome to leave the test procedure in place and require cooking top tests to be conducted using that test method without further study to resolve those inconsistencies. *Id.*

As discussed, DOE published the August 2022 TP Final Rule establishing a test procedure for conventional cooking tops, at 10 CFR part 430, subpart B, appendix I1, ''Uniform Test Method for the Measuring the Energy Consumption of Conventional Cooking Products.'' 87 FR 51492. The test procedure adopted the latest version of the relevant industry standard published by IEC, Standard 60350–2 (Edition 2.0 2017–08), ''Household electric cooking appliances—Part 2: Hobs—Methods for measuring performance'' (''IEC 60350–2:2017''), for electric cooking tops with modifications including adapting the test method to gas cooking tops, normalizing the energy use of each test cycle to a consistent final water temperature, and including a measurement of standby mode and off mode energy use. *Id.*

Under EPCA, any new or amended energy conservation standard must include, where applicable, test procedures prescribed in accordance with the test procedure provisions of the Act (42 U.S.C. 6295(r)). As discussed previously, DOE repealed the conventional oven test procedure and is evaluating new prescriptive design requirements for the control system of conventional ovens, while proposing to maintain the existing prescriptive design requirements for conventional gas ovens. As a result, the prescriptive design requirements would not require manufacturers to test using the DOE test procedure to certify conventional ovens.

Furthermore, since DOE is proposing to adopt prescriptive design requirements that would not require a test procedure for conventional ovens, DOE tentatively concludes that no test procedures for conventional ovens are needed at this time. If finalized, this tentative determination would satisfy the EPCA requirement at 42 U.S.C. 6293(b)(1)(A) that requires the Secretary to review test procedures for all covered products, including conventional ovens, every 7 years and either amend those test procedures or publish in the **Federal Register** of a determination not to amend the test procedure. The last time the conventional ovens test procedure was evaluated was as part of the December 2016 Final Rule, which repealed the existing test procedure for conventional ovens. Therefore, if DOE were to proceed, it would need to finalize its determination by December 16, 2023.

AHAM stated that the absence of a test procedure to measure efficiency for cooking tops and conventional ovens is sufficient grounds upon which to justify a determination not to amend standards beyond the existing design standards (AHAM, No. 84 at pp. 2–3). AHAM added that EPCA does not allow DOE to prescribe amended or new standards without a final test procedure in place (*Id.* referencing 42 U.S.C. 6295(o)(3)).

EPCA's requirement that the Secretary may not prescribe an amended or new standard if a test procedure has not been prescribed does not apply to dishwashers, clothes washers, clothes dryers, and kitchen ranges and ovens, the subject of this rulemaking (42 U.S.C. 6295(o)(3)(A)).

AHAM commented that it was working on a test procedure to measure the efficiency of cooking tops and conventional ovens (AHAM, No. 84 at p. 3). AHAM added that DOE and some efficiency advocates have been included in the task force that is developing the test. (*Id.*) AHAM stated that the goals of its cooking top and conventional oven test procedures are to address the technical issues in the previous cooking top and conventional oven test procedures, which ultimately resulted in their withdrawal, and to develop new test procedures that are accurate, repeatable, and reproducible. (*Id.*) AHAM suggested that DOE would be

[23] EN 60350–2:2013 requires testing of the largest measured diameter of multi-ring surface units only, unless an additional test vessel category is needed to meet the test vessel selection requirements in EN 60350–2:2013. In that case, one of the smaller-diameter settings of the multi-ring surface unit may be tested if it fulfills the test vessel category requirement.

able to adopt both procedures in their entirety in a future rulemaking. (*Id.*)

In response to DOE's notification of the White House Office of Management and Budget (''OMB'') that it would review its withdrawal of the cooking top test procedure, AHAM urged DOE not to consume its resources in considering to reinstate the withdrawn cooking top test procedure and stated that DOE should continue to work with AHAM and efficiency advocates to develop a new collaborative cooking top test procedure which would provide certainty as DOE proceeds with a future standards rulemaking process, shorten the time needed to finalize a test method, and satisfy the goals of Executive Order 13990. (AHAM, No. 84 at p. 3)

GEA supported DOE's proposed determination not to amend standards because there is no current test procedure for consumer conventional cooking products. (GEA, No. 85 at p. 2) GEA stated that the previously withdrawn test procedures were not reliable or reproducible. (*Id.*) GEA stated that it is working closely with the AHAM task force dedicated to developing a reliable, repeatable, and reproducible test procedure for consumer conventional cooking products. (*Id.*)

The Joint Commenters stated that DOE must establish test procedures for cooking products and complete the revision of the Process Rule prior to proceeding with a determination for cooking products standards. (Joint Commenters, No. 87 at p. 1) The Joint Commenters noted that performance-based standards have the potential to achieve significantly greater savings than prescriptive requirements, and that DOE should focus on establishing test procedures rather than use repealed test procedures to evaluate potential standard levels. (*Id.*)

NEEA recommended that DOE conduct further testing as needed and issue updated test procedures for both cooking tops and conventional ovens, given the significant potential energy savings from performance standards for both product categories. (NEEA, No. 88 at pp. 1–2) NEEA recommended that DOE conduct additional testing to resolve the discrepancies found during former testing and develop a revised test procedure for conventional cooking tops as soon as possible. (NEEA, No. 88 at p. 2) NEEA stated that all concerns submitted in AHAM's petition for the withdrawal of the cooking top test procedure (concern over the lack of defined tolerance for staying ''as close as possible'' to 194 degrees Fahrenheit (''°F'') in the test procedure, variability in energy consumption during the simmer phase, and variability in determining the turn down temperature and setting) can be addressed by setting appropriate tolerances on these variables. (*Id.*) NEEA further noted that the test method that was referenced in the 2016 test procedure, EN 60350–2–2013, has been updated since the December 2016 TP Final Rule and the revised test method may serve as an additional resource in developing an updated test procedure that is representative, repeatable, and reproducible. (NEEA, No. 88 at pp. 2–3) NEEA recommended that DOE consider ASTM Standard F1521 in updating the test procedure, which has been used by the Food Service Technology Center to conduct testing on conventional cooking top performance and efficiency and is currently being updated for ASTM Committee F26 on Food Service Equipment. (NEEA, No. 88 at p. 2)

The CA IOUs believe that the withdrawn cooking top test procedure is adequately repeatable and that it should be re-examined. (CA IOUs, No. 89 at p. 2) The CA IOUs stated they believe the discrepancies presented in the AHAM Withdrawal Petition are, in part, due to specific test method employed during AHAM's testing. (*Id.*) The CA IOUs continued that because the test data which was used to withdraw the test procedure did not use the ambient condition[24] specifications of the test procedure in question, DOE should pursue robust round robin testing to uncover the true reproducibility values associated with the test procedure. (*Id.*) In the August 2020 TP Final Rule, DOE cited authority to withdraw the cooking products test procedure under 42 U.S.C. 6293(b)(3), noting that ''DOE has the authority to withdraw a test procedure that is not representative of an average use cycle or period of use and is unduly burdensome to conduct.'' (*Id.*) In response, the CA IOUs commented that they believe the authority to act on an unrepresentative test procedure lies in 42 U.S.C. 6293(b)(2), which only grants DOE the authority to prescribe or amend a test procedure, not to withdraw a test procedure in its entirety. (*Id.*) The CA IOUs requested that DOE consider reinstating the test procedure and using the performance-based analysis therein. (*Id.*)

DOE acknowledges that a test procedure is necessary to evaluate the performance of, and to adopt performance standards for, cooking tops. As discussed previously, since the December 2020 NOPD, DOE has published a test procedure final rule establishing test procedures for cooking tops. In this SNOPR, DOE has analyzed performance-based standards for cooking tops, measured according to new appendix I1.

D. Technological Feasibility

1. General

In each energy conservation standards rulemaking, DOE conducts a screening analysis based on information gathered on all current technology options and prototype designs that could improve the efficiency of the products or equipment that are the subject of the rulemaking. As the first step in such an analysis, DOE develops a list of technology options for consideration in consultation with manufacturers, design engineers, and other interested parties. DOE then determines which of those means for improving efficiency are technologically feasible. DOE considers technologies incorporated in commercially-available products or in working prototypes to be technologically feasible. Sections 6(b)(3)(i) and 7(b)(1) of appendix A.

After DOE has determined that particular technology options are technologically feasible, it further evaluates each technology option in light of the following additional screening criteria: (1) practicability to manufacture, install, and service; (2) adverse impacts on product utility or availability; (3) adverse impacts on health or safety, and (4) unique-pathway proprietary technologies. Sections 6(b)(3)(ii)–(v) and 7(b)(2)–(5) of appendix A. Section IV.B of this document discusses the results of the screening analysis for consumer conventional cooking products, particularly the designs DOE considered, those it screened out, and those that are the basis for the standards considered in this rulemaking. For further details on the screening analysis for this rulemaking, see chapter 4 of the TSD for this SNOPR.

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

[24] AHAM's petition noted that some of the test labs participating in the round robin testing were unable to meet the ambient conditions of ''±2 °F'' specified in the DOE test procedure, and therefore ran tests at ±5 °F in their laboratories. (EERE–2018–BT–TP–0004–0003) DOE notes that the test procedure finalized in the December 2016 TP Final Rule required ambient conditions of ±2 °Celsius (''°C''), which is equivalent to ±5 °F, the specification used by AHAM.

energy use that is technologically feasible for such product. (42 U.S.C. 6295(p)(1)) Accordingly, in the engineering analysis, DOE determined the maximum technologically feasible (''max-tech'') improvements in energy efficiency for consumer conventional cooking products, using the design parameters for the most efficient products available on the market or in working prototypes. The max-tech levels that DOE determined for this rulemaking are described in section IV.C of this proposed rule and in chapter 5 of the TSD for this SNOPR.

E. Energy Savings

1. Determination of Savings

For each trial standard level (*i.e.,* TSL), DOE projected energy savings from application of the TSL to consumer conventional cooking products purchased in the 30-year period that begins in the year of compliance with the proposed standards (2027–2056).[25] The savings are measured over the entire lifetime of consumer conventional cooking products 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 or amended energy conservation standards.

DOE used its national impact analysis (''NIA'') spreadsheet model to estimate national energy savings (''NES'') from potential amended or new standards for consumer conventional cooking products. 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. For natural gas, the primary energy savings are considered to be equal to the site energy savings. 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.[26] 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.1 of this document.

2. Significance of Savings

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

The significance of energy savings offered by a new or amended energy conservation standard cannot be determined without knowledge of the specific circumstances surrounding a given rulemaking.[27] For example, some covered products and equipment have most of their energy consumption occur during periods of peak energy demand. The impacts of these products on the energy infrastructure can be more pronounced than products with relatively constant demand.

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

F. Economic Justification

1. Specific Criteria

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. 6295(o)(2)(B)(i)(I)–(VII)). The following sections discuss how DOE has addressed each of those seven factors in this rulemaking.

a. Economic Impact on Manufacturers and Consumers

In determining the impacts of 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. 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

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

[26] 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).

[27] The numeric threshold for determining the significance of energy savings established in a final rule published on February 14, 2020 (85 FR 8626, 8670), was subsequently eliminated in a final rule published on December 13, 2021 (86 FR 70924).

inputs, such as product lifetime and discount rate, DOE uses a distribution of values, with probabilities attached to each value.

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

For its LCC and PBP analysis, DOE assumes that consumers will purchase the covered products in the first year of compliance with new or amended standards. The LCC savings for the considered efficiency levels are calculated relative to the case that reflects projected market trends in the absence of new or amended standards. DOE's LCC and PBP analysis is discussed in further detail in section IV.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. 6295(o)(2)(B)(i)(III)) As discussed in section III.E of this document, DOE uses the NIA spreadsheet models to project national energy savings.

d. Lessening of Utility or Performance of Products

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. 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 rulemaking.

e. Impact of Any Lessening of Competition

EPCA directs DOE to consider the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from a proposed standard. (42 U.S.C. 6295(o)(2)(B)(i)(V)) It also directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a proposed standard and to transmit such determination to the Secretary within 60 days of the publication of a proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(ii)) DOE will transmit a copy of this proposed rule to the Attorney General with a request that the Department of Justice (''DOJ'') provide its determination on this issue. DOE will publish and respond to the Attorney General's determination in the final rule. DOE invites comment from the public regarding the competitive impacts that are likely to result from this proposed rule. In addition, stakeholders may also provide comments separately to DOJ regarding these potential impacts. See the **ADDRESSES** section for information to send comments to DOJ.

f. Need for National Energy Conservation

DOE 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. 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 associated with energy production and use, including in-home emissions reductions experienced by consumers, and their families. DOE conducts an emissions analysis to estimate how potential standards may affect these emissions, as discussed in section IV.K of this document; the estimated emissions impacts are reported in section V.B.6 of this document. DOE also estimates the economic value of climate and health benefits from certain 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. 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

As set forth in 42 U.S.C. 6295(o)(2)(B)(iii), EPCA creates a rebuttable presumption that an energy conservation standard is economically justified if the additional cost to the consumer of a product that meets the standard is less than three times the value of the first year's energy savings resulting from the standard, as calculated under the applicable DOE test procedure. DOE's LCC and PBP analyses generate values used to calculate the effects that proposed energy conservation standards would have on the payback period for consumers. These analyses include, but are not limited to, the 3-year payback period contemplated under the rebuttable-presumption test. In addition, DOE routinely conducts an economic analysis that considers the full range of impacts to consumers, manufacturers, the Nation, and the environment, as required under 42 U.S.C. 6295(o)(2)(B)(i). The results of this analysis serve as the basis for DOE's evaluation of the economic justification for a potential standard level (thereby supporting or rebutting the results of any preliminary determination of economic justification). The rebuttable presumption payback calculation is discussed in section IV.F.9 of this proposed rule.

IV. Methodology and Discussion of Related Comments

This section addresses the analyses DOE has performed for this rulemaking with regard to consumer conventional cooking products. Separate paragraphs address each component of DOE's analyses.

DOE used several analytical tools to estimate the impact of the standards proposed in this document. The first tool is a spreadsheet that calculates the LCC savings and PBP of potential amended or new energy conservation standards. The national impacts analysis uses a second spreadsheet set that provides shipments projections and calculates national energy savings and net present value of total consumer

costs and savings expected to result from potential energy conservation standards. DOE uses the third spreadsheet tool, the Government Regulatory Impact Model (''GRIM''), to assess manufacturer impacts of potential standards. These three spreadsheet tools are available on the DOE website for this rulemaking: *www.regulations.gov/docket/EERE-2014-BT-STD-0005/document.* 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 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 consumer conventional cooking products. The key findings of DOE's market assessment are summarized in the following sections. See chapter 3 of the TSD for this SNOPR for further discussion of the market and technology assessment.

1. Product Classes

When evaluating and establishing energy conservation standards, DOE may establish separate standards for a group of covered products (*i.e.,* establish a separate product class) if DOE determines that separate standards are justified based on the type of energy used, or if DOE determines that a product's capacity or other performance-related features that justifies a different standard. (42 U.S.C. 6295(q)) In making a determination whether a performance-related feature justifies a different standard, DOE must consider such factors as the utility to the consumer of the feature and other factors DOE determines are appropriate. (*Id.*)

a. Conventional Cooking Tops

During the previous energy conservation standards rulemaking for cooking products, DOE evaluated product classes for conventional cooking tops based on energy source (*i.e.,* gas or electric). These distinctions initially yielded two conventional cooking top classes: (1) gas cooking tops; and (2) electric cooking tops. For electric cooking tops, DOE determined that the ease of cleaning smooth elements provides enhanced consumer utility over coil elements. Because smooth elements can use more energy than coil elements, DOE defined two separate product classes for electric cooking tops. DOE defined the following product classes for consumer conventional cooking tops in the April 2009 Final Rule TSD (''2009 TSD''): [28]

- Electric cooking tops—low or high wattage open (coil) elements;
- Electric cooking tops—smooth elements; and
- Gas cooking tops—conventional burners.

Induction Heating

In the December 2020 NOPD, DOE proposed to maintain the product classes for conventional cooking tops from the previous standards rulemaking, as discussed. 85 FR 80982, 80995. DOE also proposed to consider induction heating as a technology option for electric smooth element cooking tops rather than as a separate product class. *Id.* DOE noted that induction heating provides the same basic function of cooking or heating food as heating by gas flame or electric resistance, and that the installation options available to consumers are also the same for both cooking products with induction and with electric resistance heating. *Id.* In addition, in considering whether there are any performance-related features that justify a higher energy use standard to establish a separate product class, DOE noted in the September 2016 SNOPR that the utility of speed of cooking, ease of cleaning, and requirements for specific cookware for induction cooking tops do not appear to be uniquely associated with higher energy use compared to other electric smooth element cooking tops with electric resistance heating elements. 81 FR 60784, 60801.

DOE did not receive any comments regarding induction technologies in response to the December 2020 NOPD.

[28] The TSD from the previous residential cooking products standards rulemaking is available at: *www.regulations.gov/docket/EERE-2006-STD-0127/document.*

In addition to the reasons presented in the December 2020 NOPD and discussed previously, DOE recognizes that induction cooking tops are only compatible with ferromagnetic cooking vessels. However, DOE does not identify any consumer utility unique to any specific type of cookware that would warrant establishing separate product classes. As discussed in chapter 8 of the TSD for this SNOPR, DOE considered the cost of replacing cookware as part of the LCC analysis. DOE also conducted standby testing on full-surface induction cooking tops. Based on DOE's testing, the sensors required to detect the presence of a pot placed on the cooking surface do not remain active while the product is in standby mode. In addition, DOE notes that the standby power required for the tested model (0.25 watts (''W'')) was below the average standby power for other electric cooking tops in DOE's test sample (2.25 W). For these reasons, DOE is not considering a separate product class for induction cooking products.

Commercial-Style Cooking Tops

Based on DOE's review of conventional gas cooking tops available on the market, DOE determined for December 2020 NOPD that products marketed as commercial-style cannot be distinguished from standard residential-style products based on performance characteristics or consumer utility. 85 FR 80982, 80995. While conventional gas cooking tops marketed as commercial-style have more than one burner rated above 14,000 Btu/h and cast-iron grates, approximately 50 percent of cooking top models marketed as residential-style also have one or more burners rated above 14,000 Btu/h and cast-iron grates. *Id.*

As part of the December 2020 NOPD, DOE considered whether separate product classes for commercial-style gas cooking tops with higher burner input rates are warranted by comparing the test energy consumption of individual surface units in a sample of cooking tops tested by DOE. *Id.* For the September 2016 SNOPR analysis, DOE conducted testing of gas surface units in a sample of twelve gas cooking tops, which included six products marketed as commercial-style, according to the test procedure established in the December 2016 TP Final Rule and determined that there was no statistically significant correlation between burner input rate and the ratio of surface unit energy consumption to

test load mass [29] for cooking tops marketed as either residential-style or commercial-style. 81 FR 60783, 60801–60802. DOE noted that its testing showed that this efficiency ratio for gas cooking tops is more closely related to burner and grate design rather than input rate. *Id.* at 81 FR 60802.

DOE recognized in the December 2020 NOPD that the presence of certain features, such as heavy cast-iron grates and multiple high-input rate burners (''HIR burners''), may help consumers perceive a difference between commercial-style and residential-style gas cooking top performance. 85 FR 80982, 80996. However, DOE stated that it was not aware of clearly defined and consistent design differences and corresponding utility provided by commercial-style gas cooking tops as compared to residential-style gas cooking tops. *Id.* Although DOE's testing indicated there is a difference in energy consumption between residential-style and commercial-style gas cooking tops, this difference could not be correlated to any specific utility provided to consumers. *Id.* Moreover, DOE stated that it is not aware of an industry test standard that evaluates cooking performance and that would quantify the utility provided by these products. *Id.* While DOE stated in the December 2020 NOPD that it recognizes the presence of certain commercial-style features described by manufacturers may allow consumers to cook with a wide variety of cooking methods, manufacturers have not provided consumer usage data demonstrating that consumers of commercial-style cooking tops and residential-style cooking tops employ significantly different cooking methods during a typical cooking cycle. *Id.* Moreover, DOE also stated that manufacturers have not provided evidence that consumers of commercial-style cooking tops would use more burners on a cooking top during a single cooking cycle than consumers of residential-style cooking tops. *Id.* DOE noted that there are many residential-style cooking tops with one to two HIR burners and continuous cast-iron grates that provide consumers with the ability to sear food at high temperatures and simmer at low temperatures. *Id.* For these reasons, DOE did not propose in the December 2020 NOPD to establish a separate product class for gas cooking tops marketed as commercial-style or conventional gas cooking tops with higher burner input rates. *Id.*

DOE did not receive any comments regarding commercial-style gas cooking tops in response to the December 2020 NOPD.

For this SNOPR analysis, DOE further considered whether separate product classes for commercial-style cooking tops are warranted by comparing the test energy consumption of burners in a sample of cooking tops tested by DOE according to new appendix I1. DOE measured energy consumption of gas burners in a sample of 24 gas cooking tops, which included 11 products marketed as commercial-style. The number of burners per cooking top ranged from four to six.

DOE's testing, as presented in chapter 5 of the TSD for this SNOPR, showed that energy consumption for gas cooking tops continues to be more closely related to burner and grate design rather than input rate, as it was in the September 2016 SNOPR analysis.

Based on both review of the market and comments from manufacturers, DOE recognizes that the presence of certain features, such as heavy cast-iron grates and multiple HIR burners, may help consumers perceive a difference between commercial-style and residential-style gas cooking top performance. However, DOE continues to not be aware of clearly defined, consistent design differences and corresponding utility provided by commercial-style gas cooking tops as compared to residential-style gas cooking tops. Although DOE's testing indicates there is a difference in energy consumption between residential-style and commercial-style gas cooking tops, this difference could not be correlated to any specific utility provided to consumers. In addition, there are many residential-style cooking tops with one to two HIR burners and continuous cast-iron grates that provide consumers with the ability to sear food at high temperatures and simmer at low temperatures. For these reasons, DOE is not evaluating a separate product class for commercial-style gas cooking tops.

However, as discussed in sections IV.B.1.b and IV.C.1.a of this document, DOE conducted its engineering analysis consistent with products currently available on the market and only evaluated efficiency levels for gas cooking tops that maintain the features available in conventional cooking tops marketed as commercial-style (*e.g.,* at least one HIR burners, continuous cast-iron gates, *etc.*) that may be used to differentiate these products in the marketplace.

Downdraft Cooking Tops

DOE is aware of conventional cooking tops, including the cooking top portion of conventional ranges, which incorporate venting systems which draw air, combustion products, steam, smoke, grease, odors, and other cooking emissions across the surface of the cooking top and through a vent ducted to the outdoors (''downdraft venting systems''). The fan in downdraft venting systems may be activated automatically any time the cooking top is being operated, through a control algorithm that determines when the fan should be activated, or by means of consumer selection. Because indoor air quality (''IAQ'') related to cooking emissions is the subject of increasing attention and concern,[30] and because venting systems designed to specifically exhaust the emissions from conventional cooking products have been shown to significantly improve IAQ in homes,[31] building codes in certain local jurisdictions mandate the use of venting systems for conventional cooking products.[32] Although these venting systems may be external to and separate from the conventional cooking product (*i.e.,* a vent hood over a conventional cooking top or a separate downdraft venting unit built into a countertop), venting may also be accomplished by means of a downdraft venting system incorporated integrally in a conventional cooking top. According to DOE's review of products on the market and discussions with manufacturers, the prevalence of conventional cooking tops with integral downdraft venting systems is increasing.

The energy consumption of an integral downdraft venting system, including the fan and, in some cases, a motor to move the inlet duct into position during operation, increases the total annual energy consumption of a conventional cooking top. At this time, DOE does not have information

[29] Because the mass of the test load depends on the input rate of the burner, the test energy consumption must be normalized for comparison. The higher the ratio of test energy consumption to test load mass, the less efficient the surface unit.

[30] See, for example, the discussion and recommendations addressing ''Indoor Air Pollution from Cooking'' by the California Air Resources Board, available at: *ww2.arb.ca.gov/resources/documents/indoor-air-pollution-cooking.*

[31] Militello-Hourigan, R.E. and Miller, S.L., ''The impacts of cooking and an assessment of indoor air quality in Colorado passive and tightly constructed homes,'' *Building and Environment,* October 15, 2018. Vol. 144, pp. 573–582. Research indicated that fine particulate matter ($PM_{2.5}$) concentrations from cooking activity in homes could be reduced by at least 75 percent through the use of a directly exhausting conventional range hood.

[32] See, for example, Section 15.16.020 ''Domestic Range Hoods and Vents'' of the San Clemente, California, Mechanical Code, which requires that ''[k]itchen range hoods shall be installed for cooking facilities with an approved forced-draft system of ventilation vented to the outside of the building.''

regarding the operating patterns or consumer usage of downdraft venting systems in conventional cooking tops that would allow it to characterize representative energy use. Therefore, recognizing the importance of IAQ issues and rapidly evolving market demands, and so as to not impede innovation in this area, DOE has not evaluated the energy consumption of downdraft venting systems nor is proposing to establish separate product classes for conventional cooking tops with downdraft venting systems in this SNOPR. DOE will continue to collect information on such cooking tops and may consider the impacts in a future rulemaking.

Alternatively, DOE could consider specifying an adder to the maximum allowable IAEC value in the energy conservation standards for conventional cooking tops with a downdraft venting system, which would account for the energy consumption of the fan and any motor operation during active mode and any standby mode or off mode power consumption specifically associated with the downdraft venting system.

DOE seeks comment on the impacts of downdraft venting systems on energy consumption and associated data about such impacts. DOE further requests comment on its proposal to not include the energy consumption of any downdraft venting system in the energy conservation standards for conventional cooking tops.

Single-Zone Conventional Cooking Tops

DOE notes that some conventional cooking tops are distributed in commerce with only a single cooking zone with a relatively high input power for electric cooking tops or high burner input rate for gas cooking tops. Single-cooking zone cooking tops do not provide the ability for consumers to cook multiple food loads at the same time and, particularly for gas cooking tops, may not operate over the full range of input rates associated with all typical cooking processes for which a conventional cooking top is used (*e.g.,* boiling, sautéing, simmering, reheating) or accommodate the complete range of typical cookware sizes. To achieve this full functionality, conventional cooking tops with single cooking zones are typically used in conjunction with one or more additional conventional cooking tops to provide the consumer with the choice of the number and type of cooking zones to use. Indeed, DOE observes that manufacturers of single-zone cooking tops that are not portable conventional cooking tops also typically manufacture and market comparable dual-zone cooking tops with similar construction and design features, and consumers may choose to install non-portable single-zone cooking units in combination with one or more of such comparable dual-zone units to achieve full cooking functionality. As a result, DOE expects that evaluating the IAEC of a single-zone non-portable cooking top by itself would not be representative of the average use of the product, and therefore proposes that a more representative value of IAEC would be based on a tested configuration of the typical combination of a single-zone cooking top paired with one or more additional cooking tops, such that the combination of conventional cooking tops in aggregate provides complete functionality to the consumer.

Based on DOE's review of commercially available products, single-zone and dual-zone non-portable cooking tops typically range in width from 12 inches to 15 inches; DOE therefore proposes that the most representative pairing for the tested configuration of a single-zone cooking top would be the combination of one single-zone cooking top and one comparable dual-zone cooking top, because the overall width of the combination would not exceed the width of typical conventional cooking tops with four to six cooking zones (24 inches to 36 inches) and because this is the minimum number of such cooking tops that would ensure complete functionality as previously described. Based on its expectation that consumers will select, to the extent possible, matching products for this combination, DOE proposes to define the tested configuration of a single-zone non-portable cooking top as the single-zone unit along with the same manufacturer's dual-zone non-portable cooking top unit within the same product class and with similar design characteristics (*e.g.,* construction materials, user interface), and use the same heating technology (*i.e.,* gas flame, electric resistive heating, or electric inductive heating) and energy source (*e.g.,* voltage, gas type). DOE expects that these products comprising the test configuration typically would be marketed as being within the same ''product line'' by manufacturers. In instances where the manufacturer's product line contains more than one dual-zone non-portable cooking top unit, DOE proposes that the dual-zone unit with the least energy consumption, as measured using appendix I1, be selected for the tested configuration, which along with the single-zone counterpart, would span the full range of expected per-cooking zone energy efficiency performance.

In the approach DOE is proposing, the representative IAEC of the single-zone non-portable cooking top would factor in the performance of the two additional cooking zones included in the dual-zone cooking top that is part of the tested configuration. That is, the IAEC would be based on the average active mode performance of the three cooking zones comprising the tested configuration. Because the single-zone non-portable cooking top contains one of the three burners, while the comparable dual-zone cooking top contains two, DOE additionally proposes that the IAEC of the single-zone non-portable cooking top unit under consideration be calculated as the weighted average of the measured IAEC of the single-zone cooking top and the IAEC dual-zone cooking top in the tested configuration, using the number of cooking zones as the basis for the weighting factors; *i.e.,* the single-zone IAEC would have a weighting of ⅓ and the dual-zone IAEC would have a weighting of ⅔. Recognizing that the dual-zone cooking top in the tested configuration would already be separately tested to determine its IAEC value for certification purposes, to minimize testing burden associated with this approach, DOE is proposing that the represented IAEC value of the dual-zone cooking top (determined separately) would be used in the calculation of the single-zone cooking top's represented IAEC value (*i.e.,* DOE is not requiring the dual-zone cooking top to be tested again for the purpose of determining the represented IAEC value of the single-zone cooking top). DOE expects that this approach will produce results that are most representative for the tested configuration. Further, DOE proposes that if there is no dual-zone non-portable cooking top within the same product class and with similar construction and design features as the single-zone non-portable cooking top being tested, then consumers are likely to purchase and install the single-zone cooking top for use on its own; in that case, the most representative IAEC of the single-zone cooking top is the IAEC of that product as measured according to appendix I1.

DOE requests comment on its proposed tested configuration and determination of representative IAEC for single-zone non-portable cooking tops.

DOE additionally proposes that a cooking top basic model is an individual cooking top model and does not include any combinations of cooking top models that may be installed together. Accordingly, as part of DOE's proposal, each individual cooking top model that may be installed

in combination must be rated as a separate basic model, and any combination of such cooking top models that are typically installed in combination does not itself need to have a separate representation as its own basic model. In other words, DOE does not expect combinations to be separately represented or certified to the Department as their own basic models. This proposal is consistent with the current definition of a basic model at 10 CFR 430.2, which specifies that basic model includes all units of a given type of covered product (or class thereof) manufactured by one manufacturer; having the same primary energy source; and, which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency. Therefore, DOE believes this clarification is helpful to provide specific context for cooking tops, but DOE is not proposing specific amendments to the basic model definition in this rule.

DOE requests comment on its proposal to not define ''basic model'' with respect to cooking products or cooking tops, and on possible definitions for ''basic model'' with respect to cooking products or cooking tops that could be used if DOE were to determine such a definition is necessary.

b. Conventional Ovens

During the first energy conservation standards rulemaking for cooking products, DOE evaluated product classes for conventional ovens based on energy source (*i.e.,* gas or electric). These distinctions initially yielded two conventional oven product classes: (1) gas ovens; and (2) electric ovens. DOE more recently determined that the type of oven-cleaning system is a utility feature that affects performance. DOE found that standard ovens and ovens using a catalytic continuous-cleaning process use roughly the same amount of energy. On the other hand, self-clean ovens use a pyrolytic process that provides enhanced consumer utility with lower overall energy consumption as compared to either standard or catalytically lined ovens. Therefore, in the April 2009 Final Rule analysis described in the 2009 TSD, DOE defined the following product classes for conventional ovens:

• Electric ovens—standard oven with or without a catalytic line;
• Electric ovens—self-clean oven;
• Gas ovens—standard oven with or without a catalytic line; and
• Gas ovens—self-clean oven.

Self-Cleaning Technology

Based on DOE's review of conventional gas ovens available on the U.S. market, and on manufacturer interviews and testing conducted as part of the engineering analysis, DOE noted in the June 2015 NOPR that the self-cleaning function of a self-clean oven may employ methods other than a high-temperature pyrolytic cycle to perform the cleaning action.[33] 80 FR 33030, 33043. DOE clarified that a conventional self-clean electric or gas oven is an oven that has a user-selectable mode separate from the normal baking mode, not intended to heat or cook food, which is dedicated to cleaning and removing cooking deposits from the oven cavity walls. *Id.* As part of the September 2016 SNOPR, DOE stated that it is not aware of any differences in consumer behavior in terms of the frequency of use of the self-clean function that would be predicated on the *type* of self-cleaning technology rather than on cleaning habits or cooking usage patterns that are not dependent on the type of technology. 81 FR 60784, 60804. As a result, DOE did not consider establishing separate product classes based on the type of self-cleaning technology in the December 2020 NOPD. *Id.*

For the reasons discussed previously, DOE is not considering separate product classes based on the type of self-cleaning technology.

DOE welcomes data on the consumer usage patterns of pyrolytic versus non-pyrolytic self-cleaning functions in conventional ovens, and requests comment on its preliminary determination that self-cleaning technologies do not warrant separate product class considerations.

Commercial-Style Ovens

With regard to gas oven burner input rates, DOE noted in the June 2015 NOPR that based on its review of the consumer conventional gas ovens available on the market, residential-style gas ovens typically have an input rate of 16,000 to 18,000 Btu/h, whereas residential gas ovens marketed as commercial-style typically have burner input rates ranging from 22,500 to 30,000 Btu/h.[34] 80 FR 33030, 33043. Additional review of both the residential-style and commercial-style gas oven cavities indicated that there is significant overlap in oven cavity volume between the two oven types. *Id.* Standard residential-style gas oven cavity volumes range from 2.5 to 5.6 cubic feet (''ft^3'') and gas ovens marketed as commercial-style have cavity volumes ranging from 3.0 to 6.0 ft^3. *Id.* Sixty percent of the commercial-style models surveyed had cavity volumes between 4.0 and 5.0 ft^3, while fifty percent of the standard models had cavity volumes between 4.0 and 5.0 ft^3. *Id.* The primary differentiating factor between the two oven types was burner input rate, which is greater than 22,500 Btu/h for commercial-style gas ovens. *Id.*

DOE conducted testing for the June 2015 NOPR using the version of the test procedure later adopted in the July 2015 TP Final Rule to determine whether commercial-style gas ovens with higher burner input rates warrant establishing a separate product class. DOE evaluated the cooking efficiency of eight conventional gas ovens, including five ovens with burners rated at 18,000 Btu/h or less and the remaining three with burner input rates ranging from 27,000 Btu/h to 30,000 Btu/h. *Id.* DOE's testing showed that the measured cooking efficiencies for ovens with burner input rates above 22,500 Btu/h were lower than for ovens with ratings below 22,500 Btu/h, even after normalizing cooking efficiency to a fixed cavity volume. *Id.* at 80 FR 33044. DOE also noted that the conventional gas ovens with higher burner input rates in its test sample were marketed as commercial-style and had greater total thermal mass, including heavier racks and thicker cavity walls, even after normalizing for cavity volume. *Id.* DOE's testing of a 30,000 Btu/h oven suggested that much of the energy input to commercial-style ovens with higher burner input rates goes to heating the added mass of the cavity, rather than the test load, resulting in relatively lower measured efficiency when measured according to the test procedure adopted in the July 2015 TP Final Rule. *Id.* DOE also investigated the time it took each oven in the test sample to heat the test load to a final test temperature of 234 °F above its initial temperature, as specified in the DOE test procedure in appendix I at the time of the testing. *Id.* at 80 FR 33045. DOE's testing showed that gas ovens with burner input rates greater than 22,500 Btu/h do not heat the test load significantly faster than the

[33] DOE noted that it is aware of a type of self-cleaning oven that uses a proprietary oven coating and water to perform a self-clean cycle with a shorter duration and at a significantly lower temperature setting. The self-cleaning cycle for these ovens, unlike catalytically-lined standard ovens that provide continuous cleaning during normal baking, still have a separate self-cleaning mode that is user-selectable.

[34] However, DOE noted that many gas ranges, while marketed as commercial- or professional-style and having multiple surface units with high input rates, did not have a gas oven with a burner input rate above 22,500 Btu/h.

ovens with lower burner input rates, and two out of the three units with the higher burner input rates took longer than the average time to heat the test load. *Id.* Therefore, DOE concluded in the June 2015 NOPR that there is no unique utility associated with faster cook times that is provided by gas ovens with burner input rates greater than 22,500 Btu/h. *Id.*

Based on DOE's testing, reverse engineering, and additional discussions with manufacturers, DOE posited in the June 2015 NOPR that the major differentiation between conventional gas ovens with lower burner input rates and those with higher input rates, including those marketed as commercial-style, was design and construction related to aesthetics rather than improved cooking performance. *Id.* Further, DOE did not identify any unique utility conferred by commercial-style gas ovens. For the reasons discussed above, DOE did not propose in the June 2015 NOPR to establish a separate product class for conventional gas ovens with higher burner input rates. *Id.*

As part of the September 2016 SNOPR, to further address whether commercial-style ovens provide a unique utility that would warrant establishing a separate product class, DOE conducted additional interviews with manufacturers of commercial-style cooking products and reviewed additional commercial-style test data. 81 FR 60783, 60805–60806. While these data demonstrated a difference in energy consumption between residential-style and commercial-style ovens when measured according to the test procedure adopted in the July 2015 TP Final Rule, this difference could not be correlated to any specific utility provided to consumers. *Id.* at 60806. Moreover, DOE stated that it is not aware of an industry test standard that evaluates cooking performance and that would quantify the utility provided by these products. *Id.* DOE also noted that all conventional ovens, regardless of whether or not the product is marketed as commercial-style, must meet the same safety standards for the construction of the oven. *Id.* American National Standards Institute (''ANSI'') Z21.1 ''Household Cooking Gas Appliances'' (''ANSI Z21.1''), Section 1.21.1, requires that the oven structure, and specifically the baking racks, have sufficient strength to sustain a load of up to 25 pounds depending on the width of the rack. A similar standard (Underwriters Laboratories (''UL'') 858 ''Household Electric Ranges'' (''UL 858'')) exists for electric ovens.

DOE also observed as part of the September 2016 SNOPR that many of the design features identified by manufacturers as unique to commercial-style ovens and that may impact the energy consumption, such as extension racks, convection fans, cooling fans, and hidden bake elements, are also found in residential-style products. 81 FR 60783, 60806. DOE noted that the presence of these features, along with thicker oven cavity walls and higher burner input rates, may help consumers perceive a difference between commercial-style and residential-style ovens. *Id.* However, DOE stated in the September 2016 SNOPR that it was not aware of a clearly defined and consistent design difference and corresponding utility provided by commercial-style ovens as compared to residential-style ovens. *Id.* For these reasons, DOE did not propose in the September 2016 SNOPR, or in the December 2020 NOPD to establish a separate product class for commercial-style ovens. *Id.* at 85 FR 80982, 80998.

DOE did not receive any comments on the December 2020 NOPD regarding commercial-style ovens. Based on DOE's analysis discussed previously, DOE is not evaluating a separate product class for commercial-style ovens in this SNOPR.

Installation Configuration

As discussed in section III.C of this document, in the October 2012 TP Final Rule, DOE amended appendix I to include methods for measuring fan-only mode.[35] Based on DOE's testing of freestanding, built-in, and slide-in conventional gas and electric ovens, DOE observed that all of the built-in and slide-in ovens tested consumed energy in fan-only mode, whereas freestanding ovens did not. The energy consumption in fan-only mode for built-in and slide-in ovens ranged from approximately 1.3 to 37.6 watt-hours (''Wh'') per cycle, which corresponds to 0.25 to 7.6 kWh/year. Based on DOE's reverse engineering analyses, DOE noted that built-in and slide-in products incorporate an additional exhaust fan and vent assembly that is not present in freestanding products. The additional energy required to exhaust air from the oven cavity is necessary for slide-in and built-in installation configurations to meet safety-related temperature requirements because the oven is enclosed in cabinetry. For these reasons, DOE proposed in the June 2015 NOPR, September 2016 SNOPR, and December 2020 NOPD to include separate product classes for freestanding and built-in/slide-in ovens. 80 FR 33030, 33045; 81 FR 60784, 60806; 85 FR 80982, 80998.

DOE did not receive comment on its proposal in the December 2020 NOPD to include separate product classes for built-in/slide-in ovens. For the reasons discussed above, DOE analyzed separate product classes for freestanding and built-in/slide-in ovens for this SNOPR.

c. Evaluated Product Classes

In summary, DOE analyzed the product classes listed in Table IV.1 for this SNOPR.

TABLE IV.1—PRODUCT CLASSES FOR CONSUMER CONVENTIONAL COOKING PRODUCTS

Product class	Product type	Sub-category	Installation type
1	Electric cooking top	Open (coil) elements.	
2		Smooth elements.	
3	Gas cooking top.		
4	Electric oven	Standard with or without a catalytic line	Freestanding.
5			Built-in/Slide-in.
6		Self-clean	Freestanding.
7			Built-in/Slide-in.
8	Gas oven	Standard with or without a catalytic line	Freestanding.
9			Built-in/Slide-in.

[35] Fan-only mode is an active mode that is not user-selectable in which a fan circulates air internally or externally to the cooking product for a finite period of time after the end of the heating function.

TABLE IV.1—PRODUCT CLASSES FOR CONSUMER CONVENTIONAL COOKING PRODUCTS—Continued

Product class	Product type	Sub-category	Installation type
10		Self-clean	Freestanding.
11			Built-in/Slide-in.

DOE seeks comment on the product classes evaluated in this SNOPR.

2. Technology Options

In the preliminary market analysis and technology assessment, DOE identified technology options that would be expected to improve the efficiency of conventional cooking tops and of conventional ovens. Initially, these technologies encompass all those that DOE believes are technologically feasible. Chapter 3 of the TSD for this SNOPR includes the detailed list and descriptions of all technology options identified for consumer conventional cooking products.

AHAM stated that the available technology options have not changed since the April 2009 Final Rule. (AHAM, No. 84 at p. 4)

GEA stated there have been no technology improvements impacting energy efficiency and no meaningful energy savings opportunity in consumer conventional cooking products since the last standards rule and therefore there is no justification for changing the current standards. (GEA, No. 85 at p. 2)

As discussed in chapter 3 of the TSD for this SNOPR, DOE has performed market research and evaluated available consumer conventional cooking products to assess existing technology options. Although DOE has found that there are no specific new technology options that impact energy efficiency available since the April 2009 Final Rule, manufacturers are innovating on aspects of cooking performance that do not relate to efficiency.

a. Conventional Electric Cooking Tops

In response to the September 2016 SNOPR, DOE received comments from AHAM opposing improved contact conductance as a technology option for electric open (coil) element cooking tops. AHAM commented that the test procedure specifies narrow tolerances on the flatness of the test vessel, which AHAM felt were appropriate to reduce variability in test results. AHAM stated that if a consumer does not use pots with comparable flatness, any reduction in energy consumption due to greater flatness of the heating element that would be measured using the test procedure will not be realized in the field. Based on its test data, AHAM asserted that consumers are using warped pans and that improving the flatness of the heating element will not achieve improved contact conductance. AHAM stated, therefore, that the energy savings associated with the improved contact conductance technology option measured under the test procedure is not representative of what consumer will experience in the field and, as a result, this should not be considered as a technology option. (AHAM, No. 64 at pp. 7–10)

DOE agreed that, based on the test data provided by AHAM, improving the flatness of the electric coil heating element may not result in energy savings due to the warping of pots and pans used by consumers. As a result, DOE did not consider improved contact conductance as a technology option for electric open (coil) element cooking tops for the December 2020 NOPD. 85 FR 80982, 80999.

In the December 2020 NOPD, DOE proposed to consider the technology options for conventional electric cooking tops listed in Table IV.2. *Id.* at 85 FR 80999–81000.

TABLE IV.2—DECEMBER 2020 NOPD TECHNOLOGY OPTIONS FOR CONVENTIONAL ELECTRIC COOKING TOPS

Electric Open (Coil) Element Cooking Tops:
1. None.

Electric Smooth Element Cooking Tops:
1. Halogen elements.
2. Induction elements.
3. Low-standby-loss electronic controls.

In response to the December 2020 NOPD, the CA IOUs requested that DOE re-examine its reasoning for no longer considering improved electric coils as a technology option in electric open (coil) element cooking tops. (CA IOUs, No. 89 at p. 5) The CA IOUs acknowledged that pan warping over time is likely to occur, however the CA IOUs do not believe this should preclude DOE from exploring improved electric coils as an energy saving option. (*Id.*) The CA IOUs also expressed doubt that energy savings from improving contact conductance is non-existent due to pan warping, stating that AHAM's own data confirms that pan warping may, in some cases, actually lessen the time it takes for a pot of water to reach 200 °F on an electric open (coil) element cooking top. (*Id.* citing AHAM, No. 64 at p. 9)

DOE agrees that AHAM's data show that pan warping may, in some cases, lessen the time it takes for a pot of water to reach 200 °F on an electric open (coil) element cooking top; however, AHAM's data also demonstrate that in other cases, pan warpage may increase such heating time. Given the inconsistent relationship between pan warpage and heat-up time, and the lack of information regarding how cookware may warp during typical consumer use, manufacturers would be unable to determine whether any modification to the flatness of their coil heating elements would improve contact conductance. Therefore, DOE tentatively concludes that greater flatness of the heating element would not result in energy savings for consumers, and maintains its decision to not consider improved contact conductance as a technology option. DOE is also not aware of any other technology options to improve electric open (coil) element cooking tops.

For electric open (coil) element cooking tops, in this SNOPR, DOE did not identify any technology options for improving efficiency.

DOE seeks comment on any existing technologies that improve the efficiency of electric open (coil) element cooking tops.

For electric smooth element cooking tops, DOE has identified an additional technology option: reduced air gap. Typical radiant element cooking tops have an air gap between the heating element and the ceramic-glass cooking top surface. Energy is expended to heat the air between the heating element and the glass, with that heated air providing minimal heating to the cooking vessel. One approach for increasing the efficiency of a radiant element is to reduce the air gap to reduce the amount of wasted heat.

For electric smooth element cooking tops, in this SNOPR, DOE considered the technologies listed in Table IV.3.

TABLE IV.3—TECHNOLOGY OPTIONS FOR ELECTRIC SMOOTH ELEMENT COOKING TOPS

1. Halogen elements.
2. Induction elements.

TABLE IV.3—TECHNOLOGY OPTIONS FOR ELECTRIC SMOOTH ELEMENT COOKING TOPS—Continued

3. Low-standby-loss electronic controls.
4. Reduced air gap.

b. Conventional Gas Cooking Tops

In the December 2020 NOPD, DOE proposed to consider the technology options for conventional gas cooking tops listed in Table IV.4. 85 FR 80982, 80999–81000.

TABLE IV.4—DECEMBER 2020 NOPD TECHNOLOGY OPTIONS FOR CONVENTIONAL GAS COOKING TOPS

1. Radiant gas burners.
2. Catalytic burners.
3. Reduced excess air at burner.
4. Reflective surfaces.
5. Optimized burner and grate design.

DOE did not receive any comments on the December 2020 NOPD regarding additional technology options for gas cooking tops.

For gas cooking tops, in this SNOPR, DOE considered the technologies listed in Table IV.5.

TABLE IV.5—TECHNOLOGY OPTIONS FOR CONVENTIONAL GAS COOKING TOPS

1. Catalytic burners.
2. Optimized burner and grate design.
3. Radiant gas burners.
4. Reduced excess air at burner.
5. Reflective surfaces.

c. Conventional Ovens

In the December 2020 NOPD, DOE proposed to consider the technology options for conventional ovens listed in Table IV.6. 85 FR 80982, 81003.

TABLE IV.6—DECEMBER 2020 NOPD TECHNOLOGY OPTIONS FOR CONVENTIONAL OVENS

1. Bi-radiant oven (electric only).
2. Forced convection.
3. Halogen lamp oven (electric only).
4. Improved and added insulation (standard ovens only).
5. Improved door seals.
6. Low-standby-loss electronic controls.
7. No oven-door window.
8. Oven separator (electric only).
9. Optimized burner and cavity design (gas only).
10. Reduced vent rate (electric standard ovens only).
11. Reflective surfaces.

Based on review of the additional test data provided by AHAM and GEA in response to the September 2016 SNOPR, in the December 2020 NOPD, DOE agreed that replacing the intermittent glo-bar ignition system with an intermittent/interrupted ignition or intermittent pilot ignition may not achieve energy savings due to the elimination of heat input that the glo-bar contributes to the cavity and food load, which must be offset by additional gas consumption. *Id.* at 85 FR 81001. As a result, DOE did not consider intermittent/interrupted or intermittent pilot ignition systems as a technology option in the December 2020 NOPD. *Id.*

NEEA recommended that DOE conduct its own testing to verify whether or not there is an energy savings opportunity from intermittent pilot ignition systems compared to glo-bar ignition systems. (NEEA, No. 88 at p. 4)

NEEA has not provided any data or information to suggest that intermittent pilot ignition systems provide any energy savings compared to glo-bar ignition systems. DOE continues to agree with AHAM's theoretical assertion that replacing the intermittent glo-bar ignition system with an intermittent pilot ignition would eliminate the heat input that the glo-bar contributes to the cavity and food load, which must be offset by additional gas consumption. Because this theory is supported by AHAM's test data, DOE continues to consider that intermittent pilot ignition systems would not provide energy savings, and is not considering them as a technology option in this SNOPR.

DOE requests information on the potential energy savings associated with intermittent pilot ignition systems.

For gas and electric ovens, in this SNOPR, DOE considered the technologies listed in Table IV.7.

TABLE IV.7—TECHNOLOGY OPTIONS FOR CONVENTIONAL ELECTRIC AND GAS OVENS

1. Bi-radiant oven (electric only).
2. Forced convection.
3. Halogen lamp oven (electric only).
4. Improved and added insulation (standard ovens only).
5. Improved door seals.
6. Low-standby-loss electronic controls.
7. No oven-door window.
8. Optimized burner and cavity design (gas only).
9. Oven separator (electric only).
10. Reduced vent rate (electric standard ovens only).
11. Reflective surfaces.

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 commercially viable, existing prototypes will not be considered further.

(2) *Practicability to manufacture, install, and service.* If it is determined that mass production of a technology in commercial products and reliable installation and servicing of the technology 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.* If a technology is determined to have a significant adverse impact on the utility of the product to subgroups of consumers, or 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) *Safety of technologies.* 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 technology has proprietary protection and represents a unique pathway to achieving a given efficiency level, it 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. The reasons for eliminating any technology are discussed in the following sections.

The following sections also include comments from interested parties pertinent to the screening criteria, DOE's evaluation of each technology option against the screening analysis criteria, and whether DOE determined that a technology option should be excluded (''screened out'') based on the screening criteria.

1. Screened-Out Technologies

a. Conventional Electric Cooking Tops

Based on DOE's review of products available on the market and its product teardowns, DOE stated in the December 2020 NOPD that it is not aware of any cooking tops that incorporate halogen heating elements. *Id.* at 85 FR 81004. Because this technology is currently not being used commercially or in working prototypes, DOE stated that it does not believe that it would be practicable to

produce this technology in commercial products on the scale necessary to serve the market by the potential compliance date of the proposed standards. *Id.* As a result, DOE screened out halogen elements from further analysis in the December 2020 NOPD. *Id.*

DOE did not receive any comments on the December 2020 NOPD regarding the screening analysis for conventional electric cooking tops.

In this SNOPR, DOE maintains its tentative determination from the December 2020 NOPD that it would not be practicable to manufacture, install and service halogen heating elements for electric smooth element cooking tops on the scale necessary to serve the relevant market at the time of the effective date of an amended standard, and screened out this technology from further consideration.

In this SNOPR, DOE is additionally screening out a subset of low-standby-loss electronic controls, namely those that use ''automatic power-down'' because this type of low-standby-loss electronic controls may negatively impact product utility. In particular, it may result in a loss in the utility of the continuous clock display for combined cooking products, such as ranges. However, it should be noted that the other low-standby-loss electronic controls such as switch-mode power supplies (''SMPSs'') were still analyzed in this SNOPR.

In this SNOPR, DOE is additionally screening out reduced air gap as a technology option because DOE is aware that the air gaps in commercialized radiant heating elements are currently as small as is practicable to manufacture on the scale necessary to serve the cooking products market. Furthermore, DOE is not aware of the magnitude of potential energy savings from this technology.

DOE requests comment on the magnitude of potential energy savings that could result from the use of a reduced air gap as a technology option.

DOE seeks comment on its screening analysis for conventional electric cooking tops and whether any additional technology options should be screened out on the basis of any of the screening criteria in this SNOPR.

b. Conventional Gas Cooking Tops

For conventional gas cooking tops, in the September 2016 SNOPR and the December 2020 NOPD, DOE screened out radiant gas burners, catalytic burners, reduced excess air at burner, and reflective surfaces. 81 FR 60784, 60810–60811; 85 FR 80982, 81003.

In the September 2016 SNOPR, DOE considered different efficiency levels associated with the optimized burner and grate design technology option that it observed in products available on the market, including a range of commercial-style gas cooking tops that maintain the utilities discussed previously in section IV.A.1.a of this document. 81 FR 60784, 60817. DOE characterized the optimized burner and grate design incremental efficiency levels based on different observed features (*e.g.,* HIR burners, grate types and material). *Id.*

In the December 2020 NOPD, DOE further noted that all gas cooking tops on the market, including those with an optimized burner and grate design, have been certified to applicable safety standards. 85 FR 80982, 81004. However, DOE recognized that the estimates for the energy savings associated with optimized burner and grate design may vary depending on the test procedure, and thus screened out this technology option from further analysis of gas cooking tops in the December 2020 NOPD. *Id.* DOE stated that it would reevaluate the energy savings associated with this technology option if it considered performance standards in a future rulemaking. *Id.*

NEEA recommended that, under an updated test procedure, DOE continue to evaluate screened out technologies such as optimized burner and grate design, because NEEA believes this technology option has the potential to impact efficiency significantly as it affects heat transfer from the burner to the pot or pan. (NEEA, No. 88 at pp. 3–4) NEEA recommended that, under an updated test procedure, DOE continue to evaluate screened out technology options that may improve heat transfer between the burner and the cooking vessel like the Turbo Pot product which according to NEEA can improve efficiency by 50 to 60 percent through a fin design on the pot. (NEEA, No. 88 at p. 4) NEEA recommends that, under an updated test procedure, DOE continue to evaluate screened out technology options that improve transfer efficiency between the burner and the cooking vessel including new burner face materials (such as metal mesh, ceramics, and metal foam) and power burners instead of atmospheric burners. (NEEA, No. 88 at p. 4)

The CA IOUs requested that DOE re-examine its reasoning for screening out optimized grates and burners, because the CA IOUs believe improvements to this technology could ultimately lead to a non-zero savings value for gas cooking tops. (CA IOUs, No. 89 at p. 4) The CA IOUs added that if the withdrawn test procedure is adequate to analyze the efficiency improvements of grate design, and overall performance improvement of other product classes' design features, it should not preclude DOE from considering technologically feasible design improvements that would improve energy efficiency in gas cooking tops. (*Id.*)

As discussed in section III.C of this document, DOE is considering performance standards for cooking tops, based on new appendix I1. Therefore, as discussed in the December 2020 NOPD, DOE is reevaluating the energy savings associated with optimized burner and grate design. As discussed in chapter 5 of the TSD for this SNOPR, DOE testing has confirmed that optimizing the burner and grate system can lead to reduced energy consumption, as measured under appendix I1. Therefore, DOE is no longer screening out optimized burner and grate design from its analysis.

However, DOE is aware of a wide range of optimized burner and grate designs on the market, some of which may reduce the consumer utility associated with HIR burners and continuous cast-iron grates. In this SNOPR, DOE is screening out any optimized burner and grate designs that would reduce consumer utility by only including in its analysis gas cooking tops that include at least one HIR burner and continuous cast-iron grates.

In this SNOPR, DOE is continuing to screen out catalytic burners, radiant gas burners, reduced excess air at burner, and reflective surfaces, for the same reasons as in the December 2020 NOPD.

DOE seeks comment on its screening analysis for conventional gas cooking tops and whether any additional technology options should be screened out on the basis of any of the screening criteria in this SNOPR.

c. Conventional Ovens

For the same reasons discussed in the September 2016 SNOPR, DOE screened out added insulation, bi-radiant oven, halogen lamp oven, no oven door window, reflective surfaces, and optimized burner and cavity design from further analysis for conventional ovens in the December 2020 NOPD. 81 FR 60784, 60811; 85 FR 80982, 81004.

The Joint Commenters stated that DOE's screening analysis was inconsistent. (Joint Commenters, No. 87 at p. 2) In particular, the Joint Commenters noted that technology options like optimized burner and grate design for gas cooking tops were screened out due to the lack of a test procedure whereas other technology options that rely on a test procedure like improved insulation and improved door seals for conventional ovens were kept

in the analysis. (*Id.*) The Joint Commenters added that new test procedures should be established prior to conducting analysis of potential standards. (*Id.*)

As discussed above, DOE is no longer screening out optimized burner and grate design for gas cooking tops, due to the existence of the new appendix I1 test procedure.

DOE agrees with the Joint Commenters and recognizes that the estimates for the energy savings associated with improved insulation, improved door seals and reduced vent rate may vary depending on the test procedure, and thus is screening out these technology options from further analysis of gas cooking tops in this SNOPR. DOE will reevaluate the energy savings associated with this technology option if it considers performance standards in a future rulemaking.

For the same reasons as discussed above for conventional electric cooking tops, DOE is continuing to screen out the use of automatic power-down low-standby-loss electronic controls. DOE is aware that the use of automatic power-down low-standby-loss electronic controls may negatively impact product utility. In particular, the use of automatic power-down low-standby-loss electronic controls may result in a loss in the utility of the continuous clock display for ovens. However, it should be noted that the other low-standby-loss electronic controls such as SMPSs were still analyzed.

Because DOE did not receive any comments opposing the conventional oven technology options screened out in the December 2020 NOPD, for the same reasons discussed in the December 2020 NOPD, DOE is continuing to screen out added insulation, bi-radiant oven, halogen lamp oven, no oven door window, reflective surfaces, and optimized burner and cavity design from further analysis in this SNOPR. DOE continues to seek comment on the technology options screened out in this SNOPR.

DOE seeks comment on its screening analysis for conventional ovens and whether any additional technology options should be screened out on the basis of any of the screening criteria in this SNOPR.

2. Remaining Technologies

Through a review of each technology, DOE tentatively concludes that all of the other identified technologies listed in section IV.A.2 of this document met all five screening criteria to be examined further as design options in DOE's SNOPR analysis. In summary, DOE did not screen out the technology options listed in Table IV.8.

TABLE IV.8—RETAINED DESIGN OPTIONS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS

Electric Open (Coil) Element Cooking Tops:
None.
Electric Smooth Element Cooking Tops:
1. Induction elements.
2. Switch-mode power supply.
Gas Cooking Tops:
1. Optimized burner and grate design.
Conventional Ovens:
1. Forced convection.
2. Switch-mode power supply.
3. Oven separator (electric only).

DOE seeks comment on the retained design options for consumer conventional cooking products.

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

C. Engineering Analysis

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

1. Efficiency Analysis

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

In this SNOPR, DOE is adopting a design-option approach supported by testing, supplemented by reverse engineering (physical teardowns and testing of existing products in the market) to identify the incremental cost and efficiency improvement associated with each design option or design option combination. The design-option approach is appropriate for consumer conventional cooking products, given the lack of certification data to determine the market distribution of existing products and to identify efficiency level ''clusters'' that already exist on the market. DOE also conducted interviews with manufacturers of consumer conventional cooking products following the February 2014 RFI to develop a deeper understanding of the various combinations of design options used to increase product efficiency, and their associated manufacturing costs.

DOE conducted testing and reverse engineering teardowns on products available on the market. Because there are no performance-based energy conservation standards or energy reporting requirements for consumer conventional cooking products, DOE selected test units based on performance-related features and technologies advertised in product literature.

For each product/equipment class, DOE generally selects a baseline model

as a reference point for each class, and measures changes resulting from potential energy conservation standards against the baseline. The baseline model in each product class represents the characteristics of a product 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.

For each product class for both conventional cooking tops and conventional ovens, DOE analyzed several efficiency levels (''ELs''). 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.

In response to the September 2016 SNOPR, AHAM commented that the manufacturer interviews in the earlier stages of the rulemaking have little or no meaning under the current proposed test procedure. (AHAM, No. 64 at p. 34–35) AHAM commented that significant changes to DOE's analysis have occurred since the manufacturer interviews, including (a) the proposed repeal of the oven test procedure;(b) the proposal of an entirely different cooking top test procedure; and (c) the entirely different approach taken to both cooking top and oven standards. (*Id.*) AHAM commented that the September 2016 SNOPR was an entirely new proposal, compared to previous proposals, that was based on a totally new test procedure with which manufacturers had very little experience. (*Id.*)

In the December 2020 NOPD, before the publication of the August 2022 TP Final Rule, DOE was following the then-current version of the Process Rule which indicated that a NOPD would be warranted due to the potential energy savings of the economically justified efficiency levels being below the mandatory threshold level. Therefore, at the time of the December 2020 NOPD, DOE did not conduct supplemental manufacturer interviews. Since then, two factors have changed to justify DOE's current SNOPR: first the Process Rule has been amended and no longer includes a mandatory threshold, and second, the publication of the August 2022 TP Final Rule enabled DOE to propose performance standards for conventional cooking tops which have higher energy saving potentials than the design requirement standards considered in the December 2020 NOPD. Accordingly, for this SNOPR, DOE sought updated manufacturer feedback through confidential interviews on issues relating to potential energy conservation standards for both conventional cooking tops and conventional ovens.

a. Conventional Cooking Tops

The December 2020 NOPD was published prior to the August 2022 TP Final Rule establishing appendix I1, which measures the energy consumption of conventional cooking tops. In the absence of a test procedure, the efficiency levels defined in the December 2020 NOPD were based on prescriptive standards. Therefore, the efficiency levels defined in the December 2020 NOPD are no longer relevant.

DOE's test sample for this SNOPR included 14 electric cooking tops, the cooking top portion of 8 electric ranges, 13 gas cooking tops, and the cooking top portion of 8 gas ranges for a total of 43 consumer conventional cooking tops covering all of the product classes considered in this analysis. The test unit characteristics and appendix I1 test results are available in chapter 5 of the TSD for this SNOPR.

Baseline Efficiency Levels

For this SNOPR, DOE developed performance-based baseline efficiency levels for consumer conventional cooking tops using the measured energy consumption of units in the DOE test sample. DOE determined the cooking top IAEC for each cooking top in the test sample based on the water heating test procedure adopted in the August 2022 TP Final Rule.

The baseline cooking top efficiency levels for this SNOPR differ from those presented in the December 2020 NOPD. As discussed, the cooking top efficiency levels for this SNOPR were determined using the test procedure finalized in the August 2022 TP Final Rule, whereas the analysis published in the December 2020 NOPD was based on the test method adopted in the December 2016 TP Final Rule. As part of the August 2022 TP Final Rule, DOE defined IAEC using an average of 418 cooking top cycles per year to represent consumer cooking frequency, as determined using data from the 2015 RECS. By comparison, the December 2016 TP Final Rule used values of 207.5 and 214.5 cooking top cycles per year for electric and gas cooking tops, respectively, based on the 2009 RECS. Primarily due to the updated number of cooking top cycles per year (along with some other minor changes to the test procedure), the baseline IAEC values calculated using the test method finalized in the August 2022 TP Final Rule are higher than the baseline IAEC values presented in the December 2020 NOPD.

To establish the new baseline IAEC values for cooking tops, DOE set the baseline cooking top integrated annual energy consumption (*i.e.,* IAEC) equal to the sum of the maximum cooking top active annual energy consumption (*i.e.,* AEC) observed in the dataset for the analyzed product class and the maximum combined low-power mode annual energy consumption (''E_{TLP}'') observed in the dataset for the analyzed product class. This approach is consistent with the design-option approach used to determine the incremental efficiency levels, as discussed further in chapter 5 of TSD for this SNOPR. The consumer conventional cooking top baseline efficiency levels for this SNOPR, expressed in kWh/year for electric cooking tops and kBtu/year, are presented in Table IV.9.

TABLE IV.9—CONSUMER CONVENTIONAL COOKING TOP BASELINE EFFICIENCY LEVELS

Product class	IAEC
Electric Cooking Tops—Open (Coil) Elements.	199 kWh/year.
Electric Cooking Tops—Smooth Elements.	250 kWh/year.
Gas Cooking Tops	1,775 kBtu/year.

DOE notes that the efficiency levels for gas cooking tops evaluated in this SNOPR would replace the current prescriptive standards for gas cooking tops which prohibits the use of a constant burning pilot light. As such, DOE's proposed standards for gas cooking tops would be only performance standards. DOE notes that constant burning pilot lights consume approximately 2,000 kBtu/year and even the baseline considered efficiency level of 1,775 kBtu per year for gas cooking tops would not be achievable by products if they were to incorporate a constant burning pilot.

DOE seeks comment on the methodology and results for the proposed baseline efficiency levels for conventional cooking tops.

Incremental Efficiency Levels

i. Electric Cooking Tops

For the electric open (coil) element cooking top product class, DOE did not identify any design options for reducing IAEC in this SNOPR and as a result, DOE did not consider any higher efficiency levels above the baseline.

For electric smooth element cooking tops, as discussed, DOE measured the

AEC and E_{TLP} of each cooking top in its test sample for this SNOPR. DOE then reviewed the AEC and E_{TLP} values for the electric smooth element cooking tops in its test sample and identified three higher efficiency levels that can be achieved without sacrificing clock functionality.

DOE defined EL 1 for electric smooth element cooking tops based on the low-standby-loss electronic controls design option. As discussed above, DOE defined the baseline efficiency assuming the highest AEC would be paired with the highest E_{TLP} observed in its test sample. DOE is aware of many methods employed by manufacturers to achieve lower E_{TLP}, including by changing from a linear power supply to an SMPS, by dimming the control screen's default brightness, by allowing the clock functionality to turn off after a period of inactivity, and by removing the clock from the cooking top altogether. DOE defined EL 1 using the lowest measured E_{TLP} among the units in its test sample with clock functionality, paired with the baseline AEC, to avoid any potential loss of utility from setting a standard based on a unit without clock functionality.

DOE defined EL 2 for electric smooth element cooking tops using the lowest measured AEC (highest efficiency) among radiant cooking tops in its sample and the same E_{TLP} as EL 1. DOE notes that, this AEC value can also be reached by units using induction technology.

To determine the highest measured efficiency for electric smooth element cooking tops, ''max tech'' or EL 3, DOE calculated the sum of the lowest measured AEC in its test sample of electric smooth element cooking tops, which represented induction technology, and the same E_{TLP} as EL 1.

DOE seeks comment on the methodology and results for the proposed incremental efficiency levels for electric cooking tops.

ii. Gas Cooking Tops

In the September 2016 SNOPR, DOE considered efficiency levels associated with optimized burner and grate design for conventional gas cooking tops. 81 FR 60783, 60817. DOE's testing at the time showed that energy use was correlated to burner design (*e.g.,* grate weight, flame angle, distance from burner ports to the cooking surface) and could be reduced by optimizing the design of the burner and grate system. DOE reviewed the test data for the conventional gas cooking tops in its test sample and identified three efficiency levels associated with improving the burner and grate design. *Id.*

Although DOE's testing showed that there was no statistically significant correlation between burner input rate and cooking energy consumption of the cooking top, DOE noted that cooking tops that incorporate different combinations of burners, including HIR burners for larger food loads, have differing capabilities to cook or heat different sized food loads. As a result, DOE proposed multiple efficiency levels that took into account key burner configurations. *Id.* DOE defined EL 1 in the September 2016 SNOPR based on an optimized burner and improved grate design of the unit in the test sample with the lowest measured IAEC among those with cast-iron grates and a six-surface unit configuration with at least four out of the six surface units having burner input rates exceeding 14,000 Btu/h. *Id.* DOE selected these criteria to maintain the full functionality of cooking tops marketed as commercial-style. *Id.* DOE noted that while there are some such products with fewer than six surface units and fewer than four HIR burners, DOE did not observe any products marketed as residential-style with the burner configuration DOE associated with Efficiency Level 1 of the September 2016 SNOPR. *Id.*

DOE defined EL 2 in the September 2016 SNOPR based on an optimized burner and further improved grate design of the unit in the DOE test sample with the lowest measured IAEC among those units with cast-iron grates and at least one surface unit having a burner input rate exceeding 14,000 Btu/h. *Id.* None of the gas units in the DOE test sample marketed as commercial-style were capable of achieving this efficiency level. The cooking tops in the DOE test sample capable of meeting this efficiency level were marketed as residential-style and had significantly lighter cast-iron grates than the commercial-style units. *Id.*

DOE defined EL 3 (max-tech) in the September 2016 SNOPR based on the unit in the DOE test sample with the lowest measured IAEC among those with cast-iron grates, regardless of the number of burners or burner input rate. *Id.* DOE noted that the grate weight for this unit was not lowest in the DOE test sample, confirming that a fully optimized burner and grate design, and not a reduction in grate weight alone, is required to improve cooking top efficiency.

In response to the September 2016 SNOPR, AHAM commented that there were commercial-style products on the market at that time with up to six HIR burners. AHAM's test data indicated that cooking products meeting this description were not able to meet DOE's Efficiency Level 1 as proposed in the September 2016 SNOPR. (AHAM, No. 64 at p. 25) Because DOE's proposed standard level was designed to maintain the full functionality of commercial-style gas cooking tops, AHAM urged DOE to propose a less stringent level for gas cooking tops. (AHAM, No. 64 at p. 28)

DOE has preliminarily determined, as discussed in section IV.B.1.b of this document, that the utility of commercial-style cooking products can be met with a single HIR burner. For this SNOPR, DOE considered efficiency levels associated with optimized burner and grate design, but only insofar as was not screened out. DOE is aware that some methods used by gas cooking top manufacturers to achieve lower AEC can result in a smaller number of HIR burners.[36] HIR burners provide unique consumer utility and allow consumers to perform high heat cooking activities such as searing and stir-frying. DOE is also aware that some consumers derive utility from continuous cast-iron grates, such as the ability to use heavy pans, or to shift cookware between burners without needing to lift them. Because of this, as discussed in IV.B.1.b of this document, DOE has defined the ELs for gas cooking tops such that all ELs are achievable with continuous cast-iron grates and at least one HIR burner.

DOE's testing showed that energy use was correlated to burner design and cooking top configuration (*e.g.,* grate weight, flame angle, distance from burner ports to the cooking surface) and could be reduced by optimizing the design of the burner and grate system. DOE reviewed the test data for the gas cooking tops in its test sample and identified two efficiency levels associated with improving the burner and grate design that corresponded to different design criteria. DOE defined EL 1 and EL 2 for gas cooking tops using the same E_{TLP} as used for the baseline efficiency level.

DOE seeks comment on the methodology and results for the proposed incremental efficiency levels for gas cooking tops.

iii. Analyzed Efficiency Levels

As discussed, DOE established efficiency levels for electric smooth element cooking tops and for gas cooking tops based on combining an AEC value and an E_{TLP} value associated with specific design options, noting that different combinations of AEC and E_{TLP} could be used to meet the IAEC of a

[36] DOE defines a high-input rate burner as a burner with an input rate greater than or equal to 14,000 Btu/h.

given efficiency level. Table IV.10 through Table IV.12 show the efficiency levels for each cooking top product class that are evaluated in this SNOPR.

TABLE IV.10—ELECTRIC OPEN (COIL) ELEMENT COOKING TOP EFFICIENCY LEVELS

Level	IAEC (kWh/year)
Baseline	199

TABLE IV.11—ELECTRIC SMOOTH ELEMENT COOKING TOP EFFICIENCY LEVELS

Level	Design options	IAEC (kWh/year)
Baseline	Baseline	250
1	Baseline + Low-Standby-Loss Electronic Controls	207
2	1 + Improved Resistance Heating Elements	189
3	1 + Highest Active Mode Efficiency (Induction)	179

TABLE IV.12—GAS COOKING TOP EFFICIENCY LEVELS

Level	Design options	IAEC (kBtu/year)
Baseline	Baseline	1,775
1	Baseline + Optimized Burner/Improved Grates (Achievable with 4 or more HIR burners and continuous cast-iron grates).	1,440
2	Highest Measured Efficiency	1,204

b. Conventional Ovens

Potential Prescriptive Standards

As discussed in section III.C of this document, there are no current test procedures for conventional ovens. Therefore, in this SNOPR, DOE is considering only efficiency levels corresponding to prescriptive design requirements as defined by the design options developed as part of the screening analysis (see section IV.B of this document): forced convection, the use of a switch-mode power supply, and an oven separator.

DOE ordered the design options by ease of implementation. Table IV.13 and Table IV.14 define the efficiency levels analyzed in this SNOPR for conventional electric and gas ovens, respectively.

TABLE IV.13—CONVENTIONAL ELECTRIC OVEN EFFICIENCY LEVELS

Level	Design option
Baseline	Baseline.
1	Baseline + SMPS.
2	1 + Forced Convection.
3	2 + Oven Separator.

TABLE IV.14—CONVENTIONAL GAS OVEN EFFICIENCY LEVELS

Level	Design option
Baseline	Baseline.
1	Baseline + SMPS.
2	1 + Forced Convection.

Note: All efficiency levels for conventional gas ovens include the current prescriptive requirement prohibiting the use of a constant burning pilot light.

In this SNOPR, DOE is assuming that a baseline conventional oven uses a linear power supply, based on DOE's analysis of these products. A linear power supply typically produces unregulated as well as regulated power. The main characteristic of an unregulated power supply is that its output may contain significant voltage ripple and that the output voltage will usually vary with the current drawn. The voltages produced by regulated power supplies are typically more stable, exhibiting less ripple than the output from an unregulated power supply and maintaining a relatively constant voltage within the specified current limits of the device(s) regulating the power. The unregulated portion of a linear power supply typically consists of a transformer that steps AC line voltage down, a voltage rectifier circuit for AC to DC conversion, and a capacitor to produce unregulated, DC output. However, there are other means of producing and implementing an unregulated power supply such as transformerless capacitive and/or resistive rectification circuits. Within a linear power supply, the unregulated

output serves as an input into a single or multiple voltage-regulating devices. Such regulating devices include Zener diodes, linear voltage regulators, or similar components which produce a lower-potential, regulated power output from a higher-potential DC input. This approach results in a rugged power supply which is reliable, but typically has an efficiency of about 40 percent.

For EL 1, DOE is analyzing the use of an SMPS rather than a linear power supply. An SMPS can reduce the standby mode energy consumption for conventional ovens due to their higher conversion efficiencies of up to 75 percent in appliance applications for power supply sizes similar to those of conventional ovens. An SMPS also reduces the no-load standby losses. In this SNOPR, DOE is considering EL 1 to correspond to the prescriptive requirement that the conventional oven not be equipped with a linear power supply.

For EL 2, DOE is analyzing the use of forced convection. A forced convection oven uses a fan to distribute warm air evenly throughout the oven cavity. The use of forced circulation can reduce fuel consumption by cooking food more quickly, at lower temperatures, and in larger quantities than a natural convection oven of the same size and rating. Ovens can use convection heating elements in addition to resistance and other types of elements to speed up the cooking process. By using different cooking elements where they are most effective, such combination ovens can reduce the time and energy consumption required to cook food. As described further in chapter 5 of the TSD for this SNOPR, DOE performed testing on consumer conventional ovens in support of this rulemaking to determine the improvement in cooking efficiency associated with forced convection. Included in the DOE test sample were four gas ovens and two electric ovens equipped with forced convection. DOE compared the measured energy consumption of each oven in bake mode to the average energy consumption of bake mode and convection mode (including energy consumption due to the fan motor) as specified in the test procedure. The relative decrease in active mode energy consumption resulting from the use of forced convection in consumer conventional ovens ranged from 3.5 to 7.5 percent depending on the product class. In this SNOPR, DOE is considering EL 2 to correspond to the prescriptive requirement that the conventional oven be equipped with a convection fan. This prescriptive requirement would not preclude a non-convection mode being offered selectable by the consumer.

For EL 3, DOE is analyzing the use of an oven separator, for electric ovens only.[37] For loads that do not require the entire oven volume, an oven separator can be used to reduce the cavity volume that is used for cooking. With less oven volume to heat, the energy used to cook an item would be reduced. The oven separator considered here is the type that can be easily and quickly installed by the user. The side walls of the oven cavity would be fitted with ''slots'' that guide and hold the separator into position, and a switch to indicate when the separator has been installed. The oven would also require at least two separate heating elements to heat the two cavities. Different pairs of ''slots'' would be spaced throughout the oven cavity so that the user could select different positions to place the separator. In this SNOPR, DOE is considering EL 3 to correspond to the prescriptive requirement that the conventional electric oven be equipped with an oven separator.

DOE seeks comment on the definitions of the proposed efficiency level for conventional ovens.

Energy Consumption of Baseline Efficiency Level

As noted in the December 2020 NOPD, DOE's test sample for conventional ovens included one gas wall oven, seven gas ranges, five electric wall ovens, and two electric ranges for a total of 15 conventional ovens covering all of the considered product classes. DOE conducted testing according to the test procedure adopted in the July 2015 TP Final Rule. 81 FR 60784, 60812. However, as discussed previously, in this SNOPR, DOE is considering only efficiency levels corresponding to prescriptive design requirements. In order to develop estimated energy consumption rates for each efficiency level, in support of the Energy Use analysis (see section IV.E of this document), DOE based its analyses on the data measured using the now-repealed test procedure.

The integrated annual oven energy consumption (''IE_{AO}'' [38]) for each consumer conventional oven in DOE's test sample was broken down into its component parts: the energy of active cooking mode, E_{AO} (including any self-cleaning operation); fan-only mode, for built-in/slide-in ovens as applicable; and combined low-power mode, E_{TLP} (including standby mode and off mode).

Because oven cooking efficiency and energy consumption depend on cavity volume, DOE normalized IE_{AO} to a representative cavity volume of 4.3 ft^3 using the relationship between energy consumption and cavity volume discussed in chapter 5 of the TSD for this SNOPR to allow for more direct comparison between units in the test sample.

As part of the September 2016 SNOPR, DOE developed energy consumption values for the baseline efficiency levels for conventional ovens considering both data from the previous standards rulemaking and the measured energy use for the test units. DOE conducted testing for all units in its test sample to measure integrated annual energy consumption, which included energy use in active mode (including fan-only mode) and standby mode. 81 FR 60784, 60814. As discussed in the September 2016 SNOPR, DOE augmented its analysis of electric standard ovens by considering the energy use of the electric self-clean units in its test sample, adjusted to account for the differences between standard-clean and self-clean ovens. Augmenting the electric standard oven dataset with self-clean models from the DOE test sample allowed DOE to consider a wider range of cavity volumes in its analysis. 81 FR 60784, 60815. To establish the estimated energy consumption values for the baseline efficiency levels for conventional ovens, DOE first derived a relationship between energy consumption and cavity volume. Using the slope from the previous rulemaking, DOE selected new intercepts corresponding to the ovens in its test sample with the lowest efficiency, so that no ovens in the test sample were cut off by the baseline curve. DOE then set baseline standby energy consumption for conventional ovens equal to that of the oven (including the oven component of a range) with the highest standby energy consumption in DOE's test sample to maintain the full functionality of controls for consumer utility. In response to the September 2016 SNOPR, DOE did not receive comment on the baseline efficiency levels considered for

[37] Oven separators are not used in conventional gas ovens because they would interfere with the combustion air flow and venting requirements for the separate gas burners on the top and bottom of the oven cavity.

[38] In this SNOPR, DOE refers to the integrated annual oven energy consumption using the abbreviation IE_{AO}, rather than IAEC, as was used in previous documents in this rulemaking. This change is being made to emphasize the difference between the IAEC values used for conventional cooking tops which were measured according to the new appendix I1 and the energy use values used for conventional ovens which were measured according to the test procedure as finalized in the July 2015 TP Final Rule.

conventional ovens. 85 FR 80982, 81011. Thus, DOE did not modify the baseline levels for conventional ovens in the December 2020 NOPD.

As part of the December 2020 NOPD, DOE evaluated the baseline efficiency levels presented in Table IV.15, which also presents the energy consumption values for each product class which are based on an oven with a cavity volume of 4.3 ft³. *Id.*

TABLE IV.15—DECEMBER 2020 NOPD PROPOSED CONVENTIONAL OVEN BASELINE EFFICIENCY LEVELS

Product class	Sub type	IE_{AO}*
Electric Oven—Standard Oven with or without a Catalytic Line	Freestanding	315.2 kWh/year.
	Built-in/Slide-in	322.3 kWh/year.
Electric Oven—Self-Clean Oven	Freestanding	354.9 kWh/year.
	Built-in/Slide-in	362.0 kWh/year.
Gas Oven—Standard Oven with or without a Catalytic Line	Freestanding	2083.1 kBtu/year.
	Built-in/Slide-in	2093.0 kBtu/year.
Gas Oven—Self-Clean Oven	Freestanding	1959.6 kBtu/year.
	Built-in/Slide-in	1969.6 kBtu/year.

* IE_{AO} values are normalized based on a 4.3 ft³ volume oven.

For this SNOPR, DOE expanded its sample size of conventional ovens and ranges which were used to determine the baseline E_{TLP} value. DOE calculated the baseline E_{TLP} using the highest combined low-power mode measured power on a conventional range with a linear power supply. DOE also rectified a formula error which was incorrectly allocating the number of hours in fan-only mode. These small changes resulted in slightly updated estimated energy consumption representing the baseline efficiency levels.

The evaluated baseline efficiency levels for consumer conventional ovens are presented in Table IV.16. After receiving manufacturer feedback and reviewing products currently on the market, DOE determined the energy consumption of the baseline efficiency levels based on an oven with a cavity volume of 4.3 ft³ to represent the market-average cavity volume.

TABLE IV.16—ESTIMATED ENERGY CONSUMPTION OF BASELINE CONSUMER CONVENTIONAL OVENS

Product class	Sub type	IE_{AO}*
Electric Oven—Standard Oven with or without a Catalytic Line	Freestanding	314.7 kWh/year.
	Built-in/Slide-in	321.2 kWh/year.
Electric Oven—Self-Clean Oven	Freestanding	354.4 kWh/year.
	Built-in/Slide-in	360.5 kWh/year.
Gas Oven—Standard Oven with or without a Catalytic Line	Freestanding	2085 kBtu/year.
	Built-in/Slide-in	2104 kBtu/year.
Gas Oven—Self-Clean Oven	Freestanding	1958 kBtu/year.
	Built-in/Slide-in	1979 kBtu/year.

* IE_{AO} values are normalized based on a 4.3 ft³ volume oven.

Energy Consumption of Incremental Efficiency Levels

For the September 2016 SNOPR, DOE developed incremental efficiency levels for each conventional oven product class by first considering information from the previous rulemaking analysis described in the 2009 TSD. In cases where DOE identified design options during testing and reverse engineering teardowns, DOE updated the efficiency levels based on the tested data. 81 FR 60784, 60818. Table IV.17 through Table IV.20 present the efficiency levels for each product class proposed in the September 2016 SNOPR, along with the associated estimated energy consumption normalized based on an oven with a cavity volume of 4.3 ft³. In response to the September 2016 SNOPR, DOE did not receive comment on the incremental efficiency levels considered for conventional ovens. *Id.* Thus, DOE did not modify the incremental levels for conventional ovens in the December 2020 NOPD. 85 FR 80982, 81015.

TABLE IV.17—DECEMBER 2020 NOPD EVALUATED ELECTRIC STANDARD OVEN EFFICIENCY LEVELS

Level	Design option	IE_{AO} (kWh/year)	
		Freestanding	Built-in/slide-in
Baseline	Baseline	315.2	322.3
1	Baseline + SMPS	306.3	313.3
2	1 + Reduced Vent Rate	291.9	299.0
3	2 + Improved Insulation	278.0	285.0
4	3 + Improved Door Seals	273.2	280.3
5	4 + Forced Convection	261.7	268.7
6	5 + Oven Separator	220.6	227.7

TABLE IV.18—DECEMBER 2020 NOPD EVALUATED ELECTRIC SELF-CLEAN OVEN EFFICIENCY LEVELS

Level	Design option	IE_{AO} (kWh/year)	
		Freestanding	Built-in/ slide-in
Baseline	Baseline	354.9	362.0
1	Baseline + SMPS	346.0	353.0
2	1 + Forced Convection	327.3	334.3
3	2 + Oven Separator	277.8	284.7

TABLE IV.19—DECEMBER 2020 NOPD EVALUATED GAS STANDARD OVEN EFFICIENCY LEVELS

Level	Design option	IE_{AO} (kBtu/year)	
		Freestanding	Built-in/ slide-in
Baseline	Baseline	2083.1	2093.0
1	Baseline + SMPS	2052.5	2062.4
2	1 + Improved Insulation	1946.4	1955.8
3	2 + Improved Door Seals	1926.6	1935.9
4	3 + Forced Convection	1832.9	1841.7

TABLE IV.20—DECEMBER 2020 NOPD EVALUATED GAS SELF-CLEAN OVEN EFFICIENCY LEVELS

Level	Design option	IE_{AO} (kBtu/year)	
		Freestanding	Built-in/ slide-in
Baseline	Baseline	1959.6	1969.6
1	Baseline + SMPS	1929.0	1939.0
2	1 + Forced Convection	1830.5	1839.9

DOE developed the incremental efficiency levels for each design option identified as a result of the screening analysis. DOE then developed estimated energy consumption values for each efficiency level based on test data collected according to the earlier version of the oven test procedure established in the July 2015 TP Final Rule. The details of the methodology used to estimate the energy consumption of each efficiency level for each product class are available in chapter 5 of the TSD for this SNOPR.

DOE's testing of freestanding, built-in, and slide-in installation configurations for consumer conventional gas and electric ovens revealed that built-in and slide-in ovens have a fan that consumes energy in fan-only mode, whereas freestanding ovens do not have such a fan. For this SNOPR, DOE developed separate energy consumption values for each installation configuration.

Table IV.21 and Table IV.22 show the efficiency levels for each consumer conventional oven product class analyzed in this SNOPR. The IE_{AO} values for each efficiency level are normalized based on an oven cavity volume of 4.3 ft^3.

TABLE IV.21—ESTIMATED ENERGY CONSUMPTION OF ELECTRIC OVEN EFFICIENCY LEVELS

Level	Design option	IE_{AO} (kBtu/year)			
		Standard freestanding	Standard built-in/ slide-in	Self-clean freestanding	Self-clean built-in/ slide-in
Baseline	Baseline	314.7	321.2	354.4	360.5
1	Baseline + SMPS	302.0	308.9	341.7	348.1
2	1 + Forced Convection	289.0	295.9	328.7	335.1
3	2 + Oven Separator	235.3	242.1	275.0	281.4

TABLE IV.22—ESTIMATED ENERGY CONSUMPTION OF GAS OVEN EFFICIENCY LEVELS

Level	Design option	IE_{AO} (kBtu/year)			
		Standard freestanding	Standard built-in/ slide-in	Self-clean freestanding	Self-clean built-in/ slide-in
Baseline	Baseline	2085	2104	1958	1979
1	Baseline + SMPS	2041	2062	1915	1937
2	1 + Forced Convection	1908	1929	1781	1804

DOE seeks comment on the methodology and results for the estimated energy use of each proposed efficiency level for conventional ovens.

Energy Use Versus Cavity Volume

The energy consumption of the conventional oven efficiency levels detailed above are predicated upon ovens with a cavity volume of 4.3 ft^3. Based on DOE's testing of conventional gas and electric ovens and discussions with manufacturers, energy use scales with oven cavity volume due to larger ovens having higher thermal masses and larger volumes of air (including larger vent rates) than smaller ovens. Because the DOE test procedure adopted in the July 2015 TP Final Rule for measuring IE_{AO} uses a fixed test load size, larger ovens with higher thermal mass will have a higher measured IE_{AO}. As a result, DOE considered available data to characterize the relationship between energy use and oven cavity volume.

For the September 2016 SNOPR, DOE established the slopes by first evaluating the data from the previous rulemaking analysis described in the 2009 TSD, which presented the relationship between measured energy factor (''EF'') and cavity volume, then translating from EF to IE_{AO}, considering the range of cavity volumes for the majority of products available on the market as well as testing of units in DOE's test sample. The intercepts for each efficiency level were then chosen so that the equations passed through the desired IE_{AO} corresponding to a particular volume. 81 FR 60784, 60821–60822. As part of the analysis for the December 2020 NOPD, DOE updated the intercepts in the IE_{AO} versus cavity volume relationships for each product class to reflect the revisions to the efficiency levels made in that analysis.

In this SNOPR, DOE further updated the efficiency levels, and associated IE_{AO} intercepts. Additional discussion of DOE's derivation of the oven IE_{AO} versus cavity volume relationship is presented in chapter 5 of the TSD for this SNOPR.

2. Cost Analysis

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

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

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

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

In the present case, DOE conducted the analysis using physical and catalog teardowns. The resulting bill of materials provides the basis for the manufacturer production cost (''MPC'') estimates.

3. Cost-Efficiency Results

a. Conventional Cooking Tops

For the December 2020 NOPD, DOE maintained its estimates for the incremental MPCs developed for the September 2016 SNOPR, but adjusted the cost-efficiency results to reflect updates to parts pricing estimates and the most recent PPI data. 85 FR 80982, 81018. DOE also updated the cost-efficiency results to reflect the revised efficiency levels in that analysis. *Id.* The estimates for the incremental MPCs considered in the December 2020 NOPD are presented in Table IV.23.

TABLE IV.23—DECEMBER 2020 NOPD CONVENTIONAL COOKING TOP INCREMENTAL MANUFACTURING PRODUCTION COSTS

[2018$]

NOPD level	Electric open (coil) element cooking tops	Electric smooth element cooking tops	Gas cooking tops
Baseline			
1		$0.69	
2		1.81	
3		198.33	

For this SNOPR, DOE developed the cost-efficiency results for each conventional cooking top product class with incremental efficiency levels shown in Table IV.24 and Table IV.25. DOE developed incremental MPCs based on manufacturing cost modeling of units in its sample featuring the design options.

As discussed in chapter 5 of the TSD for this SNOPR, DOE evaluated two versions of the optimized burner and grate design option, representative of a minimum of either 4 or 1 HIR burners. DOE's testing showed that decreased energy use could be correlated to burner design and cooking top configuration (*e.g.,* grate weight, flame angle, distance from burner ports to the cooking surface). Because this design option effectively corresponds to a whole burner and grate system re-design, regardless of the efficiency level achieved by the re-design, the incremental costs for EL 1 and for EL 2 for gas cooking tops include the cost for redesigning the combination of each burner and grate configuration. Therefore, DOE was not able to determine different incremental costs for EL 1 and EL 2 for gas cooking tops.

TABLE IV.24—ELECTRIC SMOOTH ELEMENT COOKING TOPS INCREMENTAL MANUFACTURER PRODUCTION COSTS

Level	Design option	Incremental MPC (2021$)
1	Baseline + Low-Standby-Loss Electronic Controls	$2.17
2	1 + Improved Resistance Heating Elements	11.05
3	1 + Highest Active Mode Efficiency (Induction)	263.19

TABLE IV.25—GAS COOKING TOPS MANUFACTURER PRODUCTION COSTS

Level	Design option	Incremental MPC (2021$)
1	Baseline + Optimized Burner/Improved Grates (Achievable with 4 or more HIR burners and continuous cast-iron grates).	$12.41
2	Maximum Measured Efficiency	12.41

b. Conventional Ovens

For the December 2020 NOPD, DOE maintained its estimates for the incremental MPCs developed for the September 2016 SNOPR, but adjusted the cost-efficiency results to reflect updates to parts pricing estimates and the most recent PPI data. 85 FR 80982, 81019. DOE also updated the cost-efficiency results to reflect the efficiency levels in that analysis. *Id.* The estimates for the incremental MPCs considered in the December 2020 NOPD are presented in Table IV.26.

TABLE IV.26—DECEMBER 2020 NOPD CONVENTIONAL OVEN INCREMENTAL MANUFACTURING PRODUCTION COSTS

[2018$]

NOPD level	Electric ovens		Gas ovens	
	Standard	Self-clean	Standard	Self-clean
Baseline.				
1	$0.81	$0.81	$0.81	$0.81
2	2.73	26.97	6.00	21.35
3	7.91	58.68	8.40	
4	10.31		28.94	
5	36.48			
6	68.19			

For this SNOPR, DOE developed the cost-efficiency results for each conventional oven product class shown in Table IV.27 and Table IV.28. DOE developed incremental MPCs based on manufacturing cost modeling of units in its sample featuring the design options. DOE notes that the estimated incremental MPCs are equivalent for the freestanding and built-in/slide-in oven product classes and for the standard and self-clean oven product classes because none of the considered design options would be implemented differently as a function of installation configuration or self-clean functionality.

TABLE IV.27—ELECTRIC OVEN INCREMENTAL MANUFACTURER PRODUCTION COSTS

Level	Design option	Incremental MPC (2021$)
1	Baseline + SMPS	$2.03
2	1 + Forced Convection	34.11
3	2 + Oven Separator	67.77

TABLE IV.28—GAS OVEN INCREMENTAL MANUFACTURER PRODUCTION COSTS

Level	Design option	Incremental MPC (2021$)
1	Baseline + SMPS	$2.17
2	1 + Forced Convection	24.96

DOE seeks comment on the manufacturer production costs for consumer conventional cooking products used in this analysis.

4. Manufacturer Selling Price

To account for manufacturers' non-production costs and profit margin, DOE applies a 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 by examining the annual Securities and Exchange Commission (''SEC'') 10–K reports filed by publicly traded manufacturers primarily engaged in appliance manufacturing and whose combined product range includes consumer conventional cooking products. See chapter 12 of the TSD for this SNOPR for additional detail on the manufacturer markup.

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. At each step in the distribution channel, companies mark up the price of the product to cover business costs and profit.

For consumer conventional cooking products, the main parties in the distribution chain are (1) the manufacturers of the products; (2) the retailers purchasing the products from manufacturers and selling them to consumers; and (3) the consumers who purchase the products.

For retailers, DOE developed separate markups for baseline products (baseline markups) and for the incremental cost of more efficient products (incremental markups). Incremental markups are coefficients that relate the change in the MSP of higher-efficiency models to the change in the retailer sales price. Baseline markups are applied to the price of products with baseline efficiency, while incremental markups are applied to the difference in price between baseline and higher-efficiency models (the incremental cost increase). The incremental markup is typically less than the baseline markup and is designed to maintain similar per-unit operating profit before and after new or amended standards.[39] DOE relied on economic data from the U.S. Census Bureau to estimate average baseline and incremental markups.[40]

Based on microeconomic theory, the degree to which firms can pass along a cost increase depends on the level of market competition, including variables such as the market structure and conditions on both the supply and demand sides (*e.g.,* supply and demand elasticity). DOE examined industry data from IBISWorld and determined the results suggest that the industry groups involved in appliance retail exhibit a fair degree of competition even though three firms occupy approximately 85 percent of the market.[41] However DOE notes that, consumer demand for household appliances is relatively inelastic (*i.e.,* demand is not expected to decrease substantially with an increase in the price of product). Under relatively competitive markets with elastic demand, it may be tenable for retailers to maintain a fixed markup for a short period of time after an input price increase, but the market competition should eventually force them to readjust their markups to reach a medium-term equilibrium in which per-unit profit is relatively unchanged before and after standards are implemented. DOE developed the incremental markup approach based on the widely accepted economic view that firms are not able to sustain a persistently higher dollar margin in a competitive market in the medium term. Under competitive market conditions, if the price of the product increases under standards, the only way to maintain the same dollar margin as before is for the markup (and percent gross margin) to decline.

Chapter 6 of the TSD for this SNOPR provides details on DOE's development of retail markups for consumer conventional cooking products DOE requests comment on the markup analysis described above.

E. Energy Use Analysis

The purpose of the energy use analysis is to determine the annual energy consumption of consumer conventional cooking products at different efficiencies in representative U.S. single-family homes, multi-family residences, and to assess the energy savings potential of increased consumer conventional cooking product efficiency. The energy use analysis estimates the range of energy use of consumer conventional cooking products 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 energy savings and the savings in consumer operating costs that could result from adoption of amended or new standards.

In the December 2020 NOPD, DOE used the 2009 California Residential Appliance Saturation Survey (''RASS'') and a Florida Solar Energy Center (''FSEC'') study to establish representative annual energy use values for conventional cooking tops and ovens.

DOE established a range of energy use from data in the EIA's 2015 Residential Energy Consumption Survey (''RECS 2015'').[42] RECS 2015 does not provide the annual energy consumption of cooking tops, but it does provide the frequency of cooking top use.[43] DOE

[39] Because the projected price of standards-compliant products is typically higher than the price of baseline products, using the same retail markup for the incremental cost and the baseline cost would result in higher per-unit operating profit for retailers. 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 for retailers in the long run.

[40] U.S. Census, *2017 Annual Retail Trade Survey* (*ARTS*), Electronics and Appliance Stores sectors.

[41] IBISWorld. *US Industry Reports (NAICS): 45211—Department Stores; 44311—Consumer Electronics Stores; 44411—Home Improvement Stores; 42362 TV & Appliance Retailers in the US.* 2022. IBISWorld. (Last accessed February 1, 2022.) *www.ibisworld.com.*

[42] U.S. Department of Energy: Energy Information Administration, Residential Energy Consumption Survey: 2015 RECS Survey Data (2019). Available at: *www.eia.gov/consumption/residential/data/2015/.* RECS 2015 is based on a sample of 5,686 households statistically selected to represent 118.2 million housing units in the United States. Available at: *www.eia.gov/consumption/residential/.*

[43] DOE was unable to use the frequency of use to calculate the annual energy consumption using a bottom-up approach, as data in RECS did not include information about the duration of a cooking event to allow for an annual energy use calculation.

was unable to use the frequency of use to calculate the annual energy consumption using a bottom-up approach, as data in RECS 2015 did not include information about the duration of a cooking event to allow for an annual energy use calculation. For the December 2020 NOPD, DOE relied on California RASS 2009 and FSEC data to establish the average annual energy consumption of a conventional cooking top and a conventional oven.

From RECS 2015, DOE developed household samples for each product class. For each household using a conventional cooking top and a conventional oven, RECS provides data on the frequency of use and number of meals cooked in the following bins: (1) less than once per week, (2) once per week, (3) a few times per week, (4) once per day, (5) two times per day, and (6) three or more times per day. DOE utilized the frequency of use to define the variability of the annual energy consumption. First, DOE assumed that the weighted-average cooking frequency from RECS represents the average energy use values based on the California RASS and FSEC data. DOE then varied the annual energy consumption across the RECS households based on their reported cooking frequency relative to the weighted-average cooking frequency.

AHAM stated that consumer cooking behavior is still the most significant factor in the energy use of consumer conventional cooking products. (AHAM, No. 84 at p. 4)

The CA IOUs commented that the COVID–19 pandemic has fundamentally altered cooking behavior in households across the country. (CA IOUs, No. 89 at p. 3) The CA IOUs cited a December 2020 survey of more than 1,000 demographically and geographically representative participants conducted by HUNTER,[44] in which over 54 percent of responders reported that they cooked more at home compared to before the pandemic, with 51–71 percent of responders intending to continue cooking at home, even after the pandemic is over. (*Id.*) The CA IOUs also cited a survey by International Food Information Council,[45] in which nearly 60 percent of responders stated they are cooking at home more as a result of the pandemic, and a separate PG&E survey[46] in which 28 percent of responders claiming that cooking had been the most likely factor which contributed to increased energy use in their home during the pandemic. (*Id.*) The CA IOUs added that DOE's use of the 2015 RECS to estimate operating hours for cooking tops does not account for these changing use trends. (*Id.*)

DOE agrees that cooking behavior is a significant factor for determining the energy use of consumer conventional cooking products. Although, the pandemic has likely introduced changes to consumers lifestyle, there is insufficient data at this time to establish a definite trend originating from the pandemic. If appropriate data from the 2020 RECS are available for the final rule analysis, DOE will evaluate the extent to which the data may have been affected by changes in cooking usage due to the pandemic. DOE notes that an increase in consumer cooking product usage would translate into increased energy savings and monetized benefits relative to the reference estimates presented in this SNOPR.

DOE requests comment on data and information on how the pandemic has changed consumer cooking behavior and product usage.

For this SNOPR, DOE updated the datasets used to establish average annual energy consumption values for cooking tops and ovens. DOE utilized the 2019 California RASS[47] and 2021 field-metered data from the Pecan Street Project[48] to estimate representative annual energy use values for conventional cooking tops and ovens. Pecan Street measures circuit-level electricity use at 1-minute resolution from volunteer households across multiple states. From the Pecan Street data, DOE performed an analysis of 39 households in Texas and 28 households in New York to derive develop average annual energy consumption values for each State. In the absence of similar field-metered data for other States, DOE weighted the average annual energy use results from California (from CA RASS 2019), Texas, and New York by the number of households in each State to estimate an average National energy use value more representative than any individual State measurement. DOE calculated a household-weighted National value using the average values from Texas, New York, and California and estimates for the number of households in each State from the U.S. Census.[49] DOE retained the methodology used in the NOPD to establish a range in energy use values using RECS 2015.

Chapter 7 of the TSD for this SNOPR provides details on DOE's energy use analysis for consumer conventional cooking products.

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 consumer conventional cooking products. The effect of new or amended 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 appliance or product over the life of that product, consisting of total installed cost (manufacturer selling price, distribution chain markups, sales tax, and installation costs) plus operating costs (expenses for energy use, maintenance, and repair). To compute the operating costs, DOE discounts future operating costs to the time of purchase and sums them over the lifetime of the product.
- The PBP is the estimated amount of time (in years) it takes consumers to recover the increased purchase cost (including installation) of a more-efficient product through lower operating costs. DOE calculates the PBP by dividing the change in purchase cost at higher efficiency levels by the change in annual operating cost for the year that amended or new standards are assumed to take effect.

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

For each considered efficiency level in each product class, DOE calculated the LCC and PBP for a nationally representative set of housing units. As stated previously, DOE developed household samples from the 2015 RECS. For each sample household, DOE determined the energy consumption for the consumer conventional cooking

[44] HUNTER: FOOD STUDY 2020 SPECIAL REPORT (America Gets Cooking: The Impact of COVID–19 on Americans' Food Habits), published in December 2020. Available at *www.hunterpr.com/foodstudy_coronavirus/.*

[45] International Food Information Council. 2020 Food & Health Survey. 10 June 2020. Available at *www.foodinsight.org/2020-food-and-health-survey/.*

[46] PG&E administered survey results, November 18, 2020.

[47] California Energy Commission, Residential Appliance Saturation Survey (RASS) (2019).

[48] Pecan Street Dataset. *www.pecanstreet.org/category/dataport/* (last accessed June 28, 2022).

[49] U.S. Census. *data.census.gov/cedsci/table?q=households%20by%20state&tid=ACSDT5Y2020.B10063.*

products and the appropriate energy price. By developing a representative sample of households, the analysis captured the variability in energy consumption and energy prices associated with the use of consumer conventional cooking products.

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

The computer model DOE uses to calculate the LCC 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 consumer conventional cooking product user samples. For this rulemaking, the Monte Carlo approach is implemented in MS Excel together with the Crystal Ball™ add-on.[50] The model calculated the LCC for products at each efficiency level for 10,000 housing units per simulation run. The analytical results include a distribution of 10,000 data points showing the range of LCC savings for a given efficiency level relative to the no-new-standards case efficiency distribution. In performing an iteration of the Monte Carlo simulation for a given consumer, product efficiency is chosen based on its probability. If the chosen product efficiency is greater than or equal to the efficiency of the standard level under consideration, the LCC calculation reveals that a consumer is not impacted by the standard level. By accounting for consumers who already purchase more-efficient products, DOE avoids overstating the potential benefits from increasing product efficiency.

DOE calculated the LCC and PBP for consumers of conventional cooking products as if each were to purchase a new product in the expected year of required compliance with new or amended standards. New and amended standards would apply to consumer conventional cooking products manufactured 3 years after the date on which any new or amended standard is published. (42 U.S.C. 6295(m)(4)(A)(i)) At this time, DOE estimates publication of a final rule in 2023. Therefore, for purposes of its analysis, DOE used 2027 as the first year of compliance with any amended standards for consumer conventional cooking products.

Table IV.29 summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The paragraphs 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 TSD for this SNOPR and its appendices.

TABLE IV.29—SUMMARY OF INPUTS AND METHODS FOR THE LCC AND PBP ANALYSIS *

Inputs	Source/method
Product Cost	Derived by multiplying MPCs by manufacturer and retailer markups and sales tax, as appropriate. Used historical data to derive a price scaling index to project product costs.
Installation Costs	Baseline installation cost determined with data from RS Means. Assumed no change with efficiency level.
Annual Energy Use	The total annual energy use multiplied by the hours per year. Average number of hours based on field data. *Variability:* Based on the 2015 RECS.
Energy Prices	*Electricity:* Based on Edison Electric Institute data for 2021. *Natural Gas:* Based on EIA's Natural Gas Navigator for 2020. *Variability:* Regional energy prices by Census Division.
Energy Price Trends	Based on *AEO2022* price projections.
Repair and Maintenance Costs.	Assumed no change with efficiency level.
Product Lifetime	Average: 16.8 years for electric units and 14.5 years for gas units.
Discount Rates	Approach involves identifying all possible debt or asset classes that might be used to purchase the considered appliances, or might be affected indirectly. Primary data source was the Federal Reserve Board's Survey of Consumer Finances.
Compliance Date	2027.

* Not used for PBP calculation. References for the data sources mentioned in this table are provided in the sections following the table or in chapter 8 of the TSD for this SNOPR.

1. Product Cost

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

To project future product prices, DOE examined the electric and gas cooking products Producer Price Index ("PPI"). These indices, adjusted for inflation, show a declining trend. DOE performed a power-law fit of historical PPI data and cumulative shipments. For the electric cooking products price trend, DOE used the "Electric household ranges, ovens, surface cooking units and equipment" PPI for 1967–2021.[51] For the gas cooking product price trend, DOE used the "Gas household ranges, ovens, surface cooking units and equipment" for 1981–2021.[52] See chapter 8 of the TSD for this SNOPR

2. Installation Cost

Installation cost includes labor, overhead, and any miscellaneous materials and parts needed to install the product. DOE used data from the 2021

[50] 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/middleware/technologies/crystalball.html* (last accessed June 28, 2022).

[51] Electric household ranges, ovens, surface cooking units and equipment PPI series ID: PCU33522033522011; *www.bls.gov/ppi/.*

[52] Gas household ranges, ovens, surface cooking units, and equipment PPI series ID; PCU33522033522013; *www.bls.gov/ppi/.*

RS Means Mechanical Cost Data [53] on labor requirements to estimate installation costs for consumer conventional cooking products.

In general, DOE estimated that installation costs would be the same for different efficiency levels. In the case of electric smooth element cooking tops, the induction heating at EL 3 requires a change of cookware to those that are ferromagnetic to operate the cooking tops in addition to an upgrade to existing electrical wiring to accommodate for a higher amperage. DOE treated this as additional installation cost for this particular design option. DOE used average number of pots and pans utilized by a representative household to estimate this portion of the installation cost. See chapter 8 of the TSD for this SNOPR for details about this component.

3. Annual Energy Consumption

For each sampled household, DOE determined the energy consumption for a consumer conventional cooking product at different efficiency levels using the approach described previously in section IV.E of this document.

4. Energy and Gas 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 product purchased in the no-new-standards case, and marginal electricity prices for the incremental change in energy use associated with the other efficiency levels considered.

DOE derived electricity prices in 2021 using data from the Edison Electric Institute (''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).[54] For the commercial sector, DOE calculated electricity prices using the methodology described in Coughlin and Beraki (2019).[55]

DOE obtained data for calculating regional prices of natural gas from the EIA publication, *Natural Gas Navigator*.[56] This publication presents monthly volumes of natural gas deliveries and average prices by state for residential, commercial, and industrial customers.

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 consumer conventional cooking products, DOE calculated weighted-average values for average and marginal electricity and gas price for the nine census divisions. See chapter 8 of the TSD for this SNOPR for details.

To estimate energy prices in future years, DOE multiplied the 2021 energy prices by the projection of annual average price changes for each of the nine census divisions from the Reference case in *AEO2022,* which has an end year of 2050.[57] To estimate price trends after 2050, DOE used constant value calculated from a simple average of the price trend between 2046 through 2050.

5. Maintenance and Repair Costs

Repair costs are associated with repairing or replacing product components that have failed in an appliance; maintenance costs are associated with maintaining the operation of the product. Typically, small incremental increases in product efficiency produce no, or only minor, changes in repair and maintenance costs compared to baseline efficiency products.

For gas ovens, DOE determined the repair and maintenance costs associated with glo-bar ignition systems. DOE estimated the average repair cost attributable to glo-bar systems and annualized it over the life of the unit at $22.58 based on an analysis of available online data found on appliance repair costs.

DOE seeks feedback and comment on its estimate for repair costs for consumer conventional cooking products.

6. Product Lifetime

Equipment lifetime is the age at which the equipment is retired from service. DOE used a variety of sources to establish low, average, and high estimates for product lifetime. Additionally, DOE used AHAM's input to the December 2020 NOPD on the average useful life by product categories, such as electric range, gas range, wall oven, and electric cooking top. Utilizing this detail and the market shares of these product categories, DOE refined the average lifetime estimates to a more representative 16.8 years for all electric cooking products and 14.5 years for all gas cooking products. DOE characterized the product lifetimes with Weibull probability distributions.

DOE requests comment and additional data on its estimates for the lifetime distribution.

See chapter 8 of the TSD for this SNOPR for further details on the sources used to develop product lifetimes, as well as the use of Weibull distributions.

7. Discount Rates

In the calculation of LCC, DOE applies discount rates appropriate to households to estimate the present value of future operating cost savings. DOE estimated a distribution of discount rates for consumer conventional cooking products 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.[58] The LCC analysis estimates net present value over the lifetime of the product, so the appropriate discount rate will reflect the general opportunity cost of household funds, taking this time scale into account. Given the long-time horizon modeled in the LCC analysis, the application of a marginal interest rate associated with an initial source of funds is inaccurate. Regardless of the method of purchase, consumers are expected to continue to rebalance their

[53] RS Means Company Inc., RS Means Mechanical Cost Data (2021). Available at *https://rsmeans.com* (last accessed on June 23, 2022).

[54] 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. *ees.lbl.gov/publications/residential-electricity-prices-review.*

[55] 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. *ees.lbl.gov/publications/non-residential-electricity-prices.*

[56] U.S. Department of Energy—Energy Information Administration. *Natural Gas Navigator* 2020. Available at *www.eia.gov/naturalgas/data.php* (last accessed November 14, 2021).

[57] EIA. *Annual Energy Outlook 2022 with Projections to 2050.* Washington, DC. Available at *www.eia.gov/forecasts/aeo/* (last accessed June 28, 2022).

[58] 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.

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 triennial Survey of Consumer Finances [59] (''SCF'') starting in 1995 and ending in 2019. Using the SCF and other sources, DOE developed a distribution of rates for each type of debt and asset by income group to represent the rates that may apply in the year in which amended standards would take effect. DOE assigned each sample household a specific discount rate drawn from one of the distributions. The average rate across all types of household debt and equity and income groups, weighted by the shares of each type, is 4.3 percent. See chapter 8 of the TSD for this SNOPR for further details on the development of consumer discount rates.

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

To accurately estimate the share of consumers that would be affected by a potential energy conservation standard at a particular efficiency level, DOE's LCC analysis considered the projected distribution (market shares) of product efficiencies under the no-new-standards case (*i.e.,* the case without amended or new energy conservation standards) in the compliance year (2027).

For cooking tops, DOE estimated the current efficiency distribution for each product class from the sample of cooking tops used to develop the engineering analysis. For ovens, DOE relied on model counts of the current market distribution. Given the lack of data on historic efficiency trends, DOE assumed that the estimated current distributions would apply in 2027.

While DOE acknowledges that economic factors may play a role when consumers decide on what type of conventional cooking product to install, assignment of conventional cooking product efficiency for a given installation, based solely on economic measures such as life-cycle cost or simple payback period most likely would not fully and accurately reflect actual real-world installations. There are a number of market failures discussed in the economics literature that illustrate how purchasing decisions with respect to energy efficiency are unlikely to be perfectly correlated with energy use, as described below. DOE maintains that the method of assignment, which is in part random, is a reasonable approach, one that simulates behavior in the conventional cooking product market, where market failures result in purchasing decisions not being perfectly aligned with economic interests, more realistically than relying only on apparent cost-effectiveness criteria derived from the limited information in RECS. DOE further emphasizes that its approach does not assume that all purchasers of conventional cooking product make economically irrational decisions (*i.e.,* the lack of a correlation is not the same as a negative correlation). As part of the random assignment, some homes or buildings with more frequent cooking events will be assigned higher efficiency conventional cooking products, and some homes or buildings with particularly lower cooking events will be assigned baseline units. By using this approach, DOE acknowledges the uncertainty inherent in the data and minimizes any bias in the analysis by using random assignment, as opposed to assuming certain market conditions that are unsupported given the available evidence.

First, consumers are motivated by more than simple financial trade-offs. There are consumers who are willing to pay a premium for more energy-efficient products because they are environmentally conscious.[60] There are also several behavioral factors that can influence the purchasing decisions of complicated multi-attribute products, such as conventional cooking products. For example, consumers (or decision makers in an organization) are highly influenced by choice architecture, defined as the framing of the decision, the surrounding circumstances of the purchase, the alternatives available, and how they're presented for any given choice scenario.[61] The same consumer or decision maker may make different choices depending on the characteristics of the decision context (*e.g.,* the timing of the purchase), which have nothing to do with the characteristics of the alternatives themselves or their prices. Consumers or decision makers also face a variety of other behavioral phenomena including loss aversion, sensitivity to information salience, and other forms of bounded rationality.[62]

The first of these market failures—the split-incentive or principal-agent problem—is likely to affect conventional cooking products more than many other types of appliances. The principal-agent problem is a market failure that results when the consumer that purchases the equipment does not internalize all of the costs associated with operating the equipment. Instead, the user of the product, who has no control over the purchase decision, pays the operating costs. There is a high likelihood of split incentive problems in the case of rental properties where the landlord makes the choice of what conventional cooking product to install, whereas the renter is responsible for paying energy bills.

Attari et al.[63] show that consumers tend to underestimate the energy use of large energy-intensive appliances, but overestimate the energy use of small appliances. This may affect how consumers evaluate and purchase available products on the market. Therefore, it is likely that consumers systematically underestimate the energy use associated with conventional cooking products, resulting in less cost-effective purchases.

These market failures affect a sizeable share of the consumer population. A study by Houde [64] indicates that there is a non-negligible subset of consumers

[59] U.S. Board of Governors of the Federal Reserve System. Survey of Consumer Finances. 1995, 1998, 2001, 2004, 2007, 2010, 2013, 2016, and 2019. (Last accessed June 28, 2022.) *www.federalreserve.gov/econresdata/scf/scfindex.htm.*

[60] Ward, D.O., Clark, C.D., Jensen, K.L., Yen, S.T., & Russell, C.S. (2011): ''Factors influencing willingness-to pay for the ENERGY STAR® label,'' *Energy Policy, 39*(3), 1450–1458. (Available at: *www.sciencedirect.com/science/article/abs/pii/S0301421510009171*) (Last accessed Feb. 15, 2022).

[61] Thaler, R.H., Sunstein, C.R., and Balz, J.P. (2014). ''Choice Architecture'' in *The Behavioral Foundations of Public Policy,* Eldar Shafir (ed).

[62] Thaler, R.H., and Bernartzi, S. (2004). ''Save More Tomorrow: Using Behavioral Economics in Increase Employee Savings,'' *Journal of Political Economy* 112(1), S164–S187. *See also* Klemick, H., et al. (2015) ''Heavy-Duty Trucking and the Energy Efficiency Paradox: Evidence from Focus Groups and Interviews,'' *Transportation Research Part A: Policy & Practice,* 77, 154–166. (providing evidence that loss aversion and other market failures can affect otherwise profit-maximizing firms).

[63] Attari, S.Z., M.L. DeKay, C.I. Davidson, and W. Bruine de Bruin (2010): ''Public perceptions of energy consumption and savings.'' *Proceedings of the National Academy of Sciences* 107(37), 16054–16059 (Available at: *www.pnas.org/content/107/37/16054*) (Last accessed Feb. 15, 2022).

[64] Houde, S. (2018): ''How Consumers Respond to Environmental Certification and the Value of Energy Information,'' *The RAND Journal of Economics,* 49 (2), 453–477 (Available at: *onlinelibrary.wiley.com/doi/full/10.1111/1756–2171.12231*) (Last accessed Feb. 15, 2022).

that appear to purchase appliances without taking into account their energy efficiency and operating costs at all.

DOE requests comment and feedback on its efficiency assignment in the LCC analysis.

The estimated market shares for the no-new-standards case for consumer conventional cooking products in 2027 are shown in Table IV.30 through Table IV.32. See chapter 8 of the TSD for this SNOPR for further information on the derivation of the efficiency distributions.

TABLE IV.30—COOKING TOP MARKET SHARES FOR THE NO-NEW STANDARDS CASE

Electric open (coil) element cooking tops			Electric smooth element cooking tops			Gas cooking tops		
Standard level	IAEC (kWh/year)	Market share (%)	Standard level	IAEC (kWh/year)	Market share (%)	Standard level	IAEC (kBtu/year)	Market share (%)
Baseline	199	100	Baseline	250	20	Baseline	1,775	48
			1	207	50	1	1,440	48
			2	189	25	2	1,204	4
			3	179	5			

TABLE IV.31—CONVENTIONAL ELECTRIC OVEN PRODUCT MARKET SHARES FOR THE NO-NEW STANDARDS CASE

Efficiency level	Standard ovens				Self-clean ovens			
	Freestanding		Built-in/slide-in		Freestanding		Built-in/slide-in	
	IE_{AO} (kWh/year)	Market share (%)	IE_{AO} (kWh/year)	Market share (%)	IE_{AO} (kWh/year)	Market share (%)	IE_{AO} (kWh/year)	Market share (%)
Baseline	314.7	5	321.2	5	354.4	5	360.5	5
1	302.0	57	308.9	65	341.7	18	348.1	7
2	289.0	38	295.9	30	328.7	77	335.1	86
3	235.3	0	242.1	0	275.0	0	281.4	2

TABLE IV.32—CONVENTIONAL GAS OVEN PRODUCT MARKET SHARES FOR THE NO-NEW STANDARDS CASE

Efficiency level	Standard ovens				Self-clean ovens			
	Freestanding		Built-in/slide-in		Freestanding		Built-in/slide-in	
	IE_{AO} (kBtu/year)	Market share (%)	IE_{AO} (kBtu/year)	Market share (%)	IE_{AO} (kBtu/year)	Market share (%)	IE_{AO} (kBtu/year)	Market share (%)
Baseline	2,085	4	2,104	4	1,958	4	1,979	4
1	2,041	34	2,062	58	1,915	3	1,937	19
2	1,908	62	1,929	38	1,781	93	1,804	77

DOE seeks comment and feedback on its estimate for the no-new-standards case efficiency distribution.

9. Payback Period Analysis

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

The inputs to the PBP calculation for each efficiency level are the change in total installed cost of the product and the change in the first-year annual operating expenditures relative to the baseline. DOE refers to this as a ''simple PBP'' because it does not consider changes over time in operating cost savings. The PBP calculation uses the same inputs as the LCC analysis when deriving first-year operating costs.

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

G. Shipments Analysis

DOE uses projections of annual product shipments to calculate the national impacts of potential amended or new energy conservation standards on energy use, NPV, and future manufacturer cash flows.[65] The shipments model takes an accounting approach, tracking market shares of each product class and the vintage of units in the stock. Stock accounting uses product shipments as inputs to estimate the age distribution of in-service product stocks for all years. The age

[65] 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.

distribution of in-service product stocks is a key input to calculations of both the NES and NPV, because operating costs for any year depend on the age distribution of the stock. The shipment projections are based on historical data and an analysis of key market drivers for each product. For consumer conventional cooking products, DOE accounted for three market segments: (1) new construction, (2) existing homes (*i.e.,* replacing failed products), and (3) retired but not replaced products.

To determine new construction shipments, DOE used a forecast of new housing coupled with product market saturation data for new housing. For new housing completions and mobile home placements, DOE adopted the projections from EIA's *AEO2022* through 2050. For subsequent years, DOE set the annual new housing completions fixed to the 2050 value. The market saturation data for new housing was derived from RECS 2015.

DOE estimated replacements using product retirement functions developed from product lifetimes. DOE used retirement functions based on Weibull distributions. To reconcile the historical shipments with modeled shipments, DOE assumed that every retired unit is not replaced. DOE attributed the reason for this non-replacement to building demolition occurring over the period 2027–2056. The not-replaced rate is distributed across electric and gas cooking products.

DOE allocated shipments to each product class based on the current market share of the class. DOE developed the market shares based on data collected from Appliance Magazine Market Research report [66] and U.S. Appliance Industry Statistical Review.[67] The product class market shares are kept constant over time.

As in the December 2020 NOPD, DOE did not estimate any fuel switching between electric and gas cooking products, as no significant switching was observed from historical data between 2003 to 2020. However, DOE is aware of recent state and local policies promoting the decarbonization of residential buildings which may impact estimates for the distribution of shipments between electric and gas cooking products in the no-new-standards case. Additionally, the Inflation Reduction Act (IRA) allocates $4.5 billion in rebates to cover the costs of high-efficiency electric home upgrades, including rebates targeting electric conventional cooking products. DOE understands that these rebates may cause the shipments of electric conventional cooking products to increase and gas conventional cooking products to decline in the no-new-standards case, thus impacting economic estimates in standards cases.[68] Ideally, incorporating the impacts of these policies would require data on the consumer response rebates covering conventional cooking products offered through local policies and the IR A rebates. The implementation and consumer response to these policies is still nascent and has not yet shown an impact on available shipments data. However, other forecasts and data may prove useful in informing an analysis that recognizes the likely sizeable impact the IRA will have in incentivizing GHG reducing fuel-switching choices among cooking product consumers, independent of the standards proposed in this action. DOE will continue to explore possible avenues for such analysis in anticipation of the final rule. If DOE receives or discovers through further exploration, information and data (including its own cooking specific modeling as program designs are established under the IRA), DOE may consider a sensitivity scenario or other analytic approach based on comments received on IRA and other policies promoting electrification.

DOE seeks comment on the distribution between electric and gas cooking products over the shipments analysis period and the potential for fuel switching between electric and gas cooking products. Specifically, DOE requests data on existing policy incentives for consumers to switch fuels and data that indicates the number of consumers switching fuel types between electric and gas cooking products.

DOE considered the impact of standards on product shipments. DOE concluded that it is unlikely that the price increase due to the proposed standards would impact the decision to install a cooking product in the new construction market. In the replacement market, DOE assumed that, in response to an increased product price, some consumers will choose to repair their old cooking product and extend its lifetime instead of replacing it immediately. DOE estimated the magnitude of such impact through a purchase price elasticity of demand. The estimated price elasticity of −0.367 is based on data for cooking products as described in appendix 9A of the TSD for this SNOPR. This elasticity relates the repair or replace decision to the incremental installed cost of higher efficiency cooking products. DOE estimated that the average extension of life of the repaired unit would be 5 years, and then that unit will be replaced with a new cooking unit.

The second-hand market for used appliances is a potential alternative to consumers purchasing a new unit or repairing a broken unit. An increase in the purchases of older, less-efficient second-hand units due to a price increase due to a standard could potentially decrease projected energy savings. DOE assumed that purchases on the second-hand market would not change significantly due to a standard and did not include their impact on product shipments.

DOE requests data on the market size and typical selling price of units sold through the second-hand market for cooking products.

For further details on the shipments analysis, please refer to chapter 9 of the TSD for this SNOPR.

DOE welcomes input on the effect of new and amended standards on impacts across products within the same fuel class and equipment type.

DOE seeks comment on the general approach to its shipments methodology.

H. National Impact Analysis

The NIA assesses the national energy savings (*i.e.,* 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.[69] (''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 consumer conventional cooking products sold from 2027 through 2056.

DOE evaluates the impacts of new or amended standards by comparing a case without such standards with standards-case projections. The no-new-standards case characterizes energy use and consumer costs for each product class in

[66] Appliance Magazine Market Research. The U.S. Appliance Industry: Market Value, Life Expectancy & Replacement Picture 2012.

[67] U.S. Appliance Industry Statistical Review: 2000 to YTD 2011.

[68] U. S. Department of Energy Press Release Pertaining to the Inflation Reduction Act's Direct Consumer Rebates. See *https://www.energy.gov/articles/biden-harris-administration-announces-state-and-tribe-allocations-home-energy-rebate.*

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

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.33 summarizes the inputs and methods DOE used for the NIA analysis for the SNOPR. Discussion of these inputs and methods follows the table. See chapter 10 of the TSD for this SNOPR for further details.

TABLE IV.33—SUMMARY OF INPUTS AND METHODS FOR THE NATIONAL IMPACT ANALYSIS

Inputs	Method
Shipments	Annual shipments from shipments model.
Compliance Date of Standard	2027.
Efficiency Trends	No-new-standards case: No efficiency trend. Standards cases: No efficiency trend.
Annual Energy Consumption per Unit	Annual weighted-average values are a function of energy use at each TSL.
Total Installed Cost per Unit	Annual weighted-average values are a function of cost at each TSL. Incorporates projection of future product prices based on historical data.
Annual Energy Cost per Unit	Annual weighted-average values as a function of the annual energy consumption per unit and energy prices.
Repair and Maintenance Cost per Unit	Annual values do not change with efficiency level.
Energy Price Trends	*AEO2022* projections (to 2050) and constant value based on average between 2046–2050 thereafter.
Energy Site-to-Primary and FFC Conversion	A time-series conversion factor based on *AEO2022.*
Discount Rate	3 percent and 7 percent.
Present Year	2022.

1. Product Efficiency Trends

A key component of the NIA is the trend in energy efficiency projected for the no-new-standards case and each of the standards cases. Section IV.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 product classes for the year of anticipated compliance with an amended or new standard. DOE assumed a static efficiency distribution over the shipments analysis period.

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

2. National Energy Savings

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

Use of higher-efficiency products is sometimes 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 consumer conventional cooking products.

DOE seeks feedback on its assumption of no rebound effect associated with the use of more efficient conventional cooking products as a result of a standard.

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[70] that EIA uses to prepare its *Annual Energy Outlook.* The FFC factors incorporate losses in production and delivery in the case of natural gas (including fugitive emissions) and additional energy used to produce and deliver the various fuels used by power plants. The approach used for deriving FFC measures of energy use and emissions is described in appendix 10B of the TSD for this SNOPR.

EEI commented that values for full-fuel-cycle energy estimates for electricity are extremely overstated,

[70] 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/outlooks/aeo/nems/documentation/archive/pdf/0581(2009).pdf* (last accessed July 11, 2022).

especially for consumers in states with renewable portfolio standards. (EEI, No. 83 at pp. 61–62) EEI added that the values in the December 2020 NOPD use outdated information, are more accurate of a national average, and are not very representative of what many consumers are going to see. (*Id.*) EEI also noted that other standards are increasingly using regional values. (*Id.*)

As previously mentioned, DOE converts electricity consumption and savings to primary energy using annual conversion factors derived from the *AEO*. Traditionally, EIA has used the fossil fuel equivalency approach to report noncombustible renewables' contribution to total primary energy, in part because the resulting shares of primary energy are closer to the shares of generated electricity.[71] The fossil fuel equivalency approach applies an annualized weighted-average heat rate for fossil fuel power plants to the electricity generated (in kWh) from noncombustible renewables. EIA recognizes that using captured energy (the net energy available for direct consumption after transformation of a noncombustible renewable energy into electricity) or incident energy (the mechanical, radiation, or thermal energy that is measurable as the ''input'' to the device) are possible approaches for converting renewable electricity to a common measure of primary energy,[72] but it continues to use the fossil fuel equivalency approach in the *AEO* and other reporting of energy statistics. DOE contends that it is important for it to maintain consistency with EIA in DOE's accounting of primary energy savings from energy efficiency standards.

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 separate product price trends for electric and gas cooking products based on a power-law fit of historical PPI data and cumulative shipments. For the electric cooking products price trend, DOE used the ''Electric household ranges, ovens, surface cooking units and equipment'' PPI for 1967–2021.[73] For the gas cooking product price trend, DOE used the ''Gas household ranges, ovens, surface cooking units and equipment'' for 1981–2021.[74] DOE applied the same trends to project prices for each product class at each considered efficiency level. By 2056, which is the end date of the projection period, the average product price is projected to drop 17 percent relative to 2027 for electric cooking products, and 25 percent for gas cooking products. DOE's projection of product prices is described in chapter 8 of the TSD for this SNOPR.

To evaluate the effect of uncertainty regarding the price trend estimates, DOE investigated the impact of different product price projections on the consumer NPV for the considered TSLs for consumer conventional cooking products. In addition to the default price trend, DOE considered two product price sensitivity cases: (1) a high price decline case based on a learning rate derived from subset of PPI data for the period 1993–2021 for electric cooking products and the period 1981–2001 for gas cooking products (2) a low price decline case based on a learning rate derived from a subset of PPI data from the period of 1967–1992 for electric cooking products and the period 2002–2021 for gas cooking products. The derivation of these price trends and the results of these sensitivity cases are described in appendix 10C of the TSD for this SNOPR.

The energy cost savings 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 energy price changes in the Reference case from *AEO2022,* which has an end year of 2050. To estimate price trends after 2050, DOE used a constant value derived from the average value between 2046 through 2050. As part of the NIA, DOE also analyzed scenarios that used inputs from variants of the *AEO2022* 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 TSD for this SNOPR.

In calculating the NPV, DOE multiplies the net savings in future years by a discount factor to determine their present value. For this SNOPR, 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 OMB to Federal agencies on the development of regulatory analysis.[75] 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 impacts and PBP for those particular consumers from alternative standard levels. For this SNOPR, DOE analyzed the impacts of the considered standard levels on two subgroups: (1) low-income households and (2) senior-only households. The analysis used subsets of the RECS 2015 sample composed of households that meet the criteria for the two subgroups. While the RECS data offers further disaggregation of these consumer subgroups by owner or renter status, DOE only examined the overall positive LCC savings to these consumer subgroups and did not further

[71] Without adjusting primary energy for fossil fuel equivalence, the noncombustible renewable share of total energy consumption for utility-scale electricity generation in 2018 would have bene 6 percent instead of the 15-percent share under the fossil fuel equivalency approach. On a physical units basis, net generation from noncombustible renewable energy sources was 16 percent of total utility-scale net generation in the same year. *www.eia.gov/todayinenergy/detail.php?id=41013* (last accessed June 28, 2022).

[72] See: *www.eia.gov/totalenergy/data/monthly/pdf/sec12_28.pdf* (last accessed June 28, 2022).

[73] Electric household ranges, ovens, surface cooking units and equipment PPI series ID: PCU33522033522011; *www.bls.gov/ppi/.*

[74] Gas household ranges, ovens, surface cooking units, and equipment PPI series ID; PCU33522033522013; *www.bls.gov/ppi/.*

[75] 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 July 11, 2022).

disaggregate the data. DOE used the LCC and PBP spreadsheet model to estimate the impacts of the considered efficiency levels on these subgroups. Chapter 11 in the TSD for this SNOPR describes the consumer subgroup analysis.

DOE requests comment on whether additional consumer subgroups, including any disaggregation of the subgroups analyzed in this SNOPR, may be disproportionately affected by a new or amended national standard and warrant additional analysis in the final rule.

J. Manufacturer Impact Analysis

1. Overview

DOE performed an MIA to estimate the financial impacts of new and amended energy conservation standards on manufacturers of consumer conventional cooking products 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 new and 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 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 margins, 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 (*i.e.,* TSLs). To capture the uncertainty relating to manufacturer pricing strategies following new and 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 the impacts on manufacturer subgroups. The complete MIA is outlined in chapter 12 of the TSD for this SNOPR.

DOE conducted the MIA for this rulemaking in three phases. In Phase 1 of the MIA, DOE prepared a profile of the consumer conventional cooking product manufacturing industry based on the market and technology assessment, preliminary manufacturer interviews, and publicly available information. This included a top-down analysis of consumer conventional cooking product 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 consumer conventional cooking products manufacturing industry, including company filings of form 10–K from the SEC,[76] corporate annual reports, the U.S. Census Bureau's *Economic Census,*[77] and reports from D&B Hoovers.[78]

In Phase 2 of the MIA, DOE prepared a framework industry cash-flow analysis to quantify the potential impacts of new and amended energy conservation standards. The GRIM uses several factors to determine a series of annual cash flows starting with the announcement of the standard and extending over a 30-year period following the 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 consumer conventional cooking products 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. As part of Phase 3, DOE also evaluated subgroups of manufacturers that may be disproportionately impacted by new and 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 (''LVMs''), niche players, and/or manufacturers exhibiting a cost structure that largely differs from the industry average. DOE identified two manufacturer subgroups for a separate impact analysis: commercial-style manufacturers and small business manufacturers. The commercial-style manufacturer subgroup is discussed in section V.B.2.d of this document. The small business subgroup is discussed in section VI.B of this document.

2. Government Regulatory Impact Model and Key Inputs

DOE uses the GRIM to quantify the changes in cash flow due to new and 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 new and amended energy conservation standards. The GRIM spreadsheet uses the inputs to arrive at a series of annual cash flows, beginning in 2022 (the reference year of the analysis) and continuing to 2056. DOE calculated INPVs by summing the stream of annual discounted cash flows during this period. For manufacturers of consumer conventional cooking

[76] Available at *www.sec.gov/edgar.shtml.*

[77] Available at *www.census.gov/programs-surveys/asm/data/tables.html.*

[78] Available at *app.avention.com.*

products, DOE used a real discount rate of 9.1 percent, which was derived from industry financials and then modified according to feedback received during manufacturer interviews.

DOE requests comment on the use of 9.1 percent as an appropriate real discount rate for consumer conventional cooking product manufacturers.

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 new and amended energy conservation standards 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. 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 TSD for this SNOPR.

a. Manufacturer Production Costs

Manufacturing more efficient products is typically more expensive than manufacturing baseline products due to the use of more complex components, which are typically more costly than baseline components. The changes in the MPCs of the covered products can affect the revenues, manufacturer margins, and cash flow of the industry.

In the MIA, DOE used the MPCs calculated in the engineering analysis, as described in section IV.C of this document and further detailed in chapter 5 of the TSD for this SNOPR. For this SNOPR analysis, DOE used a design-option approach supported by testing, supplemented by reverse engineering (physical teardowns and testing of existing products in the market) to identify the incremental cost and efficiency improvement associated with each design option or design option combination. DOE used these updated MPCs from the engineering analysis in this MIA.

b. Shipments Projections

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

c. Product and Capital Conversion Costs

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

To evaluate the level of capital conversion costs manufacturers would likely incur to comply with new and amended energy conservation standards, DOE estimated the capital investments that a major and minor consumer conventional cooking product manufacturer would be required to make to be able to manufacture compliant products at each efficiency levels for each product class. DOE then scaled these cost investment estimates by the number of major and minor consumer conventional cooking product manufacturers to arrive at the industry conversion cost estimates.

To evaluate the level of product conversion costs manufacturers would likely incur to comply with amended energy conservation standards, DOE estimated the number of consumer conventional cooking product models currently on the market, the efficiency distribution of those models on the market, the estimated testing cost to test to the DOE test procedure (for cooking tops only), and the estimated per model R&D costs to redesign a non-compliant model into a compliant model for each analyzed efficiency level.

DOE used DOE's Compliance Certification Database (''CCD''),[79] California Energy Commission's (''CEC's'') MAEDBS database,[80] and Canada's Natural Resources Canada database [81] to identify consumer conventional cooking product models covered by this rulemaking. DOE used the efficiency distribution of the shipments analysis to estimate the model efficiency distribution. DOE increased the cost estimates from the August 2022 TP Final Rule [82] based on manufacturer feedback and used these higher per unit testing costs to estimate the per model testing costs for cooking tops. Lastly, DOE estimated separate per model R&D costs for each product class at each efficiency level based on manufacturer interviews and inputs from the engineering analysis. DOE then combined the per model testing and R&D costs with the number of models that would need to be tested and redesigned to estimate the industry product conversion costs.

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 and amended standards. The conversion cost figures used in the GRIM can be found in section V.B.2 of this document. For additional information on the estimated capital and product conversion costs, see chapter 12 of the TSD for this SNOPR.

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 manufacturer margins to the MPCs estimated in the engineering analysis for each product class and efficiency level. Modifying these margins in the standards case yields different sets of impacts on manufacturers. For the MIA, DOE modeled two standards-case scenarios to represent uncertainty regarding the potential impacts on prices and profitability for manufacturers following the implementation of new and amended energy conservation standards: (1) a preservation of gross margin scenario; and (2) a preservation of operating profit scenario. These

[79] *www.regulations.doe.gov/certification-data.* Cooking Product-Gas: only contains consumer conventional cooking products that use gas as a fuel source.

[80] Available at *cacertappliances.energy.ca.gov/Pages/Search/AdvancedSearch.aspx.*

[81] Available at *oee.nrcan.gc.ca/pml-lmp/index.cfm?action=app.welcome-bienvenue.* Used to identify any electric cooking products not identified in CEC's database, since many major consumer conventional cooking product manufacturers sell the same consumer conventional cooking products in the US and in Canada.

[82] 87 FR 51492, 51532–51533.

scenarios lead to different margins that, when applied to the MPCs, result in varying revenue and cash flow impacts on manufacturers.

Under the preservation of gross margin scenario, DOE applied the same ''gross margin percentage'' across all efficiency levels in the standards-cases that is used in the no-new-standards case. This scenario assumes that manufacturers would be able to maintain the same margin of 17 percent, that is used in the no-new-standards case, in all standards cases, even as the MPCs increase due to energy conservation standards.[83] This margin is the same margin that was used in the December 2020 NOPD. This scenario represents the upper bound to industry profitability under new and amended energy conservation standards.

Under the preservation of operating profit scenario, DOE modeled a situation in which manufacturers are not able to increase per-unit operating profit in proportion to increases in MPCs. Under this scenario, as the MPCs increase, manufacturers reduce their margins (on a percentage basis) to a level that maintains the no-new-standards operating profit (in absolute dollars). The implicit assumption behind this scenario is that the industry can only maintain its operating profit in absolute dollars after compliance with new and amended standards. Therefore, operating profit in percentage terms is reduced between the no-new-standards case and the analyzed standards cases. DOE adjusted the margins in the GRIM at each TSL to yield approximately the same earnings before interest and taxes in the standards case in the year after the compliance date of the new and amended standards as in the no-new-standards case. This scenario represents the lower bound to industry profitability under new and amended energy conservation standards.

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

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 TSD for this SNOPR. The analysis presented in this notice uses projections from *AEO2022.* Power sector emissions of CH_4 and N_2O from fuel combustion are estimated using Emission Factors for Greenhouse Gas Inventories published by the Environmental Protection Agency (''EPA'').[84]

The on-site operation of consumer conventional cooking products requires combustion of fossil fuels and results in emissions of CO_2, NO_X, SO_2, CH_4, and N_2O, where these products are used. Site emissions of these gases were estimated using Emission Factors for Greenhouse Gas Inventories and, for NO_X and SO_2 emissions intensity factors from an EPA publication.[85]

A 2022 study by Stanford University (''Stanford Study''), which measured methane emissions in 53 California homes, suggests that gas ranges (including the gas cooking top and gas oven portions) contribute methane emissions that were estimated to be 0.8 to 1.3 percent of gas consumption for active (cooking) mode due to incomplete combustion and post-meter leakage during active, standby, and off modes.[86] Further, a significant majority (three-quarters) of these emissions take place during standby mode due to leakage. In active mode, the Stanford Study noted that such emissions occurred both during steady-state operation and during burner ignition/extinction. Gas cooking tops with standing pilot lights released on average over 10 times the methane during each ignition event than those with electronic spark ignition. Regarding standby mode, the Stanford Study found that 48 out of the 53 gas ranges measured, along with their associated nearby piping, leaked some methane continuously. The Stanford Study estimated that, over a 20-year analysis period, the annual methane emissions from all gas-fired consumer conventional cooking products in U.S. homes have a climate impact comparable to the annual CO_2 emissions from 500,000 automobiles. Additionally, increased methane emissions contribute to the formation of surface level ozone which has been linked to negative health outcomes.

Studies from the emerging field of indoor air quality have measured emissions of additional pollutants associated with gas cooking products not quantified in this SNOPR analysis that may potentially contribute to negative health impacts, especially in areas with inadequate ventilation.[87] [88] Such in-home emissions may be associated with a variety of serious respiratory and cardiovascular conditions and other health risks. Reduced in-home gas combustion may deliver additional health benefits to consumers and their families by reducing exposure to various pollutants. The level of health benefits may also depend on the degree to which a household uses or has access to proper ventilation. Although the benefits in reductions of these pollutants are not quantified in this SNOPR analysis, reductions of on-site emissions provide health benefits to sensitive populations such as children, elderly, and household members with respiratory conditions.[89] These subgroups are likely to experience more acutely health effects that are caused or exacerbated by the on-site emissions. DOE acknowledges the potential heath impact of these emissions, but notes the uncertainty in quantifying their impact in this emerging area of study.

DOE notes that the current energy conservation standards for consumer conventional cooking products established in the April 2009 Final Rule prohibit constant burning pilots for all gas cooking products (*i.e.,* gas cooking

[83] The gross margin percentage of 17 percent is based on a manufacturer markup of 1.20.

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

[85] U.S. Environmental Protection Agency. External Combustion Sources. In *Compilation of Air Pollutant Emission Factors.* AP–42. Fifth Edition. Volume I: Stationary Point and Area Sources. Chapter 1. Available at *www.epa.gov/ttn/chief/ap42/index.html* (last accessed June 28, 2022).

[86] E.D. Lebel, C.J. Finnegan, Z. Ouyang, and R.B. Jackson, ''Methane and NO_X Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes,'' Environmental Science and Technology 2022, Vol. 56, pp. 2529–2539.

[87] J. Logue, N., Klepeis N, A. Lobscheid A, B. Singer B, ''Pollutant exposures from natural gas cooking burners: a simulation-based assessment for Southern California'' Environ Health Perspect, 2014, Vol 122, pp. 43–50.

[88] Eric D. Lebel et. al ''Composition, Emissions, and Air Quality Impacts of Hazardous Air Pollutants in Unburned Natural Gas from Residential Stoves in California'', Environmental Science & Technology, October 2022.

[89] Seals, D and Krasner A, ''Health Effects from Gas Stove Pollution'', Rocky Mountain Institute. 2020.

products both with or without an electrical supply cord) manufactured on and after April 9, 2012. 10 CFR 430.32(j)(1)–(2). In this SNOPR, DOE analyzed a design option and corresponding efficiency levels for gas cooking tops, optimized burner/improved grates, that are associated with improvements in combustion characteristics. In general, higher efficiency burner systems correlate with more complete combustion and thus more efficient conversion of the energy content in the gas to thermal energy.

DOE seeks comment on any health impacts to consumers, environmental impacts, or general public health and welfare impacts (including the distribution of such impacts across sensitive populations) of its proposals in this SNOPR on on-site emissions from gas cooking products of methane, carbon dioxide, particulate matter, nitrogen dioxide, or other hazardous air emissions. DOE also seeks comment on whether manufacturers are instituting design approaches, control strategies, or other measures to mitigate methane or other emissions from incomplete combustion and leakage.

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 TSD for this SNOPR.

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

1. Air Quality Regulations Incorporated in DOE's Analysis

DOE's no-new-standards case for the electric power sector reflects the *AEO,* which incorporates the projected impacts of existing air quality regulations on emissions. *AEO2022* generally represents current legislation and environmental regulations, including recent government actions, that were in place at the time of preparation of *AEO2022,* including the emissions control programs discussed in the following paragraphs.[90]

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.[91] *AEO2022* incorporates implementation of CSAPR, including the update to the CSAPR ozone season program emission budgets and target dates issued in 2016. 81 FR 74504 (Oct. 26, 2016). Compliance with CSAPR is flexible among EGUs and is enforced through the use of tradable emissions allowances. Under existing EPA regulations, any excess SO_2 emissions allowances resulting from the lower electricity demand caused by the adoption of an efficiency standard could be used to permit offsetting increases in SO_2 emissions by another regulated EGU.

However, beginning in 2016, SO_2 emissions began to fall as a result of the Mercury and Air Toxics Standards (''MATS'') for power plants. 77 FR 9304 (Feb. 16, 2012). In the MATS final rule, EPA established a standard for hydrogen chloride as a surrogate for acid gas hazardous air pollutants (''HAP''), and also established a standard for SO_2 (a non-HAP acid gas) as an alternative equivalent surrogate standard for acid gas HAP. The same controls are used to reduce HAP and non-HAP acid gas; thus, SO_2 emissions are being reduced as a result of the control technologies installed on coal-fired power plants to comply with the MATS requirements for acid gas. In order to continue operating, coal power plants must have either flue gas desulfurization or dry sorbent injection systems installed. Both technologies, which are used to reduce acid gas emissions, also reduce SO_2 emissions. Because of the emissions reductions under the MATS, it is unlikely that excess SO_2 emissions allowances resulting from the lower electricity demand would be needed or used to permit offsetting increases in SO_2 emissions by another regulated EGU. Therefore, energy conservation standards that decrease electricity generation would generally reduce SO_2 emissions. DOE estimated SO_2 emissions reduction using emissions factors based on *AEO2022.*

CSAPR also established limits on NO_X emissions for numerous States in the eastern half of the United States. Energy conservation standards would have little effect on NO_X emissions in those States covered by CSAPR emissions limits if excess NO_X emissions allowances resulting from the lower electricity demand could be used to permit offsetting increases in NO_X emissions from other EGUs. In such case, NO_X 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 NO_X emissions in covered States. Despite this possibility, DOE has chosen to be conservative in its analysis and has maintained the assumption that standards will not reduce NO_X emissions in States covered by CSAPR. Energy conservation standards would be expected to reduce NO_X emissions in the States not covered by CSAPR. DOE used *AEO2022* data to derive NO_X emissions factors for the group of States not covered by CSAPR.

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

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

[90] For further information, see the Assumptions to *AEO2022* report that sets forth the major assumptions used to generate the projections in the Annual Energy Outlook. Available at *www.eia.gov/outlooks/aeo/assumptions/* (last accessed June 28, 2022).

[91] 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).

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 SNOPR.

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. As reflected in this rule, DOE has reverted to its approach prior to the injunction and presents monetized benefits where appropriate and permissible under law. However, DOE notes it would reach the same conclusion presented in this proposed rulemaking that the proposed standards are economically justified no matter what value is ascribed to climate benefits. DOE requests comment on how to address the climate benefits and other non-monetized effects of the proposal.

1. Monetization of Greenhouse Gas Emissions

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

DOE exercises its own judgment in presenting monetized climate benefits as recommended by applicable Executive orders and DOE would reach the same conclusion presented in this proposed rulemaking in the absence of the social cost of greenhouse gases. That is, the social costs of greenhouse gases, whether measured using the February 2021 interim estimates presented by the Interagency Working Group on the Social Cost of Greenhouse Gases or by another means, did not affect the rule ultimately proposed by DOE.

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 CH_4 emissions. As a member of the IWG involved in the development of the February 2021 SC-GHG TSD, DOE agrees that the interim SC-GHG estimates represent the most appropriate estimate of the SC-GHG until revised estimates have been developed reflecting the latest, peer-reviewed science.

The SC-GHGs estimates presented here were developed over many years, using a 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 (*i.e.,* 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 (*i.e.,* SC-CH_4) and nitrous oxide (*i.e.,* 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.*[92] 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).[93] 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

[92] Marten, A.L., E.A. Kopits, C.W. Griffiths, S.C. Newbold, and A. Wolverton. Incremental CH_4 and N_2O mitigation benefits consistent with the US Government's SC-CO_2 estimates. *Climate Policy.* 2015. 15(2): pp. 272–298.

[93] 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.

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

On January 20, 2021, President Biden issued Executive Order 13990, which re-established the IWG and directed it to ensure that the U.S. Government's estimates of the social cost of carbon and other greenhouse gases reflect the best available science and the recommendations of the National Academies (2017). The IWG was tasked with first reviewing the SC-GHG estimates currently used in Federal analyses and publishing interim estimates within 30 days of the 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 that accrue only 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,[94] 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-percent discount rates as ''default'' values, Circular A–4 also reminds agencies that ''different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions.'' On discounting, Circular A–4 recognizes that ''special ethical considerations arise when comparing benefits and costs across generations,'' and Circular A–4 acknowledges that analyses may appropriately ''discount future costs and consumption benefits [. . .] at a lower rate than for intragenerational analysis.'' In the 2015 Response to Comments on the Social Cost of Carbon for Regulatory Impact Analysis, OMB, DOE, and the other IWG members recognized that ''Circular A–4 is a living document'' and ''the use of 7 percent is not considered appropriate for intergenerational discounting. There is wide support for this view in the academic literature, and it is recognized in Circular A–4 itself.'' Thus, DOE concludes that a 7 percent discount rate is not appropriate to apply to value the social cost of greenhouse gases in the analysis presented in this analysis.

To calculate the present and annualized values of climate benefits,

[94] 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.*

DOE uses the same discount rate as the rate used to discount the value of damages from future GHG emissions, for internal consistency. That approach to discounting follows the same approach that the February 2021 TSD recommends ''to ensure internal consistency—*i.e.,* future damages from climate change using the SC-GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate.'' DOE has also consulted the National Academies' 2017 recommendations on how SC-GHG estimates can ''be combined in RIAs [regulatory impact analyses] 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 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.[95] 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 SNOPR likely underestimate the damages from GHG emissions. DOE concurs with this assessment.

DOE's derivations of the SC-GHG values (*i.e.,* SC-CO_2, SC-N_2O, and SC-CH_4) used for this SNOPR 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 SNOPR were based on the values presented for the IWG's February 2021 TSD. Table IV.34 shows the updated sets of SC-CO_2 estimates from the IWG's February 2021 TSD in 5-year increments from 2020 to 2050. The full set of annual values that DOE used is presented in appendix 14A of the TSD for this SNOPR. 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.[96]

TABLE IV.34—ANNUAL SC-CO_2 VALUES FROM 2021 INTERAGENCY UPDATE, 2020–2050

[2020$ per metric ton CO_2]

Year	Discount rate			
	5% (average)	3% (average)	2.5% (average)	3% (95th percentile)
2020	14	51	76	152
2025	17	56	83	169
2030	19	62	89	187
2035	22	67	96	206
2040	25	73	103	225

[95] 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: *www.whitehouse.gov/briefing-room/blog/2021/02/26/a-return-to-science-evidence-based-estimates-of-the-benefits-of-reducing-climate-pollution/.*

[96] 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.

TABLE IV.34—ANNUAL SC-CO_2 VALUES FROM 2021 INTERAGENCY UPDATE, 2020–2050—Continued

[2020$ per metric ton CO_2]

Year	Discount rate			
	5% (average)	3% (average)	2.5% (average)	3% (95th percentile)
2045	28	79	110	242
2050	32	85	116	260

For 2051 to 2070, DOE used SC-CO_2 estimates published by EPA, adjusted to 2020$.[97] These estimates are based on methods, assumptions, and parameters identical to the 2020–2050 estimates published by the IWG. DOE expects additional climate benefits to accrue for any longer-life consumer conventional cooking products after 2070, but a lack of available SC-CO_2 estimates for emissions years beyond 2070 prevents DOE from monetizing these potential benefits in this analysis. DOE notes that the SC-CO_2 monetization results presented in this SNOPR are a conservative estimate and that the inclusion of emissions after 2070 would slightly increase estimated benefits.

DOE multiplied the CO_2 emissions reduction estimated for each year by the SC-CO_2 value for that year in each of the four cases. DOE adjusted the values to 2021$ using the implicit price deflator for gross domestic product (''GDP'') from the Bureau of Economic Analysis. To calculate a present value of the stream of monetary values, DOE discounted the values in each of the four cases using the specific discount rate that had been used to obtain the SC-CO_2 values in each case.

b. Social Cost of Methane and Nitrous Oxide

The SC-CH_4 and SC-N_2O values used for this SNOPR were based on the values developed for the February 2021 TSD. Table IV.35 shows the updated sets of SC-CH_4 and SC-N_2O estimates from the latest interagency update in 5-year increments from 2020 to 2050. The full set of annual values used is presented in appendix 14A of the TSD for this SNOPR. 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.35—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% (average)	3% (average)	2.5% (average)	3% (95th percentile)	5% (average)	3% (average)	2.5% (average)	3% (95th percentile)
2020	670	1500	2000	3900	5800	18000	27000	48000
2025	800	1700	2200	4500	6800	21000	30000	54000
2030	940	2000	2500	5200	7800	23000	33000	60000
2035	1100	2200	2800	6000	9000	25000	36000	67000
2040	1300	2500	3100	6700	10000	28000	39000	74000
2045	1500	2800	3500	7500	12000	30000	42000	81000
2050	1700	3100	3800	8200	13000	33000	45000	88000

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

2. Monetization of Other Emissions Impacts

For the SNOPR, DOE estimated the monetized value of NO_X and SO_2 emissions reductions from electricity generation using the latest benefit per ton estimates for that sector from the EPA's Benefits Mapping and Analysis Program.[98] 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 consumer conventional cooking products using a method described in appendix 14B of the TSD for this SNOPR.

DOE also estimated the monetized value of NO_X and SO_2 emissions reductions from site use of natural gas in consumer conventional cooking products using benefit-per-ton estimates from the EPA's Benefits Mapping and Analysis Program. Although none of the sectors covered by EPA refers

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

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

specifically to residential and commercial buildings, the sector called ''area sources'' would be a reasonable proxy for residential and commercial buildings.[99] The EPA document provides high and low estimates for 2025 and 2030 at 3- and 7-percent discount rates.[100] DOE used the same linear interpolation and extrapolation as it did with the values for electricity generation. DOE notes that in-home emissions may carry different monetized health risks than the risks assumed in the monetized health benefits calculations.

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. DOE will continue to evaluate the monetization of avoided NO_X emissions and will make any appropriate updates for the final rule. Additional details on the monetization of NO_X and SO_2 emissions reductions are included in chapter 14 of the TSD for this SNOPR.

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 *AEO2022.* NEMS produces the *AEO* Reference case, as well as a number of side cases that estimate the economy-wide impacts of changes to energy supply and demand. For the current analysis, impacts are quantified by comparing the levels of electricity sector generation, installed capacity, fuel consumption and emissions in the *AEO2022* Reference case and various side cases. Details of the methodology are provided in the appendices to chapters 13 and 15 of the TSD for this SNOPR.

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.

In response to the September 2016 SNOPR, the Joint Gas Associations commented that DOE should conduct a similar analysis on natural gas utilities as it conducted on electric utilities to assess the impact of the proposed efficiency requirements on that segment of the energy industry. (Joint Gas Associations, No. 68 at pp. 3–4) The Joint Gas Associations added that a shift from natural gas cooking products to electric cooking products would impact the electric grid requirements. (*Id.*)

DOE notes that the utility impact analysis as applied to electric utilities only estimates the change to capacity and generation as a result of a standard, as modeled in NEMS, and there is no gas utility analog. DOE further notes that the impact to natural gas utility sales is equivalent to the natural gas saved by the proposed standard and includes those results in chapter 15 of the TSD for this SNOPR.

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 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.[101] 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 SNOPR using an input/output model of the U.S. economy called Impact of Sector Energy Technologies version 4 (''ImSET'').[102] ImSET is a special-purpose version of the ''U.S. Benchmark National Input-Output'' (''I–O'') model, which was designed to estimate the national employment and income effects of energy-saving technologies. The ImSET software includes a computer-based I–O model having structural coefficients that characterize economic flows among 187 sectors most relevant to industrial, commercial, and residential building energy use.

DOE notes that ImSET is not a general equilibrium forecasting model, and that the uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis. Because ImSET does not incorporate price changes, the employment effects predicted by ImSET may over-estimate actual job impacts

[99] ''Area sources'' represents all emission sources for which states do not have exact (point) locations in their emissions inventories. Because exact locations would tend to be associated with larger sources, ''area sources'' would be fairly representative of small dispersed sources like homes and businesses.

[100] ''Area sources'' are a category in the 2018 document from EPA, but are not used in the 2021 document cited above. See: *www.epa.gov/sites/default/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf.*

[101] 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 *apps.bea.gov/scb/pdf/regional/perinc/meth/rims2.pdf* (last accessed July 11, 2022).

[102] 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.

over the long run for this rule. Therefore, DOE used ImSET only to generate results for near-term timeframes (2027), where these uncertainties are reduced. For more details on the employment impact analysis, see chapter 16 of the TSD for this SNOPR.

V. Analytical Results and Conclusions

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

A. Trial Standard Levels

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

In the analysis conducted for this SNOPR, DOE analyzed the benefits and burdens of three TSLs for consumer conventional cooking products. DOE developed TSLs that combine efficiency levels for each analyzed product class. DOE presents the results for the TSLs in this document, while the results for all efficiency levels that DOE analyzed are in the TSD for this SNOPR.

Table V.1 through Table V.3 present the TSLs and the corresponding efficiency levels that DOE has identified for potential amended energy conservation standards for consumer conventional cooking products. TSL 3 represents the maximum technologically feasible (max-tech) energy efficiency for all product classes. TSL 2 represents an intermediate TSL. TSL 1 is configured with the minimum efficiency improvement in each product class corresponding to electronic controls for electric cooking tops, optimized burners for gas cooking tops, and switch mode power supplies for ovens.

TABLE V.1—TRIAL STANDARD LEVELS FOR COOKING TOP MARKET

Trial standard level	Electric open (coil) element cooking tops		Electric smooth element cooking tops		Gas cooking tops	
	EL	IAEC (kWh/year)	EL	IAEC (kWh/year)	EL	IAEC (kBtu/year)
1	Baseline	199	1	207	1	1,440
2	Baseline	199	1	207	2	1,204
3	Baseline	199	3	179	2	1,204

TABLE V.2—TRIAL STANDARD LEVELS FOR CONVENTIONAL ELECTRIC OVEN

Trial standard level	Standard electric ovens				Self-clean electric ovens			
	Freestanding		Built-in/slide-in		Freestanding		Built-in/slide-in	
	EL	IE_{AO} (kWh/year)	EL	IE_{AO} (kWh/year)	EL	IE_{AO} (kWh/year)	EL	IE_{AO} (kWh/year)
1	1	302.0	1	308.9	1	341.7	1	348.1
2	1	302.0	1	308.9	1	341.7	1	348.1
3	3	235.3	3	242.1	3	275.0	3	281.4

TABLE V.3—TRIAL STANDARD LEVELS FOR CONVENTIONAL GAS OVEN

Trial standard level	Standard gas ovens				Self-clean gas ovens			
	Freestanding		Built-in/slide-in		Freestanding		Built-in/slide-in	
	EL	IE_{AO} (kBtu/year)	EL	IE_{AO} (kBtu/year)	EL	IE_{AO} (kBtu/year)	EL	IE_{AO} (kBtu/year)
1	1	2,041	1	2,062	1	1,915	1	1,937
2	1	2,041	1	2,062	1	1,915	1	1,937
3	2	1,908	2	1,929	2	1,781	2	1,804

DOE constructed the TSLs for this SNOPR to include ELs representative of ELs with similar characteristics (*i.e.,* using similar technologies and/or efficiencies, and having roughly comparable equipment availability). The use of representative ELs provided for greater distinction between the TSLs. While representative ELs were included in the TSLs, DOE considered all efficiency levels as part of its analysis.[103]

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

B. Economic Justification and Energy Savings

1. Economic Impacts on Individual Consumers

DOE analyzed the economic impacts on consumer conventional cooking products consumers by looking at the effects that potential new and amended standards at each TSL would have on

the LCC and PBP. DOE also examined the impacts of potential standards on selected consumer subgroups. These analyses are discussed in the following sections.

a. Life-Cycle Cost and Payback Period

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

Table V.4 through Table V.25 show the LCC and PBP results for the TSLs considered for each product class. In the first of each pair of tables, the simple payback is measured relative to the baseline product. 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 product 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.4—AVERAGE LCC AND PBP RESULTS FOR ELECTRIC OPEN (COIL) ELEMENT COOKING TOPS

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
1–3	Baseline	$327	$14	$334	$661	....	16.8

Note: The results for each TSL are calculated assuming that all consumers use products at that efficiency level.

TABLE V.5—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR ELECTRIC OPEN (COIL) ELEMENT COOKING TOPS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1–3	Baseline	$0.00	0

*The savings represent the average LCC for affected consumers.

TABLE V.6—AVERAGE LCC AND PBP RESULTS FOR ELECTRIC SMOOTH ELEMENT COOKING TOPS

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$552	$20	$408	$960	....	16.8
1, 2	1	555	14	336	891	0.6	16.8
	2	568	13	321	890	2.5	16.8
3	3	1,204	12	314	1,517	87.5	16.8

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 ELECTRIC SMOOTH ELEMENT COOKING TOPS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1, 2	1	$13.29	0
3	3	(580.31)	95

*The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.8—AVERAGE LCC AND PBP RESULTS FOR GAS COOKING TOPS

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$376	$16	$337	$713	....	14.5
1	1	395	13	310	705	8.4	14.5
2, 3	2	395	12	292	686	5.0	14.5

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.9—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR GAS COOKING TOPS

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2021$)	Percent of consumers that experience net cost
1	1	$3.88	27
2, 3	2	21.89	18

* The savings represent the average LCC for affected consumers.

TABLE V.10—AVERAGE LCC AND PBP RESULTS FOR ELECTRIC STANDARD OVENS, FREESTANDING

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$652	$23	$482	$1,134	....	16.8
1, 2	1	655	21	459	1,114	1.7	16.8
	2	704	20	448	1,152	19.8	16.8
3	3	755	17	405	1,160	17.0	16.8

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.11—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR ELECTRIC STANDARD OVENS, FREESTANDING

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2021$)	Percent of consumers that experience net cost
1, 2	1	$0.99	0
3	3	(29.92)	80

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.12—AVERAGE LCC AND PBP RESULTS FOR ELECTRIC STANDARD OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$682	$24	$494	$1,176	....	16.8
1, 2	1	685	22	472	1,157	1.8	16.8
	2	734	21	461	1,195	20.2	16.8
3	3	785	18	417	1,203	17.2	16.8

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.13—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR ELECTRIC STANDARD OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1, 2	1	$0.95	0
3	3	(33.05)	81

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.14—AVERAGE LCC AND PBP RESULTS FOR ELECTRIC SELF-CLEAN OVENS, FREESTANDING

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$699	$28	$552	$1,251		16.8
1, 2	1	702	26	529	1,231	1.7	16.8
	2	751	26	518	1,269	19.8	16.8
3	3	802	22	474	1,277	17.0	16.8

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.15—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR ELECTRIC SELF-CLEAN OVENS, FREESTANDING

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1, 2	1	$1.02	0
3	3	(15.31)	75

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.16—AVERAGE LCC AND PBP RESULTS FOR ELECTRIC SELF-CLEAN OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$729	$29	$563	$1,292		16.8
1, 2	1	732	27	540	1,273	1.8	16.8
	2	781	27	530	1,311	20.1	16.8
3	3	832	23	486	1,319	17.2	16.8

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.17—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR ELECTRIC SELF-CLEAN OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1, 2	1	$1.01	0
3	3	(10.84)	72

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.18—AVERAGE LCC AND PBP RESULTS FOR GAS STANDARD OVENS, FREESTANDING

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$677	$43	$684	$1,361		14.5
1, 2	1	681	41	664	1,345	1.9	14.5
3	2	715	40	653	1,367	14.1	14.5

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.19—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR GAS STANDARD OVENS, FREESTANDING

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2021$)	Percent of consumers that experience net cost
1, 2	1	$0.65	1
3	2	(7.56)	33

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.20—AVERAGE LCC AND PBP RESULTS FOR GAS STANDARD OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$707	$44	$692	$1,399		14.5
1, 2	1	710	42	673	1,384	2.0	14.5
3	2	744	41	662	1,406	14.4	14.5

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.21—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR GAS STANDARD OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings * (2021$)	Percent of consumers that experience net cost
1, 2	1	$0.59	1
3	2	(13.37)	56

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.22—AVERAGE LCC AND PBP RESULTS FOR GAS SELF-CLEAN OVENS, FREESTANDING

TSL	Efficiency level	Average costs (2021$)				Simple payback (years)	Average lifetime (years)
		Installed cost	First year's operating cost	Lifetime operating cost	LCC		
	Baseline	$847	$44	$702	$1,549		14.5
1, 2	1	850	43	683	1,532	1.9	14.5
3	2	884	42	671	1,555	14.1	14.5

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.23—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR GAS SELF-CLEAN OVENS, FREESTANDING

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1, 2	1	$0.70	1
3	2	(0.86)	6

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.24—AVERAGE LCC AND PBP RESULTS FOR GAS SELF-CLEAN OVENS, BUILT-IN/SLIDE-IN

TSL	Average costs (2021$)				LCC	Simple payback (years)	Average lifetime (years)
	Efficiency level	Installed cost	First year's operating cost	Lifetime operating cost			
	Baseline	$876	$45	$711	$1,587		14.5
1, 2	1	879	44	692	1,571	2.0	14.5
3	2	913	43	680	1,594	14.4	14.5

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.25—AVERAGE LCC SAVINGS RELATIVE TO THE NO-NEW-STANDARDS CASE FOR GAS SELF-CLEAN OVENS, BUILT-IN/SLIDE-IN

TSL	Efficiency level	Life-cycle cost savings	
		Average LCC savings* (2021$)	Percent of consumers that experience net cost
1, 2	1	$0.60	1
3	2	(4.52)	20

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

b. Consumer Subgroup Analysis

In the consumer subgroup analysis, DOE estimated the impact of the considered TSLs on low-income households and senior-only households. Table V.26 through Table V.36 compare the average LCC savings and PBP at each efficiency level for the consumer subgroups with similar metrics for the entire consumer sample for each product class. In most cases, the average LCC savings and PBP for low-income households and senior-only households at the considered efficiency levels are not substantially different from the average for all households. Usage data from RECS 2015 indicate that low-income households have a similar usage pattern to all households which leads to similar results. Senior-only households were found to use cooking products less frequently than the general population resulting in slightly lower savings. Chapter 11 of the TSD for this SNOPR presents the complete LCC and PBP results for the subgroups.

TABLE V.26—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC OPEN (COIL) ELEMENT COOKING TOPS

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)*			
TSL 1–3	$0.00	$0.00	$0.00
Payback Period (years)			
TSL 1–3			
Consumers with Net Benefit (%)			
TSL 1–3	0%	0%	0%
Consumers with Net Cost (%)			
TSL 1–3	0%	0%	0%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.27—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC SMOOTH ELEMENT COOKING TOPS

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$13.71	$13.30	$13.29
TSL 3	($556.90)	($580.13)	($580.31)
Payback Period (years)			
TSL 1, 2	0.5	0.6	0.6
TSL 3	82.4	86.6	87.5
Consumers with Net Benefit (%)			
TSL 1, 2	20%	19%	19%
TSL 3	1%	0%	0%
Consumers with Net Cost (%)			
TSL 1, 2	0%	0%	0%
TSL 3	94%	95%	95%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.28—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; GAS COOKING TOPS

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1	$3.56	$3.65	$3.88
TSL 2, 3	$21.06	$21.37	$21.89
Payback Period (years)			
TSL 1	8.5	8.6	8.4
TSL 2, 3	5.0	5.0	5.0
Consumers with Net Benefit (%)			
TSL 1	21%	19%	21%
TSL 2, 3	76%	76%	75%
Consumers with Net Cost (%)			
TSL 1	28%	29%	27%
TSL 2, 3	18%	19%	18%

* The savings represent the average LCC for affected consumers.

TABLE V.29—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC STANDARD OVENS, FREESTANDING

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$1.00	$0.95	$0.99
TSL 3	($29.95)	($40.40)	($29.92)
Payback Period (years)			
TSL 1, 2	1.7	1.8	1.7
TSL 3	17.1	20.4	17.0
Consumers with Net Benefit (%)			
TSL 1, 2	5%	5%	5%
TSL 3	21%	14%	21%
Consumers with Net Cost (%)			
TSL 1, 2	0%	0%	0%
TSL 3	79%	86%	80%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.30—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC STANDARD OVENS, BUILT-IN/SLIDE-IN

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$0.95	$0.86	$0.95
TSL 3	($32.96)	($43.69)	($33.05)
Payback Period (years)			
TSL 1, 2	1.8	1.9	1.8
TSL 3	17.3	20.6	17.2
Consumers with Net Benefit (%)			

TABLE V.30—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC STANDARD OVENS, BUILT-IN/SLIDE-IN—Continued

	Low-income households	Senior-only households	All households
TSL 1, 2	5%	5%	5%
TSL 3	20%	13%	20%
Consumers with Net Cost (%)			
TSL 1, 2	0%	0%	0%
TSL 3	80%	87%	81%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.31—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC SELF-CLEAN OVENS, FREESTANDING

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$1.07	$0.99	$1.02
TSL 3	($15.42)	($24.72)	($15.31)
Payback Period (years)			
TSL 1, 2	1.7	1.8	1.7
TSL 3	17.1	20.4	17.0
Consumers with Net Benefit (%)			
TSL 1, 2	5%	5%	5%
TSL 3	25%	18%	25%
Consumers with Net Cost (%)			
TSL 1, 2	0%	0%	0%
TSL 3	75%	82%	75%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.32—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; ELECTRIC SELF-CLEAN OVENS, BUILT-IN/SLIDE-IN

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$0.96	$0.90	$1.01
TSL 3	($10.89)	($20.02)	($10.84)
Payback Period (years)			
TSL 1, 2	1.8	1.9	1.8
TSL 3	17.3	20.6	17.2
Consumers with Net Benefit (%)			
TSL 1, 2	5%	5%	5%
TSL 3	26%	19%	26%
Consumers with Net Cost (%)			
TSL 1, 2	0%	0%	0%
TSL 3	72%	79%	72%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.33—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; GAS STANDARD OVENS, FREESTANDING

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$0.72	$0.56	$0.65
TSL 3	($6.77)	($8.51)	($7.56)
Payback Period (years)			
TSL 1, 2	1.7	2.1	1.9
TSL 3	12.0	15.7	14.1
Consumers with Net Benefit (%)			
TSL 1, 2	3%	3%	3%
TSL 3	4%	3%	4%
Consumers with Net Cost (%)			
TSL 1, 2	1%	1%	1%
TSL 3	34%	34%	33%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.34—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; GAS STANDARD OVENS, BUILT-IN/SLIDE-IN

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$0.74	$0.58	$0.59
TSL 3	($11.63)	($14.33)	($13.37)
Payback Period (years)			
TSL 1, 2	1.7	2.2	2.0
TSL 3	12.3	16.0	14.4
Consumers with Net Benefit (%)			
TSL 1, 2	4%	3%	3%
TSL 3	6%	5%	6%
Consumers with Net Cost (%)			
TSL 1, 2	1%	1%	1%
TSL 3	56%	57%	56%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.35—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; GAS SELF-CLEAN OVENS, FREESTANDING

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$0.90	$0.64	$0.70
TSL 3	($0.60)	($1.12)	($0.86)
Payback Period (years)			
TSL 1, 2	1.7	2.1	1.9
TSL 3	12.1	15.7	14.1
Consumers with Net Benefit (%)			
TSL 1, 2	4%	4%	4%
TSL 3	2%	1%	1%
Consumers with Net Cost (%)			
TSL 1, 2	0%	1%	1%
TSL 3	5%	6%	6%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

TABLE V.36—COMPARISON OF LCC SAVINGS AND PBP FOR CONSUMER SUBGROUPS AND ALL HOUSEHOLDS; GAS SELF-CLEAN OVENS, BUILT-IN/SLIDE-IN

	Low-income households	Senior-only households	All households
Average LCC Savings (2021$)			
TSL 1, 2	$0.67	$0.50	$0.60
TSL 3	($3.58)	($4.92)	($4.52)
Payback Period (years)			
TSL 1, 2	1.7	2.2	2.0
TSL 3	12.3	16.0	14.4
Consumers with Net Benefit (%)			
TSL 1, 2	3%	3%	3%
TSL 3	3%	2%	3%
Consumers with Net Cost (%)			
TSL 1, 2	1%	1%	1%
TSL 3	20%	21%	20%

* The savings represent the average LCC for affected consumers. Negative values denoted in parentheses.

In the absence to data specific to each consumer subgroup, DOE assumed the efficiency distribution developed for the reference case analysis (see section IV.F.8 of this document for details). However, for gas cooking tops, this likely overestimates the negative impact to low-income households that are more likely to purchase traditional residential-style gas cooking tops which tend to have fewer high output burners and slimmer grates relative to commercial-style gas cooking tops. These households are more likely to purchase products above the baseline at EL 1 or EL 2. As both EL 1 and EL 2 have the same installed cost (see Table V.5), a standard for these consumers would not lead to an increase in purchase price and would result in operating cost savings for consumers that purchase EL 1 in the no-new-standards case and EL 2 in a standards case.

c. Rebuttable Presumption Payback

As discussed in section III.F.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 consumer conventional cooking products. In contrast, the PBPs presented in section V.B.1.a of this document were calculated using distributions that reflect the range of energy use in the field.

Table V.37 presents the rebuttable-presumption payback periods for the considered TSLs for consumer conventional cooking products. While DOE examined the rebuttable-presumption criterion, it considered whether the standard levels considered for the SNOPR 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.37—REBUTTABLE-PRESUMPTION PAYBACK PERIODS

Product class	Trial standard level 1	Trial standard level 2	Trial standard level 3
	years		
Electric Open (Coil) Element Cooking Tops	n.a.	n.a.	n.a.
Electric Smooth Element Cooking Tops	0.5	0.5	66.0
Gas Cooking Tops	6.4	3.8	3.8
Electric Standard Ovens, Freestanding	1.8	1.8	9.4
Electric Standard Ovens, Built-In/Slide-In	1.8	1.8	9.4
Electric Self-Clean Ovens, Freestanding	1.8	1.8	9.4
Electric Self-Clean Ovens, Built-In/Slide-In	1.8	1.8	9.4
Gas Standard Ovens, Freestanding	8.5	8.5	24.4
Gas Standard Ovens, Built-In/Slide-In	8.9	8.9	24.7
Gas Self-Clean Ovens, Freestanding	8.7	8.7	24.4
Gas Self-Clean Ovens, Built-In/Slide-In	8.9	8.9	24.7

* The entry "n.a." means not applicable because the evaluated standard is the baseline.

2. Economic Impacts on Manufacturers

DOE performed an MIA to estimate the impact of new and amended energy conservation standards on manufacturers of consumer conventional cooking products. The following section describes the expected impacts on manufacturers at each considered TSL. Chapter 12 of the TSD for this SNOPR 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 the analyzed energy conservation standards. The following tables summarize the estimated financial impacts (represented by changes in INPV) of potential new and amended energy conservation standards on manufacturers of consumer conventional cooking products, as well as the conversion costs that DOE estimates manufacturers of consumer conventional cooking products would incur at each TSL. To evaluate the range of cash-flow impacts on the consumer conventional cooking product industry, DOE modeled two scenarios using different assumptions that correspond to the range of anticipated market responses to new and amended energy conservation standards: (1) the preservation of gross margin scenario and (2) the preservation of operating profit scenario.

In the preservation of gross margin scenario, consumer conventional cooking product manufacturers are able to maintain their margins (as a percentage), even as the MPCs of consumer conventional cooking products increase due to energy conservation standards. The same uniform margin of 17 percent is applied across all efficiency levels in the preservation of gross margin.[104] In the preservation of operating profit scenario, manufacturers are not able to maintain their original margins of 17 percent, in the standards cases. Instead, manufacturers are only able to maintain the same operating profit (in absolute dollars) in the standards cases as in the no-new-standards case, despite higher MPCs.

Each of the modeled scenarios results in a unique set of cash-flows and corresponding industry values at each TSL for consumer conventional cooking product manufacturers. 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 2022 through 2056. 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 and amended standards are required.

DOE presents the range in INPV for consumer conventional cooking product manufacturers in Table V.38 and Table V.39.

[104] The gross margin percentage of 17 percent is based on a manufacturer markup of 1.20.

TABLE V.38—MANUFACTURER IMPACT ANALYSIS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS—PRESERVATION OF GROSS MARGIN SCENARIO

	Units	No-new-standards case	Trial standard level*		
			1	2	3
INPV	2021$ millions	1,607	1,506	1,456	422
Change in INPV	2021$ millions		(100.7)	(150.4)	(1,185.1)
	%		(6.3)	(9.4)	(73.8)
Product Conversion Costs	2021$ millions		45.5	109.9	1,401.6
Capital Conversion Costs	2021$ millions		58.5	73.5	444.8
Total Conversion Costs	2021$ millions		104.1	183.4	1,846.4

* Parentheses indicate negative values. Numbers may not sum exactly due to rounding.

TABLE V.39—MANUFACTURER IMPACT ANALYSIS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS—PRESERVATION OF OPERATING PROFIT SCENARIO

	Units	No-new-standards case	Trial standard level*		
			1	2	3
INPV	2021$ millions	1,607	1,502	1,452	238
Change in INPV	2021$ millions		(105.1)	(154.8)	(1,368.6)
	%		(6.5)	(9.6)	(85.2)
Product Conversion Costs	2021$ millions		45.5	109.9	1,401.6
Capital Conversion Costs	2021$ millions		58.5	73.5	444.8
Total Conversion Costs	2021$ millions		104.1	183.4	1,846.4

* Parentheses indicate negative values. Numbers may not sum exactly due to rounding.

At TSL 1, DOE estimates impacts on INPV will range from −$105.1 million to −$100.7 million, which represents a change of −6.5 percent to −6.3. percent, respectively. At TSL 1, industry free cash-flow decrease to $90.3 million, which represents a decrease of approximately 42.5 percent, compared to the no-new-standards case value of $132.9 million in 2026, the year before the estimated compliance date.

TSL 1 would set the energy conservation standard at baseline for the electric open (coil) element cooking top product class and at EL 1 for all other product classes. DOE estimates that 100 percent of the electric open (coil) element cooking top shipments, 80 percent of the electric smooth element cooking top shipments, 52 percent of the gas cooking top shipments, 95 percent of the electric oven shipments, and 96 percent of the gas oven shipments would already meet or exceed the efficiency levels required at TSL 1 in 2027.

At TSL 1, DOE expects consumer conventional cooking product manufacturers to incur approximately $45.5 million in product conversion costs to redesign all non-compliant cooking top models and oven models, as well as to test all (both compliant and newly redesigned) cooking top models to DOE's cooking top test procedure. Additionally, consumer conventional cooking product manufacturers would incur approximately $58.5 million in capital conversion costs to purchase new tooling and equipment necessary to produce all electric smooth element cooking top models and all oven models to use switch-mode power supplies and to purchase new molds for grates and burners for gas cooking top models that would not meet this energy conservation standard.

At TSL 1, the shipment-weighted average MPC for consumer conventional cooking products slightly increases by 0.5 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this slight cost increase. The slight increase in shipment weighted average MPC is outweighed by the $104.1 million in conversion costs, causing a moderately negative change in INPV at TSL 1 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, manufacturers earn the same per-unit operating profit as would be earned in the no-new-standards case, but manufacturers do not earn additional profit from their investments or higher MPCs. In this scenario, the 0.5 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the margin and the $104.1 million in conversion costs incurred by manufacturers cause a moderately negative change in INPV at TSL 1 under the preservation of operating profit scenario.

At TSL 2, DOE estimates impacts on INPV will range from −$154.8 million to −$150.4 million, which represents a change of −9.6 percent to −9.4 percent, respectively. At TSL 2, industry free cash-flow decrease to $60.7 million, which represents a decrease of approximately 72.2 percent, compared to the no-new-standards case value of $132.9 million in 2026, the year before the estimated compliance date.

TSL 2 would set the energy conservation standard at baseline for the electric open (coil) element cooking top product class; at EL 1 for the electric smooth element cooking top and for all oven product classes (electric and gas); and at EL 2 for the gas cooking top product class, which represents max-tech for this product class. DOE estimates that 100 percent of the electric open (coil) element cooking top shipments, 80 percent of the electric smooth element cooking top shipments, 4 percent of the gas cooking top shipments, 95 percent of the electric oven shipments, and 96 percent of the gas oven shipments would already meet or exceed the efficiency levels required at TSL 2 in 2027.

At TSL 2, DOE expects consumer conventional cooking product manufacturers to incur approximately $109.9 million in product conversion costs at this TSL. This includes testing costs and product redesign costs. The majority of the product conversion costs

are for gas cooking top manufacturers to redesign non-compliant gas cooking top models to meet this energy conservation standard, as well as to test all (both compliant and newly redesigned) cooking top models to DOE's cooking top test procedure. Additionally, consumer conventional cooking product manufacturers would incur approximately $73.5 million in capital conversion costs to purchase new tooling and equipment necessary to produce all electric smooth element cooking top models and all oven models to use switch-mode power supplies and to purchase new molds for grates and burners for gas cooking top models that would not meet this energy conservation standard.

At TSL 2, the shipment-weighted average MPC for consumer conventional cooking products slightly increases by 0.5 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this slight cost increase. The slight increase in shipment weighted average MPC is outweighed by the $183.4 million in conversion costs, causing a moderately negative change in INPV at TSL 2 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 0.5 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the manufacturer markup and the $183.4 million in conversion costs incurred by manufacturers cause a moderately negative change in INPV at TSL 2 under the preservation of operating profit scenario.

At TSL 3, DOE estimates impacts on INPV will range from −$1,368.6 million to −$1,185.1 million, which represents a change of −85.2 percent to −73.8 percent, respectively. At TSL 3, industry free cash-flow decrease to −$666.2 million, which represents a decrease of approximately 799.0 percent, compared to the no-new-standards case value of $132.9 million in 2026, the year before the estimated compliance date.

TSL 3 would set the energy conservation standard at baseline for the electric open (coil) element cooking top product class; at EL 2 for the gas cooking top product class and for all the gas oven product classes (standard and self-clean); and at EL 3 for the electric smooth element cooking top product class and for all the electric oven product classes (standard and self-clean). This represents max-tech for all product classes. DOE estimates that 100 percent of the electric open (coil) element cooking top shipments, 5 percent of the electric smooth element cooking top shipments, 4 percent of the gas cooking top shipments, zero percent of the electric standard oven (freestanding and built-in) shipments, zero percent of the electric self-clean oven (freestanding) shipments, 2 percent of the electric self-clean (built-in) shipments, 62 percent of gas standard oven (freestanding) shipments, 38 percent of the gas standard oven (built-in) shipments, 93 percent of the gas self-clean oven (freestanding) shipments, and 77 percent of the gas self-clean (built-in) shipments would already meet the efficiency levels required at TSL 3 in 2027.

At TSL 3, DOE expects consumer conventional cooking product manufacturers to incur approximately $1,401.6 million in product conversion costs at this TSL. This includes testing costs and product redesign costs. At this TSL electric smooth element cooking top manufacturers would have to completely redesign most of their electric smooth element cooking top models to use induction technology. Electric oven manufacturers would have to completely redesign all of their electric oven models to use oven separators. Additionally, consumer conventional cooking product manufacturers would incur approximately $444.8 million in capital conversion costs to purchase new tooling and equipment necessary to produce the numerous redesigned cooking top and oven models at this TSL.

At TSL 3, the shipment-weighted average MPC for consumer conventional cooking products significantly increases by 17.7 percent relative to the no-new-standards case shipment-weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this cost increase. The significant increase in shipment weighted average MPC is outweighed by the $1,846.4 million in conversion costs, causing a significantly negative change in INPV at TSL 3 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 17.7 percent shipment weighted average MPC increase results in a reduction in the margin after the analyzed compliance year. This reduction in the margin and the $1,846.4 million in conversion costs incurred by manufacturers cause a significantly negative change in INPV at TSL 3 under the preservation of operating profit scenario.

b. Direct Impacts on Employment

To quantitatively assess the potential impacts of new and amended energy conservation standards on direct employment in the consumer conventional cooking products industry, DOE used the GRIM to estimate the domestic labor expenditures and number of direct employees in the no-new-standards case and in each of the standards cases (*i.e.,* TSLs) during the analysis period.

Production employees are those who are directly involved in fabricating and assembling products within a 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 products. This could include sales, human resources, engineering, and management. DOE estimated non-production employment levels by multiplying the number of consumer conventional cooking product workers by a scaling factor. The scaling factor is calculated by taking the ratio of the total number of employees, and the total production workers associated with the industry NAICS code 335220, which covers consumer conventional cooking product manufacturing.

The employment impacts shown in Table V.40 represent the potential domestic production employment that could result following the new and amended energy conservation standards. The upper bound of the results estimates the maximum change in the number of production workers that could occur after compliance with the new and amended energy conservation standards when assuming that manufacturers continue to produce

the same scope of covered products in the same production facilities. It also assumes that domestic production does not shift to lower labor-cost countries. Because there is a risk of manufacturers evaluating sourcing decisions in response to the new and amended energy conservation standards, the lower bound of the employment results includes DOE's estimate of the total number of U.S. production workers in the industry who could lose their jobs if some existing domestic production were moved outside of the United States. While the results present a range of domestic employment impacts following 2027, the following sections also include qualitative discussions of the likelihood of negative employment impacts at the various TSLs.

Using 2019 ASM data and interviews with manufacturers, DOE estimates that approximately 60 percent of the consumer conventional cooking products sold in the United States are manufactured domestically. With this assumption, DOE estimates that in the absence of new and amended energy conservation standards, there would be approximately 4,322 domestic production workers involved in manufacturing consumer conventional cooking products in 2027. Table V.40 shows the range of the impacts of the new and amended energy conservation standards on U.S. production workers in the consumer conventional cooking product industry.

TABLE V.40—DOMESTIC EMPLOYMENT FOR CONSUMER CONVENTIONAL COOKING PRODUCTS IN 2027

	No-new-standards case	Trial standard level		
		1	2	3
Domestic Production Workers in 2027	4,322	4,343	4,343	4,880
Domestic Non-Production Workers in 2027	631	634	634	713
Total Direct Employment in 2027	4,953	4,977	4,977	5,593
Potential Changes in Total Direct Employment in 2027 *		0–21	0–21	(1,068)–558

* DOE presents a range of potential impacts. Numbers in parentheses indicate negative values.

At the upper end of the range, all examined TSLs show an increase in the number of domestic production workers for consumer conventional cooking products. The upper end of the range represents a scenario where manufacturers increase production hiring due to the increase in the labor associated with adding the required components to make consumer conventional cooking products more efficient. However, as previously stated, this assumes that in addition to hiring more production employees, all existing domestic production would remain in the United States and not shift to lower labor-cost countries.

At the lower end of the range, all examined TSLs show either no change in domestic production employment or a decrease in domestic production employment. The lower end of the domestic employment range assumes that gas cooking top domestic production employment does not change at any TSL. Manufacturing more efficient gas cooking tops by optimizing the burner and improving grates would not impact the location where production occurs for this product class. Additionally, this lower range assumes that TSLs set at EL 1 for all oven product classes and the electric smooth element cooking top product class would not change the domestic production employment. EL 1 would require SMPSs for all oven product classes and can be achieved using low-standby-loss electronic controls for the electric smooth element cooking top product class. The majority of manufacturers already use SMPSs in their ovens and are able to meet the efficiency requirements at EL 1 for the electric smooth element cooking top product class. Adding these standby features to models currently not using these features would not change the location where production occurs for these product classes.

At the lower end of the range, DOE estimated that up to 50 percent of domestic production employment for the electric smooth element cooking top product class could be relocated abroad at max-tech. Additionally, DOE estimated that up to 25 percent of domestic production employment for the oven product classes could be relocated abroad at max-tech. DOE estimates that there would be approximately 584 domestic production employees involved in the production of electric smooth element cooking tops and 3,102 domestic production employees involved in the production covering all oven product classes in 2027 in the no-new-standards case. Using these values to estimate the lower end of the range, DOE estimated that up to 1,068 domestic production employees could be eliminated at TSL 3 (due to standards being set at max-tech for the electric smooth element cooking top product class and for all oven product classes).[105]

DOE provides a range of potential impacts to domestic production employment as each manufacturer would make a business decision that best suits their individual product needs. However, manufacturers stated during interviews that due to the larger size of most consumer conventional cooking products, there are few units that are manufactured and shipped from far distances such as Asia or Europe. The vast majority of consumer conventional cooking products are currently made in North America. Some manufacturers stated that even significant changes to production lines would not cause them to shift their production abroad, as several manufacturers either only produce consumer conventional cooking products domestically or have made significant investments to continue to produce consumer conventional cooking products domestically.

DOE requests comment on the estimated potential domestic employment impacts on consumer conventional cooking product manufacturers presented in this SNOPR.

c. Impacts on Manufacturing Capacity

Manufacturers stated that any standard requiring induction heating technology for electric smooth element cooking tops would be very difficult to meet since there are approximately 5 percent of shipments currently using this technology. Additionally, any standards requiring oven separators for the electric oven product classes would be very difficult to meet since that would require completely redesigning the oven cavity of almost every electric oven model currently on the market.

All other ELs analyzed require making incremental improvements to existing designs and should not present any manufacturing capacity constraints given the 3-year compliance period proposed in this SNOPR.

[105] $584 \times 50\% + 3{,}102 \times 25\% = 1{,}067.5$.

DOE requests comment on the potential manufacturing capacity constraints placed on consumer conventional cooking product manufacturers at the TSLs presented in this SNOPR.

d. Impacts on Subgroups of Manufacturers

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 product manufacturers, and manufacturers exhibiting cost structures substantially different from the industry average could be affected disproportionately. DOE analyzed the impacts on small businesses in section VI.B of this document. DOE also identified the commercial-style manufacturer subgroup as a potential manufacturer subgroup that could be adversely impacted by energy conservation standards based on the results of the industry characterization.

The commercial-style manufacturer subgroup consists of consumer conventional cooking product manufacturers that primarily sell gas cooking tops, gas ovens, and electric self-clean ovens marketed as commercial-style, either as a stand-alone product or as a component of a conventional range. For the cooking top product classes, while commercial-style manufacturers do not produce electric open (coil) element cooking tops, some commercial-style manufacturers do produce electric smooth element cooking tops. Of those commercial-style manufacturers that do produce electric smooth element cooking tops, all these manufacturers have products that use induction technology and would be able to meet the max-tech for this product class.

Commercial-style manufacturers would likely face more difficulty meeting potential standards set for the gas cooking top product class than other consumer conventional cooking product manufacturers. However, as previously stated in IV.C.1, all analyzed ELs for the gas cooking top product class are achievable with continuous cast-iron grates and at least one HIR burner. Therefore, while commercial-style manufacturers would likely have to redesign a higher portion of their gas cooking top models compared to other consumer conventional cooking product manufacturers, all ELs for the gas cooking top product class are achievable for commercial-style manufacturers.

For the oven product classes, the vast majority of commercial-style electric and gas ovens already use SMPSs in their ovens and would not have difficulty meeting potential standard levels requiring SMPSs for any oven product classes. Additionally, commercial-style manufactures typically have a higher percentage of gas oven models that use forced convention than other consumer conventional cooking product manufacturers. However, like the rest of the market, there are very few, if any, commercial-style electric ovens equipped with an oven separator and it would be difficult for commercial-style manufacturers to convert all of their oven cavities into ovens equipped with an oven separator.

DOE requests comment on the potential impacts on commercial-style manufacturers at the TSLs presented in this SNOPR.

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 evaluates product-specific regulations that will take effect approximately 3 years before or after the estimated 2027 compliance date of any new and amended energy conservation standards for consumer conventional cooking products. This information is presented in Table V.41.

TABLE V.41—COMPLIANCE DATES AND EXPECTED CONVERSION EXPENSES OF FEDERAL ENERGY CONSERVATION STANDARDS AFFECTING CONSUMER CONVENTIONAL COOKING PRODUCT MANUFACTURERS

Federal energy conservation standard	Number of manufacturers *	Number of manufacturers affected from this rule **	Approx. standards year	Industry conversion costs (millions)	Industry conversion costs/product revenue *** (percent)
Portable Air Conditioners, 85 FR 1378 (Jan. 10, 2020)	11	1	2025	$320.9 (2015$)	6.7
Room Air Conditioners,† 87 FR 20608 (Apr. 7, 2022)	8	3	2026	22.8 (2020$)	0.5
Microwave Ovens,† 87 FR 52282 (Aug. 24, 2022)	18	10	2026	46.1 (2021$)	0.7
Clothes Dryers,† 87 FR 51734 (Aug. 23, 2022)	15	8	2027	149.7 (2020$)	1.8

* This column presents the total number of manufacturers identified in the energy conservation standard rule contributing to cumulative regulatory burden.

** This column presents the number of manufacturers producing consumer conventional cooking products that are also listed as manufacturers in the listed energy conservation standard contributing to cumulative regulatory burden.

*** This column presents industry conversion costs as a percentage of product revenue during the conversion period. Industry conversion costs are the upfront investments manufacturers must make to sell compliant products/equipment. The revenue used for this calculation is the revenue from just the covered product/equipment associated with each row. The conversion period is the time frame over which conversion costs are made and lasts from the publication year of the final rule to the compliance year of the energy conservation standard. The conversion period typically ranges from 3 to 5 years, depending on the rulemaking.

† Indicates a NOPR publications. Values may change on publication of a Final Rule.

In addition to the rulemaking listed in Table V.41 DOE has ongoing rulemakings for other products or equipment that consumer conventional cooking product manufacturers

produce, including air cleaners;[106] automatic commercial ice makers;[107] commercial clothes washers;[108] dehumidifiers;[109] miscellaneous refrigeration products;[110] refrigerators, refrigerator-freezers, and freezers;[111] and residential clothes washers.[112] If DOE proposes or finalizes any energy conservation standards for these products or equipment prior to finalizing energy conservation standards for consumer conventional cooking products, DOE will include the energy conservation standards for these other products or equipment as part of the cumulative regulatory burden for the consumer conventional cooking products final rule.

DOE requests information regarding the impact of cumulative regulatory burden on manufacturers of consumer conventional cooking products 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 consumer conventional cooking products, DOE compared their energy consumption under the no-new-standards case to their anticipated energy consumption under each TSL. The savings are measured over the entire lifetime of products purchased in the 30-year period that begins in the year of anticipated compliance with amended standards (2027–2056). Table V.42 presents DOE's projections of the national energy savings for each TSL considered for consumer conventional cooking products. The savings were calculated using the approach described in section IV.H.3 of this document.

TABLE V.42—CUMULATIVE NATIONAL ENERGY SAVINGS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS; 30 YEARS OF SHIPMENTS

[2027–2056]

	Trial standard level		
	1	2	3
	quads		
Primary energy	0.26	0.43	1.39
FFC energy	0.28	0.46	1.47

OMB Circular A–4[113] requires agencies to present analytical results, including separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs. Circular A–4 also directs agencies to consider the variability of key elements underlying the estimates of benefits and costs. For this rulemaking, DOE undertook a sensitivity analysis using 9 years, rather than 30 years, of product shipments. The choice of a 9-year period is a proxy for the timeline in EPCA for the review of certain energy conservation standards and potential revision of and compliance with such revised standards.[114] The review timeframe established in EPCA is generally not synchronized with the product lifetime, product manufacturing cycles, or other factors specific to consumer conventional cooking products. 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.43. The impacts are counted over the lifetime of consumer conventional cooking products purchased in 2027–2035.

TABLE V.43—CUMULATIVE NATIONAL ENERGY SAVINGS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS; 9 YEARS OF SHIPMENTS

[2027–2035]

	Trial standard level		
	1	2	3
	quads		
Primary energy	0.07	0.12	0.37
FFC energy	0.08	0.13	0.39

[106] *www.regulations.gov/docket/EERE-2021-BT-STD-0035.*

[107] *www.regulations.gov/docket/EERE-2017-BT-STD-0022.*

[108] *www.regulations.gov/docket/EERE-2019-BT-STD-0044.*

[109] *www.regulations.gov/docket/EERE-2019-BT-STD-0043.*

[110] *www.regulations.gov/docket/EERE-2020-BT-STD-0039.*

[111] *www.regulations.gov/docket/EERE-2017-BT-STD-0003.*

[112] *www.regulations.gov/docket/EERE-2017-BT-STD-0014.*

[113] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed July 11, 2022).

[114] 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 consumer conventional cooking products. In accordance with OMB's guidelines on regulatory analysis,[115] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table V.44 shows the consumer NPV results with impacts counted over the lifetime of products purchased in 2027–2056.

TABLE V.44—CUMULATIVE NET PRESENT VALUE OF CONSUMER BENEFITS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS; 30 YEARS OF SHIPMENTS

[2027–2056]

Discount rate	Trial standard level		
	1	2	3 *
	billion 2021$		
3 percent	0.96	1.71	(27.75)
7 percent	0.33	0.65	(15.68)

* Negative values denoted in parentheses.

The NPV results based on the aforementioned 9-year analytical period are presented in Table V.45. The impacts are counted over the lifetime of products purchased in 2027–2035. As mentioned previously, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology or decision criteria.

TABLE V.45—CUMULATIVE NET PRESENT VALUE OF CONSUMER BENEFITS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS; 9 YEARS OF SHIPMENTS

[2027–2035]

Discount rate (percent)	Trial standard level		
	1	2	3 *
	billion 2021$		
3	0.32	0.61	(9.86)
7	0.15	0.31	(7.48)

* Negative values denoted in parentheses.

The previous results reflect the use of a default trend to estimate the change in price for consumer conventional cooking products 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 TSD for this SNOPR. 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. In each case, net benefits remain positive.

c. Indirect Impacts on Employment

It is estimated that that amended energy conservation standards for consumer conventional cooking products 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 (2027), 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 TSD for this SNOPR presents detailed results regarding anticipated indirect employment impacts.

4. Impact on Utility or Performance of Products

As discussed in section IV.C of this document, DOE has tentatively concluded that the standards proposed in this SNOPR would not lessen the utility or performance of the consumer conventional cooking products under consideration in this rulemaking. Manufacturers of these products currently offer units that meet or exceed the proposed standards.

AHAM stated that the introduction of any new standards could have a significant impact on the utility of cooking products by, for example, potentially lowering burner input rates or requiring changes that would result in less sturdy grates. (AHAM, No. 84 at p. 4)

As discuss in section IV.C of this document, when evaluating higher ELs

[115] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed July 11, 2022).

for gas cooking tops, DOE ensured that all potential standard levels would maintain the ability for cooking tops to offer at least one HIR burner and continuous cast-iron grates.

5. Impact of Any Lessening of Competition

DOE considered any lessening of competition that would be likely to result from new or amended standards. As discussed in section III.F.1.e of this document, 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 SNOPR 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.

As discussed in chapter 3 of the TSD for this SNOPR, DOE estimates that there are approximately 34 manufacturers of consumer conventional cooking products supplying the domestic market, and that three major manufacturers represent roughly 85 percent of the market. The major manufacturers offer a full array of appliances under multiple brands at a range of price points. Other manufacturers offer a much more limited set of products that are focused on the higher end premium products or other consumer niches.

The consumer conventional cooking product market can be divided into three sub-markets: a smaller entry level ''value'' consumer conventional cooking product market; a mass-market consumer conventional cooking product market; and a premium commercial-style consumer conventional cooking product market. The smaller entry level consumer conventional cooking product market typically consists of ovens, cooking tops, and ranges that have a width of 30'' or less. These products typically compete on price, as consumers that purchase these products are price sensitive. The mass-market consumer conventional cooking product market makes up the vast majority of the consumer conventional cooking product market. These are ovens, cooking tops, and ranges that are sold in big box retail stores and larger internet retailers. The premium commercial-style consumer conventional cooking product market typically consists of ovens, cooking tops, and ranges, that have a width of 30'' or larger that have gas cooking tops, gas ovens, or electric self-clean ovens marketed as commercial-style, either as a stand-alone product or as a component of a conventional range. These products typically do compete on brand and features as well as price and are significantly more expensive than the mass-produced consumer conventional cooking products.

As discussed in section III.C of this document, there is currently no test procedure for conventional ovens and efficiency gains can be obtained from product redesigns of design improvements at low incremental manufacturing costs.

For products sold in all three consumer conventional cooking product sub-markets, meeting energy conservation standards for consumer conventional ovens set at EL 1 (TSL 1 and TSL 2) would not present a significant challenge for any consumer conventional cooking product manufacturer. Based on the shipments analysis used in the NIA, DOE estimates that approximately 95 percent of ovens will meet or exceed EL 1 by the estimated compliance date. The remaining five percent of the market would need to purchase switch-mode power supplies to be used in their consumer conventional ovens. Switch-mode power supplies are widely used and readily available and constitute a minor increase in production costs for the consumer conventional ovens that do not currently use switch-mode power supplies.

As discussed in section III.C of this document, although there is a new test procedure for conventional cooking tops, there is no current performance standard. As a result, conventional cooking top design may not be optimized to the IAEC metric and efficiency gains can be obtained from product redesigns at low incremental manufacturing costs.

Regarding standards for consumer conventional cooking tops, the majority of smaller entry level ''value'' consumer conventional cooking products would not be significantly impacted by any energy conservation standards set below max-tech for consumer conventional cooking tops. The majority of consumer conventional cooking tops sold in the smaller entry level ''value'' consumer conventional cooking product market either have electric open (coil) element cooking tops or gas-cooking tops with thinner non-continuous grates. DOE is only considering a baseline efficiency level for electric open (coil) element cooking tops that can be meet by all products. Gas cooking tops with thinner non-continuous grates typically are at max-tech. It is unlikely that many gas cooking tops sold in the smaller entry level ''value'' consumer conventional cooking product market would have to redesign their products to meet standards set at any efficiency level.

For the mass-market consumer conventional cooking product market, most electric smooth element cooking tops will meet or exceed standards set at EL 1 (TSL 1 and TSL 2). The majority of electric smooth element cooking tops that are at baseline, EL 1, and EL 2 (*i.e.,* not the electric smooth cooking tops that use induction technology, which are electric smooth element cooking tops meting max-tech) are sold in the mass-market consumer conventional cooking product market. Based on the shipments analysis used in the NIA, DOE estimates that approximately 80 percent of electric smooth element cooking tops will meet or exceed EL 1 by the estimated compliance date.

Most of the gas cooking top products sold in the mass-market consumer conventional cooking product market would have to be redesigned to meet standards set at max-tech (TSL 2 and TSL 3). Based on the shipments analysis used in the NIA, DOE estimates that approximately 96 percent of gas cooking tops will need to be redesigned to meet standards set at max-tech by the estimated compliance date.

The premium commercial-style consumer conventional cooking product market typically uses either electric cooking tops that use induction technology and are at max-tech for the electric smooth element cooking top product class or gas cooking tops. All electric smooth element cooking tops using induction technology would be able to meet standards set at max-tech for the electric smooth element product class. Premium commercial-style manufacturers would likely face more difficulty meeting potential standards set for the gas cooking top product class than other consumer conventional cooking product manufacturers. However, as previously stated in section IV.C.1 of this document, all analyzed ELs for the gas cooking top product class are achievable with continuous cast-iron grates and at least one HIR burner. Therefore, while commercial-style manufacturers would likely have to redesign a higher portion of their gas cooking top models compared to other consumer conventional cooking product manufacturers, all ELs for the gas cooking top product class are achievable for commercial-style manufacturers. Additionally, premium commercial-style consumer conventional cooking products typically are not as cost sensitive as the other consumer

conventional cooking product markets. Premium commercial-style consumer conventional cooking product typically sell for more than twice the cost of mass-market consumer conventional cooking products. DOE anticipates that premium commercial-style consumer conventional cooking product manufacturers are more likely to be able to pass on cost increases to their customers than the other consumer conventional cooking product markets.

Overall, DOE does not anticipate that energy conservation standards set at TSL 1 or TSL 2 would significantly alter the current market structure that consumer conventional cooking products are currently sold.

DOE does not expect the proposed rule to increase the concentration in an already concentrated market. DOE understands that barriers to entry or expansion associated with manufacturing and selling cooking products is high particularly in the mass-market segment. The cost of developing brand recognition; achieving manufacturing scale to lower production costs; and developing a distribution network, are all significant challenges. The industry has responded by segmenting the market into more focused markets that allow differentiation and competition on factors other than price. For the reasons described in this section, the proposed rule likely would not alter the competitive balance or market structure of the consumer conventional cooking product industry.

DOE invites comment from the public regarding the competitive impacts that are likely to result from this proposed rule. In addition, stakeholders may also provide comments separately to DOJ regarding these potential impacts. See the **ADDRESSES** section for information to send comments to DOJ.

6. Need of the Nation To Conserve Energy

Enhanced energy efficiency, where economically justified, improves the Nation's energy security, strengthens the economy, and reduces the environmental impacts (costs) of energy production.

DOE seeks comment on the potential impacts on energy security as a result of amended standards for cooking products, which reduce the use of natural gas as a result of more-efficient cooking appliances.

Reduced in-home gas combustion may deliver additional health benefits to consumers and their families by reducing exposure to various pollutants. 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 TSD for this SNOPR 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 consumer conventional cooking products is expected to yield environmental benefits in the form of reduced emissions of certain air pollutants and greenhouse gases. Table V.46 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 TSD for this SNOPR.

TABLE V.46—CUMULATIVE EMISSIONS REDUCTION FOR CONSUMER CONVENTIONAL COOKING PRODUCTS SHIPPED IN 2027–2056

	Trial standard level		
	1	2	3
Power Sector Emissions:			
CO_2 (*million metric tons*)	10.7	19.6	50.7
CH_4 (*thousand tons*)	0.5	0.7	3.0
N_2O (*thousand tons*)	0.1	0.1	0.4
SO_2 (*thousand tons*)	2.2	2.2	16.6
NO_X (*thousand tons*)	7.7	15.5	31.3
Hg (*tons*)	0.01	0.01	0.11
Upstream Emissions:			
CO_2 (*million metric tons*)	1.2	2.3	4.8
CH_4 (*thousand tons*)	120.6	244.2	479.2
N_2O (*thousand tons*)	0.0	0.0	0.0
SO_2 (*thousand tons*)	0.0	0.0	0.2
NO_X (*thousand tons*)	18.1	36.3	73.7
Hg (*tons*)	0.00	0.00	0.00
Total FFC Emissions:			
CO_2 (*million metric tons*)	11.9	21.9	55.5
CH_4 (*thousand tons*)	121.1	244.9	482.2
N_2O (*thousand tons*)	0.1	0.1	0.4
SO_2 (*thousand tons*)	2.2	2.2	16.7
NO_X (*thousand tons*)	25.9	51.8	105.0
Hg (*tons*)	0.01	0.01	0.11

As part of the analysis for this rulemaking, DOE estimated monetary benefits likely to result from the reduced emissions of CO_2 that DOE estimated for each of the considered TSLs for consumer conventional cooking products. Section IV.L of this document discusses the SC–CO_2 values that DOE used. Table V.47 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 TSD for this SNOPR.

TABLE V.47—PRESENT VALUE OF CO_2 EMISSIONS REDUCTION FOR CONSUMER CONVENTIONAL COOKING PRODUCTS SHIPPED IN 2027–2056

TSL	SC–CO_2 case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	million 2021$			
1	105.2	464.5	731.9	1,409.9
2	194.3	856.8	1,349.7	2,601.2
3	488.9	2,160.9	3,405.9	6,558.5

As discussed in section IV.L.2 of this document, DOE estimated the climate benefits likely to result from the reduced emissions of methane and N_2O that DOE estimated for each of the considered TSLs for consumer conventional cooking products. Table V.48 presents the value of the CH_4 emissions reduction at each TSL, and Table V.49 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 TSD for this SNOPR.

TABLE V.48—PRESENT VALUE OF METHANE EMISSIONS REDUCTION FOR CONSUMER CONVENTIONAL COOKING PRODUCTS SHIPPED IN 2027–2056

TSL	SC–CH_4 case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	million 2021$			
1	49.8	152.5	214.2	403.4
2	101.1	309.0	433.8	817.4
3	197.1	606.1	851.8	1,603.2

TABLE V.49—PRESENT VALUE OF NITROUS OXIDE EMISSIONS REDUCTION FOR CONSUMER CONVENTIONAL COOKING PRODUCTS SHIPPED IN 2027–2056

TSL	SC–N_2O case			
	Discount rate and statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	million 2021$			
1	0.21	0.89	1.38	2.36
2	0.28	1.17	1.83	3.11
3	1.42	5.84	9.13	15.57

DOE is well aware that scientific and economic knowledge about the contribution of CO_2 and other GHG emissions to changes in the future global climate and the potential resulting damages to the global and U.S. economy continues to evolve rapidly. DOE, together with other Federal agencies, will continue to review methodologies for estimating the monetary value of reductions in CO_2 and other GHG emissions. This ongoing review will consider the comments on this subject that are part of the public record for this and other rulemakings, as well as other methodological assumptions and issues. DOE notes that the proposed standards would be economically justified even without inclusion of monetized benefits of reduced GHG emissions.

DOE also estimated the monetary value of the health benefits associated with NO_X and SO_2 emissions reductions anticipated to result from the considered TSLs for consumer conventional cooking products. The dollar-per-ton values that DOE used are discussed in section IV.L of this document. Table V.50 presents the present value for NO_X emissions reduction for each TSL calculated using 7-percent and 3-percent discount rates, and Table V.51 presents similar results for SO_2 emissions reductions. The results in these tables reflect application

of EPA's low dollar-per-ton values, which DOE used to be conservative. The time-series of annual values is presented for the proposed TSL in chapter 14 of the TSD for this SNOPR.

TABLE V.50—PRESENT VALUE OF NO_2 EMISSIONS REDUCTION FOR CONSUMER CONVENTIONAL COOKING PRODUCTS SHIPPED IN 2027–2056

TSL	3% Discount rate	7% Discount rate
	million 2021$	
1	793.7	297.5
2	1,521.9	572.9
3	3,482.5	1,299.7

TABLE V.51—PRESENT VALUE OF SO_2 EMISSIONS REDUCTION FOR CONSUMER CONVENTIONAL COOKING PRODUCTS SHIPPED IN 2027–2056

TSL	3% Discount rate	7% Discount rate
	million 2021$	
1	109.0	41.1
2	111.0	41.9
3	842.8	319.0

DOE has not considered the monetary benefits of the reduction of Hg for this proposed rule. DOE has also not quantitatively assessed the health benefits of reducing in-home exposure to particulate matter, nitrogen dioxide, and other hazardous air pollutants. Such in-home emissions may be associated with a variety of serious respiratory and cardiovascular conditions and other health risks. 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. For example, studies have indicated that gas ranges, particularly when used without venting systems, can expose household members to indoor air pollution at levels that exceed health-based guidelines.

DOE seeks comment on any impacts of its proposals in this SNOPR on indoor air pollutants released by gas cooking products, as well as any other design approaches, control strategies, or other measures to mitigate these emissions.

7. Other Factors

The Secretary of Energy, in determining whether a standard is economically justified, may consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6295(o)(2)(B)(i)(VII)) No other factors were considered in this analysis.

8. Summary of Economic Impacts

Table V.52 presents the NPV values that result from adding the estimates of the potential economic benefits resulting from reduced GHG, NO_X and SO_2 emissions to the NPV of consumer benefits calculated for each TSL considered in this rulemaking. The consumer benefits are domestic U.S. monetary savings that occur as a result of purchasing the covered products, and are measured for the lifetime of products shipped in 2027–2056. The climate benefits associated with reduced GHG emissions resulting from the adopted standards are global benefits and are also calculated based on the lifetime of consumer conventional cooking products shipped in 2027–2056.

TABLE V.52—CONSUMER NPV COMBINED WITH PRESENT VALUE OF CLIMATE BENEFITS AND HEALTH BENEFITS

Category	TSL 1	TSL 2	TSL 3 *
3% discount rate for Consumer NPV and Health Benefits (billion 2021$)			
5% Average SC–GHG case	2.02	3.64	(22.74)
3% Average SC–GHG case	2.49	4.51	(20.65)
2.5% Average SC–GHG case	2.81	5.13	(19.16)
3% 95th percentile SC–GHG case	3.68	6.77	(15.25)
7% discount rate for Consumer NPV and Health Benefits (billion 2021$)			
5% Average SC–GHG case	0.82	1.56	(13.37)
3% Average SC–GHG case	1.28	2.43	(11.29)
2.5% Average SC–GHG case	1.61	3.05	(9.79)
3% 95th percentile SC–GHG case	2.48	4.68	(5.88)

* Negative values denoted in parentheses.

C. Conclusion

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

For this SNOPR, DOE considered the impacts of new and amended standards for consumer conventional cooking products 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. DOE refers to this process at the ''walk-down'' analysis.

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 or informational asymmetries, (2) a lack of sufficient salience of the long-term or aggregate benefits, (3) a lack of sufficient personal financial 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, due to loss aversion, myopia, inattention, or other factors, (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, or between current and subsequent owners). 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 TSD for this SNOPR. 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.[116]

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.[117]

DOE welcomes data submissions and comments that will provide for a fuller assessment of 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 Consumer Conventional Cooking Products Standards

Table V.53 and Table V.54 summarize the quantitative impacts estimated for each TSL for consumer conventional cooking products. The national impacts are measured over the lifetime of consumer conventional cooking products purchased in the 30-year period that begins in the anticipated year of compliance with amended standards (2027–2056). The energy savings, emissions reductions, and value of emissions reductions refer to full-fuel-cycle results. DOE is presenting monetized benefits in accordance with the 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 Interim Estimates presented by the Interagency Working Group. The efficiency levels contained in each TSL are described in section V.A of this document.

TABLE V.53—SUMMARY OF ANALYTICAL RESULTS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS TSLS: NATIONAL IMPACTS

Category	TSL 1	TSL 2	TSL 3
Cumulative FFC National Energy Savings:			
Quads	0.28	0.46	1.47
CO_2 (*million metric tons*)	11.9	21.9	55.5

[116] 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*.

[117] Sanstad, A.H. *Notes on the Economics of Household Energy Consumption and Technology Choice*. 2010. Lawrence Berkeley National Laboratory. *www1.eere.energy.gov/buildings/appliance_standards/pdfs/consumer_ee_theory.pdf* (last accessed June 28, 2022).

TABLE V.53—SUMMARY OF ANALYTICAL RESULTS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS TSLS: NATIONAL IMPACTS—Continued

Category	TSL 1	TSL 2	TSL 3
CH_4 (*thousand tons*)	121.1	244.9	482.2
N_2O (*thousand tons*)	0.1	0.1	0.4
SO_2 (*thousand tons*)	2.2	2.2	16.7
NO_X (*thousand tons*)	25.9	51.8	105.0
Hg (*tons*)	0.01	0.01	0.11
Present Value of Monetized Benefits and Costs (*3% discount rate, billion 2021$*):			
Consumer Operating Cost Savings	1.53	2.28	8.02
Climate Benefits *	0.62	1.17	2.77
Health Benefits **	0.90	1.63	4.33
Total Benefits †	3.05	5.08	15.12
Consumer Incremental Product Costs ‡	0.56	0.56	35.77
Consumer Net Benefits ***	0.96	1.71	(27.75)
Total Net Benefits ***	2.49	4.51	(20.65)
Present Value of Monetized Benefits and Costs (*7% discount rate, billion 2021$*):			
Consumer Operating Cost Savings	0.63	0.95	3.17
Climate Benefits*	0.62	1.17	2.77
Health Benefits**	0.34	0.61	1.62
Total Benefits†	1.59	2.74	7.56
Consumer Incremental Product Costs ‡	0.31	0.31	18.85
Consumer Net Benefits***	0.33	0.65	(15.68)
Total Net Monetized Benefits***	1.28	2.43	(11.29)

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

* Climate benefits are calculated using four different estimates of the SC–CO_2, SC–CH_4 and SC–N_2O. 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. 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. As reflected in this rule, DOE has reverted 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 NO_X and SO_2) $PM_{2.5}$ precursor health benefits and (for NO_X) ozone precursor health benefits, but will continue to assess the ability to monetize other effects such as health benefits from reductions in direct $PM_{2.5}$ emissions. The health benefits are presented at real discount rates of 3 and 7 percent. See section IV.L of this document for more details.

*** Negative values denoted in parentheses.

† 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 sets of SC–GHG estimates.

‡ Costs include incremental equipment costs as well as installation costs.

TABLE V.54—SUMMARY OF ANALYTICAL RESULTS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS TSLS: MANUFACTURER AND CONSUMER IMPACTS

Category	TSL 1	TSL 2	TSL 3
Manufacturer Impacts:			
Industry NPV (*million 2021$*) (No-new-standards case INPV = 1,607)	1,502–1,506	1,452–1,456	238–422
Industry NPV (*% change*)	(6.5)–(6.3)	(9.6)–(9.4)	(85.2)–(73.8)
Consumer Average LCC Savings (*2021$*):			
Electric Open (Coil) Element Cooking Tops	$0.00	$0.00	$0.00
Electric Smooth Element Cooking Tops	$13.29	$13.29	($580.31)
Gas Cooking Tops	$3.88	$21.89	$21.89
Electric Standard Ovens, Freestanding	$0.99	$0.99	($29.92)
Electric Standard Ovens, Built-In/Slide-In	$0.95	$0.95	($33.05)
Electric Self-Clean Ovens, Freestanding	$1.02	$1.02	($15.31)
Electric Self-Clean Ovens, Built-In/Slide-In	$1.01	$1.01	($10.84)
Gas Standard Ovens, Freestanding	$0.65	$0.65	($7.56)
Gas Standard Ovens, Built-In/Slide-In	$0.59	$0.59	($13.37)
Gas Self-Clean Ovens, Freestanding	$0.70	$0.70	($0.86)
Gas Self-Clean Ovens, Built-In/Slide-In	$0.60	$0.60	($4.52)
Shipment-Weighted Average *	$3.19	$6.75	($87.60)
Consumer Simple PBP (*years*):			
Electric Open (Coil) Element Cooking Tops	n.a.	n.a.	n.a.
Electric Smooth Element Cooking Tops	0.6	0.6	87.5

TABLE V.54—SUMMARY OF ANALYTICAL RESULTS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS TSLs: MANUFACTURER AND CONSUMER IMPACTS—Continued

Category	TSL 1	TSL 2	TSL 3
Gas Cooking Tops	8.4	5.0	5.0
Electric Standard Ovens, Freestanding	1.7	1.7	17.0
Electric Standard Ovens, Built-In/Slide-In	1.8	1.8	17.2
Electric Self-Clean Ovens, Freestanding	1.7	1.7	17.0
Electric Self-Clean Ovens, Built-In/Slide-In	1.8	1.8	17.2
Gas Standard Ovens, Freestanding	1.9	1.9	14.1
Gas Standard Ovens, Built-In/Slide-In	2.0	2.0	14.4
Gas Self-Clean Ovens, Freestanding	1.9	1.9	14.1
Gas Self-Clean Ovens, Built-In/Slide-In	2.0	2.0	14.4
Shipment-Weighted Average *	2.7	2.0	22.4
Percent of Consumers that Experience a Net Cost:			
Electric Open (Coil) Element Cooking Tops	0%	0%	0%
Electric Smooth Element Cooking Tops	0%	0%	95%
Gas Cooking Tops	27%	18%	18%
Electric Standard Ovens, Freestanding	0%	0%	80%
Electric Standard Ovens, Built-In/Slide-In	0%	0%	81%
Electric Self-Clean Ovens, Freestanding	0%	0%	75%
Electric Self-Clean Ovens, Built-In/Slide-In	0%	0%	72%
Gas Standard Ovens, Freestanding	1%	1%	33%
Gas Standard Ovens, Built-In/Slide-In	1%	1%	56%
Gas Self-Clean Ovens, Freestanding	1%	1%	6%
Gas Self-Clean Ovens, Built-In/Slide-In	1%	1%	20%
Shipment-Weighted Average *	6%	4%	48%

Parentheses indicate negative (−) values. The entry "n.a." means not applicable the evaluated standard is the baseline.
* Weighted by shares of each product class in total projected shipments in 2027.

DOE first considered TSL 3, which represents the max-tech efficiency levels for all product classes except for electric open (coil) element cooking tops, for which the only considered efficiency level is the baseline. TSL 3 would save an estimated 1.47 quads of energy, an amount DOE considers significant. Under TSL 3, the NPV of consumer benefit would decrease compared to the no-new-standards case by $15.68 billion using a discount rate of 7 percent, and by $27.75 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 3 are 55.5 Mt of CO_2, 16.7 thousand tons of SO_2, 105.0 thousand tons of NO_X, 0.11 tons of Hg, 482.2 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 3 is $2.77 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 3 is $1.62 billion using a 7-percent discount rate and $4.33 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 3 is $11.29 billion less than the no-new-standards case. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 3 is $20.65 billion less than the no-new-standards case. 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 3, the average LCC impact is a savings of $22 for gas cooking tops and an average LCC loss of $580 for electric smooth element cooking tops, $30 for freestanding electric standard ovens, $33 for built-in/slide-in electric standard ovens, $15 for freestanding electric self-clean ovens, $11 for built-in/slide-in electric self-clean ovens, $8 for freestanding gas standard ovens, $13 for built-in/slide-in gas standard ovens, $1 for freestanding gas self-clean ovens, and $5 for built-in/slide-in gas self-clean ovens. The simple payback period is 87.5 years for electric smooth element cooking tops, 5.0 years for gas cooking tops, 17.0 years for freestanding electric ovens, 17.2 years for built-in/slide-in electric ovens, 14.1 years for freestanding gas ovens, and 14.4 years for built-in/slide-in gas ovens. The fraction of consumers experiencing a net LCC cost is 95 percent for electric smooth element cooking tops, 18 percent for gas cooking tops, 80 percent for freestanding electric standard ovens, 81 percent for built-in/slide-in electric standard ovens, 75 percent for freestanding electric self-clean ovens, 72 percent for built-in/slide-in electric self-clean ovens, 33 percent for freestanding gas standard ovens, 56 percent for built-in/slide-in gas standard ovens, 6 percent for freestanding gas self-clean ovens, and 20 percent for built-in/slide-in gas self-clean ovens. At TSL 3, the proposed standard for electric open (coil) element cooking tops is at the baseline resulting in no LCC impact, an undefined PBP, and no consumers experiencing a net LCC cost.

At TSL 3, the projected change in INPV ranges from a decrease of $1,368.6 million to a decrease of $1,185.1 million, which corresponds to decreases of 85.2 percent and 73.8 percent, respectively. DOE estimates that industry must invest $1,846.4 million to comply with standards set at TSL 3. DOE estimates that 100 percent of the electric open (coil) element cooking top shipments, 5 percent of the electric smooth element cooking top shipments, 4 percent of the gas cooking top shipments, zero percent of the electric standard oven (freestanding and built-in) shipments, zero percent of the electric self-clean oven (freestanding) shipments, 2 percent of the electric self-clean (built-in) shipments, 62 percent of gas standard oven (freestanding) shipments, 38 percent of the gas standard oven (built-in) shipments, 93 percent of the gas self-clean oven (freestanding) shipments, and 77 percent of the gas self-clean (built-in) shipments would already meet the efficiency levels required at TSL 3 in 2027.

The Secretary tentatively concludes that at TSL 3 for consumer conventional cooking products, the benefits of energy savings, emission reductions, and the estimated monetary value of the emissions reductions would be outweighed by the negative NPV of consumer benefits, the economic burden on many consumers (*e.g.,* negative LCC savings across all product classes except gas cooking tops), and the significant impacts on manufacturers, including the large conversion costs and the significant reduction in INPV. A significant fraction of electric smooth element cooking top, electric oven, and gas standard oven consumers would experience a net LCC cost and negative LCC savings. The consumer NPV is negative at both 3 and 7 percent. The potential reduction in INPV could be as high as 85.2 percent. Consequently, the Secretary has tentatively concluded that TSL 3 is not economically justified as a whole, and in particular for all product classes except for gas cooking tops. DOE notes that for gas cooking tops, the only product class with positive LCC savings, the same EL (2) is carried forward to TSL 2.

DOE then considered TSL 2, which represents the baseline efficiency for electric open (coil) element cooking tops, efficiency level 1 for electric smooth element cooking tops, electric ovens, and gas ovens, and efficiency level 2 for gas cooking tops. TSL 2 would save an estimated 0.46 quads of energy, an amount DOE considers significant. Under TSL 2, the NPV of consumer benefit would be $0.65 billion using a discount rate of 7 percent, and $1.71 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 2 are 21.9 Mt of CO_2, 2.2 thousand tons of SO_2, 51.8 thousand tons of NO_X, 0.01 tons of Hg, 244.9 thousand tons of CH_4, and 0.1 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 2 is $1.17 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 2 is $0.61 billion using a 7-percent discount rate and $1.63 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 2 is $2.43 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 2 is $4.51 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 2, the average LCC impact is a savings of $13 for electric smooth element cooking tops, $22 for gas cooking tops, $1 for electric ovens, and $1 for gas ovens. The simple payback period is 0.6 years for electric smooth element cooking tops, 5.0 years for gas cooking tops, 1.7 years for freestanding electric ovens, 1.8 years for built-in/slide-in electric ovens, 1.9 years for freestanding gas ovens, and 2.0 years for built-in/slide-in gas ovens. The fraction of consumers that experience a net LCC cost is 0 percent for electric smooth element cooking tops, 18 percent for gas cooking tops, 0 percent for electric ovens, and 1 percent for gas ovens. At TSL 2, the proposed standard for electric open (coil) element cooking tops is at the baseline resulting in no LCC impact, an undefined PBP, and no consumers experiencing a net LCC cost.

At TSL 2, the projected change in INPV ranges from a decrease of $154.8 million to a decrease of $150.4 million, which correspond to decreases of 9.6 percent and 9.4 percent, respectively. DOE estimates that industry must invest $183.4 million to comply with standards set at TSL 2. DOE estimates that 100 percent of the electric open (coil) element cooking top shipments, 80 percent of the electric smooth element cooking top shipments, 4 percent of the gas cooking top shipments, 95 percent of the electric oven shipments, and 96 percent of the gas oven shipments would already meet or exceed the efficiency levels required at TSL 2 in 2027.

After considering the analysis and weighing the benefits and burdens, the Secretary has tentatively concluded that at a standard set at TSL 2 for consumer conventional cooking products would be economically justified for all product classes. At this TSL, the average LCC savings for all conventional cooking product classes is positive. A shipment-weighted 4 percent of conventional cooking product consumers experience a net cost, with the highest in any single product class being 18 percent for gas cooking tops; the percent net cost for all other product classes is between 0 to 1 percent. The FFC national energy savings are significant and the NPV of consumer benefits is positive using both a 3-percent and 7-percent discount rate. Notably, the benefits to consumers vastly outweigh the cost to manufacturers. At TSL 2, the NPV of consumer benefits, even measured at the more conservative discount rate of 7 percent is over 4 times higher than the maximum estimated manufacturers' loss in INPV. The standard levels at TSL 2 are economically justified even without weighing the estimated monetary value of emissions reductions. When those emissions reductions are included—representing $1.17 billion in climate benefits (associated with the average SC–GHG at a 3-percent discount rate), and $1.63 billion (using a 3-percent discount rate) or $0.61 billion (using a 7-percent discount rate) in health benefits—the rationale becomes stronger still.

As stated, DOE conducts the walk-down analysis to determine the TSL that represents the maximum improvement in energy efficiency that is technologically feasible and economically justified as required under EPCA. The walk-down is not a comparative analysis, as a comparative analysis would result in the maximization of net benefits instead of energy savings that are technologically feasible and economically justified, which would be contrary to the statute. 86 FR 70892, 70908. Although DOE has not conducted a comparative analysis to select the proposed energy conservation standards, DOE notes that TSL 2 has a lower percentage of consumers experiencing a net cost and a shorter payback period relative to TSL 3.

Although DOE considered proposed amended standard levels for conventional cooking products by grouping the efficiency levels for each product class into TSLs, DOE evaluates all analyzed efficiency levels in its analysis. For electric open (coil) element cooking tops, TSL 2 represents the baseline efficiency level, the only level considered in this product class in this SNOPR. For electric smooth element cooking tops, TSL 2 represents EL 1 which incorporates low-standby-loss electronic controls. Setting a standard at EL 2 or EL 3 would result in a larger percentage of consumers experiencing a net LCC cost and longer payback periods relative to EL 1. For gas cooking tops, TSL 2 represents EL 2, the maximum measured efficiency for products with at least one HIR burner, which is determined to be technologically feasible and economically justified. For electric and gas ovens, TSL 2 corresponds to EL 1, which incorporates switch mode power supplies. A standard at EL 2 or EL 3 for electric ovens would result in a significantly higher percentage of consumers experiencing a net LCC cost and longer payback periods relative to EL 1. Similarly, for gas ovens, a

standard at EL 2 would result in a larger percentage of consumers experiencing a net LCC cost and longer payback periods relative to EL 1. The proposed standard levels at TSL 2 results in positive LCC savings for all product classes and a lower percentage of consumers experiencing a net cost to the point where DOE has tentatively concluded that they are economically justified, as discussed for TSL 2 in the preceding paragraphs.

Therefore, based on the above considerations, DOE proposes to adopt the energy conservation standards for consumer conventional cooking products at TSL 2. The proposed amended energy conservation standards for consumer conventional cooking products, are shown in Table V.55 and Table V.56.

TABLE V.55—PROPOSED PERFORMANCE ENERGY CONSERVATION STANDARDS FOR CONVENTIONAL COOKING TOPS

Product class	Maximum integrated annual energy consumption (IAEC)
Electric Open (Coil) Element Cooking Tops	199 *kWh/year.*
Electric Smooth Element Cooking Tops	207 *kWh/year.*
Gas Cooking Tops	1,204 *kBtu/year.*

TABLE V.56—PROPOSED PRESCRIPTIVE ENERGY CONSERVATION STANDARDS FOR CONVENTIONAL OVENS

Product class	Prescriptive standards
Electric Standard, Freestanding Electric Standard, Built-In/Slide-In Electric Self-Clean, Freestanding Electric Self-Clean, Built-In/Slide-In	Shall not be equipped with a control system that uses linear power supply.
Gas Standard, Freestanding Gas Standard, Built-In/Slide-In Gas Self-Clean, Freestanding Gas Self-Clean, Built-In/Slide-In	The control system for gas ovens shall: (1) Not be equipped with a constant burning pilot light; and (2) Not be equipped with a linear power supply.

2. Annualized Benefits and Costs of the Proposed Standards

The benefits and costs of the proposed standards can also be expressed in terms of annualized values. The annualized net benefit is (1) the annualized national economic value (expressed in 2021$) 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.57 shows the annualized values for consumer conventional cooking products under TSL 2, expressed in 2021$. The results under the primary estimate are as follows.

Using a 7-percent discount rate for consumer benefits and costs and NO_X and SO_2 reduction benefits, and a 3-percent discount rate case for GHG social costs, the estimated cost of the proposed standards for consumer conventional cooking products is $32.5 million per year in increased equipment costs, while the estimated annual benefits are $100.8 million from reduced equipment operating costs, $67.0 million from GHG reductions, and $64.9 million from reduced NO_X and SO_2 emissions. In this case, the net benefit amounts to $200.3 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards for consumer conventional cooking products is $32.2 million per year in increased equipment costs, while the estimated annual benefits are $130.7 million in reduced operating costs, $67.0 million from GHG reductions, and $93.8 million from reduced NO_X and SO_2 emissions. In this case, the net benefit amounts to $259.2 million per year.

TABLE V.57—TABLE V.57 ANNUALIZED MONETIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS (TSL 2)

	million 2021$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
3% discount rate			
Consumer Operating Cost Savings	130.7	124.7	137.9
Climate Benefits *	67.0	65.3	68.4
Health Benefits **	93.8	91.4	95.6
Total Monetized Benefits †	291.5	281.4	301.8
Consumer Incremental Product Costs ‡	32.2	36.1	31.4
Net Monetized Benefits	259.2	245.2	270.4

TABLE V.57—TABLE V.57 ANNUALIZED MONETIZED BENEFITS AND COSTS OF PROPOSED ENERGY CONSERVATION STANDARDS FOR CONSUMER CONVENTIONAL COOKING PRODUCTS (TSL 2)—Continued

	million 2021$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
7% discount rate			
Consumer Operating Cost Savings	100.8	96.5	105.8
Climate Benefits * (3% discount rate)	67.0	65.3	68.4
Health Benefits **	64.9	63.4	66.0
Total Monetized Benefits †	232.8	225.3	240.2
Consumer Incremental Product Costs ‡	32.5	35.8	31.8
Net Monetized Benefits	200.3	189.5	208.4

Note: This table presents the costs and benefits associated with consumer conventional cooking products shipped in 2027–2056. These results include benefits to consumers which accrue after 2056 from the products shipped in 2027–2056. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the *AEO2022* 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.3 of 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. As reflected in this rule, DOE has reverted 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) $PM_{2.5}$ 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.

‡ Costs include incremental equipment costs as well as installation costs.

D. Reporting, Certification, and Sampling Plan

Manufacturers, including importers, must use product-specific certification templates to certify compliance to DOE. For consumer conventional cooking products, the certification template reflects the general certification requirements specified at 10 CFR 429.12 and the product-specific requirements specified at 10 CFR 429.23.

In manufacturer interviews, multiple manufacturers expressed concern about the variability of cooking top test results and the potential impact on certifying compliance, but none provided information regarding how DOE should consider such variability in its analysis of potential energy conservation standards for cooking tops. DOE notes that as part of the August 2022 TP Final Rule, a sampling plan for cooking tops was established at 10 CFR 429.23, requiring that a sample of sufficient size be tested to ensure that any represented value of IAEC be greater than the mean of the sample or than the upper 97.5 percent confidence limit of the true mean divided by 1.05. DOE is not proposing to amend the product-specific certification requirements for these products in this SNOPR because it does not have information regarding whether the confidence limit should be adjusted.

DOE seeks comment and data to potentially re-evaluate the sampling plan for cooking tops in the context of any potential performance standards for these products.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866 and 13563

Executive Order (''E.O.'') 12866, ''Regulatory Planning and Review,'' as supplemented and reaffirmed by E.O. 13563, ''Improving Regulation and Regulatory Review,'' 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in OMB has emphasized that such techniques may include identifying changing future compliance costs that might result from

technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this proposed regulatory action is consistent with these principles.

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

B. Review Under the Regulatory Flexibility Act

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

For manufacturers of consumer conventional cooking products, the SBA has set a size threshold, which defines those entities classified as ''small businesses'' for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. (*See* 13 CFR part 121.) The size standards are listed by North American Industry Classification System (''NAICS'') code and industry description and are available at *www.sba.gov/document/support—table-size-standards.* Manufacturing of consumer conventional cooking products is classified under NAICS 335220, ''Major Household Appliance Manufacturing.'' The SBA sets a threshold of 1,500 employees or fewer for an entity to be considered as a small business for this category.

1. Description of Reasons Why Action Is Being Considered

EPCA prescribed energy conservation standards for consumer conventional cooking products (42 U.S.C. 6295(h)(1)), and directs DOE to conduct future rulemakings to determine whether to amend these standards. (42 U.S.C. 6295(h)(2)) EPCA further provides that, not later than 6 years after the issuance of any final rule establishing or amending a standard, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a NOPR including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6295(m)(1)) This rulemaking is in accordance with DOE's obligations under EPCA.

2. Objectives of, and Legal Basis for, Rule

NAECA, Public Law 100–12, amended EPCA to establish prescriptive standards for gas cooking products, requiring gas ranges and ovens with an electrical supply cord that are manufactured on or after January 1, 1990, not to be equipped with a constant burning pilot light. (42 U.S.C.6295(h)(1)) NAECA also directed DOE to conduct two cycles of rulemakings to determine if more stringent or additional standards were justified for kitchen ranges and ovens. (42 U.S.C. 6295(h)(2)) EPCA additionally requires that, not later than 6 years after the issuance of a final rule establishing or amending a standard, DOE publish a NOPR proposing new standards or a notification of determination that the existing standards do not need to be amended. (42 U.S.C. 6295(m)(1)) This rulemaking is also in accordance with the six-year review required under 42 U.S.C. 6295(m)(1).

3. Description of Estimated Number of Small Entities Regulated

DOE has recently conducted a focused inquiry into small business manufacturers of the products covered by this rulemaking. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. The size standards are listed by NAICS code as well as by industry description and are available at *www.sba.gov/document/support—table-size-standards.* Manufacturing cooking tops is classified under NAICS 335220, ''major household appliance manufacturing.'' The SBA sets a threshold of 1,500 employees or fewer for an entity to be considered as a small business for this category. DOE used available public information to identify potential small manufacturers. DOE accessed the Compliance Certification Database[118] (CCD), the Modernized Appliance Efficiency Database System[119] (MAEDbS), and the National Resources Canada database[120] (NRCan) to create a list of companies that import or otherwise manufacture the products covered by this SNOPR. Additionally, in response to the September 2016 SNOPR, Felix Storch provided a list of potential small businesses, not previously identified in the September 2016 SNOPR.[121] (Felix Storch, No. 62 at p. 2) Once DOE created a list of potential manufacturers, DOE used market research tools to determine whether any companies met SBA's definition of a small entity—based on the total number of employees for each company including parent, subsidiary, and sister entities—and gather annual revenue estimates.

Based on DOE's analysis, DOE identified 34 companies potentially manufacturing consumer conventional cooking products covered by this rulemaking. DOE screened out companies that have more than 1,500 total employees or are entirely foreign owned and operated, and therefore do not meet SBA's requirements to be considered a small entity. Of the 34 companies DOE identified as manufacturing consumer conventional cooking products sold in the United States, 15 were identified as potential small businesses.

[118] U.S. Department of Energy Compliance Certification Management System, available at: *www.regulations.doe.gov/ccms.*

[119] California Energy Commission's Modernized Appliance Efficiency Database System, available at: *cacertappliances.energy.ca.gov/Login.aspx.*

[120] Natural Resources Canada searchable product list, available at: *oee.nrcan.gc.ca/pml-lmp/.*

[121] Some of the companies Felix Storch identified, either had more than 1,500 employees, were completely foreign owned and operated, or did not sell any products covered by this rulemaking. Therefore, these companies do not meet SBA's definition of a small business and DOE did not include these companies in this IRFA. The remaining companies that do meet SBA's definition of a small business were included in this IRFA.

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

DOE is proposing TSL 2 in this SNOPR. For all oven product classes, TSL 2 requires that the ovens not be equipped with a linear power supply. Based on DOE's shipment analysis more than 95 percent of ovens use a switch mode power supply and therefore are not equipped with a linear power supply. Based on DOE's shipment analysis, DOE assumed most, if not all, small businesses already use switch mode power supplies for the ovens they manufacturer. If any small businesses do still use linear power supplies in their ovens, there would be minimal conversion costs to these small businesses, as switch mode power supplies can be purchased as a separate component and would most likely not require a significant redesign to incorporate these switch mode power supplies. The remainder of this cost analysis focuses on the costs associated with complying with the proposed cooking top energy conservation standards.

As stated in the previous section, DOE identified 15 potential small manufacturers of consumer conventional cooking products. All 15 of these small businesses manufacture cooking tops. These 15 small businesses can be grouped into two manufacturing groups: those that manufacture entry level cooking tops and those that manufacture premium cooking tops.

Gas cooking top entry level products typically have thinner non-continuous grates with only one burner above 14,000 BTUs (although some of these small businesses may offer a limited number of models with thicker continuous grates and more than one burner above 14,000 BTUs). Electric cooking top entry level products typically have electric coil element cooking tops (although a few small businesses may have up to 25 percent of their electric ranges or electric cooking tops using electric smooth element cooking tops). These entry level small businesses usually compete on price in the market.

Gas cooking top premium products typically have thicker continuous grates with multiple burners above 14,000 BTUs. Electric cooking top premium products use smooth element, typically with induction technology. Small businesses manufacturing premium products do not offer electric coil element cooking tops. Lastly, small businesses manufacturing premium products typically compete on the high quality and professional look and design of their products. These ranges or cooking tops are typically significantly more expensive than entry level products.

Based on data from each small business's websites, DOE estimated the number of basic models each small business offers.

TABLE VI.2—NUMBER OF UNIQUE BASIC MODELS FOR EACH SMALL BUSINESS

Manufacturer	Small business type	Number of cooking top basic models (by product class)		
		Gas	Smooth element	Open (coil) element
Small Business 1	Entry Level	4	4	
Small Business 2	Entry Level	14		13
Small Business 3	Entry Level	3	2	3
Small Business 4	Entry Level		30	
Small Business 5	Entry Level	24		13
Small Business 6	Entry Level	27	13	28
Small Business 7	Premium	14		
Small Business 8	Premium	42		
Small Business 9	Premium	16		
Small Business 10	Premium	24	5	
Small Business 11	Premium	12		
Small Business 12	Premium	11		
Small Business 13	Premium	13		
Small Business 14	Premium	14	1	
Small Business 15	Premium	20	7	

DOE estimated the small business conversion costs and testing costs using the same methodology used to estimate the industry conversion costs, described in section IV.J.2.c of this document. There are two types of conversion costs that small businesses could incur due to the proposed standards: product conversion costs (including any testing costs) and capital conversion costs. Felix Storch commented in response to the September 2016 SNOPR that small manufacturers often lack the staff with expertise to fully understand the test procedures, complexities and nuances of the regulations. (Felix Storch, No. 62 at p. 2) Additionally, Felix Storch commented that small manufacturers pay substantially more and have longer lead times for energy testing. (Felix Storch, No. 62 at p. 3) In the August 2022 TP Final Rule, DOE estimated a lower per unit testing costs for testing done in-house and a more costly third-party lab per unit testing cost. For this IRFA, DOE assumed all small businesses would incur the more costly third-party lab per unit testing cost, as most small businesses do not have in-house testing capabilities or capacity to test all their products in accordance with the DOE test procedure.

Product conversion costs are investments in R&D, testing, marketing, and other non-capitalized costs necessary to make product designs comply with new and 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. Manufacturers would have to incur testing costs for all cooking tops since DOE is proposing to establish a new energy conservation standard for cooking tops. Therefore, even products that meet the proposed energy conservation standard would incur testing costs to test these cooking tops to demonstrate compliance with the proposed energy conservation

standards. However, manufacturers would only incur R&D product conversion costs and capital conversion costs if they have products that do not meet the energy conservation standards.

Based on the estimated model counts for each cooking top product class shown in Table VI.2 and the conversion cost and testing cost methodology used to calculate industry conversion costs, DOE estimated the conversion costs and testing costs for each small business, displayed in Table VI.3. DOE then used D&B Hoovers [122] to estimate the annual revenue for each small business. Manufacturers will have 3 years between publication of a final rule and compliance with the energy conservation standards. Therefore, DOE presents the estimated conversion costs and testing costs as a percent of the estimated 3 years of annual revenue for each small business.

TABLE VI.3—ESTIMATED CONVERSION COSTS AND ANNUAL REVENUE FOR EACH SMALL BUSINESS

Manufacturer	Small business type	Total conversion and testing costs	Annual revenue	Conversion costs as a % of 3-years of annual revenue (%)
Small Business 1	Entry Level	$358,000	$950,000	13
Small Business 2	Entry Level	814,000	8,780,000	3
Small Business 3	Entry Level	945,400	58,630,000	1
Small Business 4	Entry Level	303,400	31,370,000	<1
Small Business 5	Entry Level	221,400	23,980,000	<1
Small Business 6	Entry Level	336,800	107,350,000	<1
Small Business 7	Premium	2,227,050	2,730,000	27
Small Business 8	Premium	4,021,200	5,000,000	27
Small Business 9	Premium	3,612,600	8,800,000	14
Small Business 10	Premium	2,784,800	7,990,000	12
Small Business 11	Premium	2,830,500	8,648,000	11
Small Business 12	Premium	2,338,600	10,970,000	7
Small Business 13	Premium	5,685,100	32,600,000	6
Small Business 14	Premium	2,450,150	19,800,000	4
Small Business 15	Premium	2,561,700	23,730,000	4
Average Small Business		2,099,380	23,421,867	3

Based on Table VI.3 there are two premium small businesses manufacturers that could be significantly impacted by this proposed rulemaking, if finalized as proposed.

DOE requests comment on its findings that there are 15 domestic small businesses that manufacture conventional cooking products and its estimate of the potential impacts on these small businesses. Additionally, DOE requests comment on the potential for any small businesses to exit the consumer conventional cooking products market in response to the proposed energy conservation standards.

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.

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 2. In reviewing alternatives to the proposed rule, DOE examined energy conservation standards set at lower efficiency levels. DOE estimates that manufacturers, including small businesses, would have to spend approximately 43 percent less conversion costs at TSL 1 compared to TSL 2. While TSL 1 would reduce the impacts on small business manufacturers, it would come at the expense of a reduction in energy savings and consumer savings. TSL 1 achieves 39 percent lower energy savings compared to the energy savings at TSL 2. Additionally, TSL 1 achieves 44 percent lower consumer NPV at 3 percent and 49 percent lower consumer NPV at 7 percent compared to the consumer NPV achieved at TSL 2.

Based on the presented discussion, establishing standards at TSL 2 balances the benefits of the energy savings at TSL 2 with the potential burdens placed on consumer conventional cooking product 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 TSD for this SNOPR.

DOE seeks comment on the policy alternatives presented in the regulatory impact analysis and data that can be used to estimate the manufacturer response to Federal credits.

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

C. Review Under the Paperwork Reduction Act

Under the procedures established by the Paperwork Reduction Act of 1995 (''PRA''), a person is not required to respond to a collection of information by a Federal agency unless that

[122] See: *app.avention.com.* Last accessed on August 22, 2022.

collection of information displays a currently valid OMB Control Number.

OMB Control Number 1910–1400, Compliance Statement Energy/Water Conservation Standards for Appliances, is currently valid and assigned to the certification reporting requirements applicable to covered equipment, including consumer conventional cooking products.

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 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 part 429, part 430, and/or part 431. Certification reports provide DOE and consumers with comprehensive, up-to date efficiency information and support effective enforcement.

Revised certification data would be required for gas cooking tops and conventional gas ovens were this SNOPR to be finalized as proposed. New certification data would be required for electric cooking tops and conventional electric ovens were this SNOPR to be finalized as proposed. However, DOE is not proposing new or amended certification or reporting requirements for consumer conventional cooking products in this SNOPR. Instead, DOE may consider proposals to establish certification requirements and reporting for consumer conventional cooking products 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 rulemaking qualifies for categorical exclusion B5.1 because it is a rulemaking that establishes energy conservation standards for consumer products or industrial equipment, none of the exceptions identified in categorical exclusion B5.1(b) apply, no extraordinary circumstances exist that require further environmental analysis, and it otherwise meets the requirements for application of a categorical exclusion. *See* 10 CFR 1021.410. DOE will complete its NEPA review before issuing the final rule.

E. Review Under Executive Order 13132

E.O. 13132, ''Federalism,'' 64 FR 43255 (Aug. 10, 1999), imposes certain requirements on Federal agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has tentatively determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) Therefore, no further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (''UMRA'') requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104–4, section 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b))

The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect them. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820. DOE's policy statement is also available at *www.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 consumer conventional cooking products 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 consumer conventional cooking products, 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 SNOPR 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(m), this proposed rule would establish new and amended energy conservation standards for consumer conventional cooking products that are designed to achieve the maximum improvement in energy efficiency that DOE has determined to be both technologically feasible and economically justified, as required by 42 U.S.C. 6295(o)(2)(A) and 42 U.S.C. 6295(o)(3)(B). A full discussion of the alternatives considered by DOE is presented in chapter 17 of the TSD for this proposed rule.

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

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This 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 SNOPR 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 new and amended energy conservation standards for consumer conventional cooking products, 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.[123] 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.[124]

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 at *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=34*. 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.

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

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

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the webinar/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 webinar.

A transcript of the webinar 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.

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.

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[123] 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 July 1, 2022).

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

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. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No telefacsimiles (''faxes'') will be accepted.

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

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

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

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

E. Issues on Which DOE Seeks Comment

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

(1) DOE requests comment on its proposed definition for portable conventional cooking top and DOE's proposal to include portable conventional cooking tops in the existing product classes. DOE also seeks data and information on its initial determination not to differentiate conventional cooking tops on the basis of portability when considering product classes for this SNOPR analysis.

(2) DOE seeks comment on the impacts of downdraft venting systems on energy consumption and associated data about such impacts. DOE further requests comment on its proposal to not include the energy consumption of any downdraft venting system in the energy conservation standards for conventional cooking tops.

(3) DOE requests comment on its proposed tested configuration and determination of representative IAEC for single-zone non-portable cooking tops.

(4) DOE requests comment on its proposal to not define ''basic model'' with respect to cooking products or cooking tops, and on possible definitions for ''basic model'' with respect to cooking products or cooking tops that could be used if DOE were to determine such a definition is necessary.

(5) DOE welcomes data on the consumer usage patterns of pyrolytic versus non-pyrolytic self-cleaning functions in conventional ovens, and requests comment on its preliminary determination that self-cleaning technologies do not warrant separate product class considerations.

(6) DOE seeks comment on the product classes evaluated in this SNOPR.

(7) DOE seeks comment on any existing technologies that improve the efficiency of electric open (coil) element cooking tops.

(8) DOE requests information on the potential energy savings associated with intermittent pilot ignition systems.

(9) DOE requests comment on the magnitude of potential energy savings that could result from the use of a reduced air gap as a technology option.

(10) DOE seeks comment on its screening analysis for conventional electric cooking tops and whether any additional technology options should be screened out on the basis of any of the screening criteria in this SNOPR.

(11) DOE seeks comment on its screening analysis for conventional gas cooking tops and whether any additional technology options should be screened out on the basis of any of the screening criteria in this SNOPR.

(12) DOE seeks comment on its screening analysis for conventional ovens and whether any additional technology options should be screened out on the basis of any of the screening criteria in this SNOPR.

(13) DOE seeks comment on the retained design options for consumer conventional cooking products.

(14) DOE seeks comment on the methodology and results for the proposed baseline efficiency levels for conventional cooking tops.

(15) DOE seeks comment on the methodology and results for the proposed incremental efficiency levels for electric cooking tops.

(16) DOE seeks comment on the methodology and results for the proposed incremental efficiency levels for gas cooking tops.

(17) DOE seeks comment on the definitions of the proposed efficiency level for conventional ovens.

(18) DOE seeks comment on the methodology and results for the estimated energy use of each proposed efficiency level for conventional ovens.

(19) DOE seeks comment on the manufacturer production costs for consumer conventional cooking products used in this analysis.

(20) DOE requests comment on data and information on how the pandemic has changed consumer cooking behavior and product usage.

(21) DOE seeks feedback and comment on its estimate for repair costs for consumer conventional cooking products.

(22) DOE requests comment and additional data on its estimates for the lifetime distribution.

(23) DOE requests comment and feedback on its efficiency assignment in the LCC analysis.

(24) DOE seeks comment and feedback on its estimate for the no-new-standards case efficiency distribution.

(25) DOE seeks comment on the distribution between electric and gas cooking products over the shipments analysis period and the potential for

fuel switching between electric and gas cooking products. Specifically, DOE requests data on existing policy incentives for consumers to switch fuels and data that indicates the number of consumers switching fuel types between electric and gas cooking products.

(26) DOE requests data on the market size and typical selling price of units sold through the second-hand market for cooking products.

(27) DOE welcomes input on the effect of new and amended standards on impacts across products within the same fuel class and equipment type.

(28) DOE seeks comment on the general approach to its shipments methodology.

(29) DOE seeks feedback on its assumption of no rebound effect associated with the use of more efficient conventional cooking products as a result of a standard.

(30) DOE requests comment on whether additional consumer subgroups, including any disaggregation of the subgroups analyzed in this SNOPR, may be disproportionately affected by a new or amended national standard and warrant additional analysis in the final rule.

(31) DOE requests comment on the use of 9.1 percent as an appropriate real discount rate for consumer conventional cooking product manufacturers.

(32) DOE seeks comment on any health impacts to consumers, environmental impacts, or general public health and welfare impacts (including the distribution of such impacts across sensitive populations) of its proposals in this SNOPR on on-site emissions from gas cooking products of methane, carbon dioxide, particulate matter, nitrogen dioxide, or other hazardous air emissions. DOE also seeks comment on whether manufacturers are instituting design approaches, control strategies, or other measures to mitigate methane or other emissions from incomplete combustion and leakage.

(33) DOE requests comment on the estimated potential domestic employment impacts on consumer conventional cooking product manufacturers presented in this SNOPR.

(34) DOE requests comment on the potential manufacturing capacity constraints placed on consumer conventional cooking product manufacturers at the TSLs presented in this SNOPR.

(35) DOE requests comment on the potential impacts on commercial-style manufacturers at the TSLs presented in this SNOPR.

(36) DOE requests information regarding the impact of cumulative regulatory burden on manufacturers of consumer conventional cooking products associated with multiple DOE standards or product-specific regulatory actions of other Federal agencies.

(37) 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.

(38) DOE seeks comment on any impacts of its proposals in this SNOPR on indoor air pollutants released by gas cooking products, as well as any other design approaches, control strategies, or other measures to mitigate these emissions.

(39) DOE welcomes data submissions and comments that will provide for a fuller assessment of the potential impact of energy conservation standards on consumer choice and how to quantify this impact in its regulatory analysis in future rulemakings.

(40) DOE seeks comment and data to potentially re-evaluate the sampling plan for cooking tops in the context of any potential performance standards for these products.

(41) DOE requests comment on its findings that there are 15 domestic small businesses that manufacture conventional cooking products and its estimate of the potential impacts on these small businesses. Additionally, DOE requests comment on the potential for any small businesses to exit the consumer conventional cooking products market in response to the proposed energy conservation standards.

(42) DOE seeks comment on the policy alternatives presented in the regulatory impact analysis and data that can be used to estimate the manufacturer response to Federal credits.

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

VIII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this supplemental 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, Imports, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

10 CFR Part 430

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

Signing Authority

This document of the Department of Energy was signed on December 23, 2022, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on January 10, 2023.

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 430 of chapter II, subchapter D, of 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 § 429.23 by revising paragraph (a) to read as follows:

§ 429.23 Cooking products.

(a) Determination of represented values. Manufacturers must determine the represented values, which include the certified ratings, for each basic model of cooking product by testing, in conjunction with the applicable sampling provisions.

(1) *Sampling plan for selection of units for testing.* (i) The requirements of

§ 429.11 are applicable to cooking products; and

(ii) For each basic model of cooking product, a sample of sufficient size shall be randomly selected and tested to ensure that any represented value of estimated annual operating cost, standby mode power consumption, off mode power consumption, annual energy consumption, integrated annual energy consumption, or other measure of energy consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) The mean of the sample, where:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

and $\bar{x}$ is the sample mean; n is the number of samples; and x_i is the i^{th} sample; Or,

(B) The upper 97½ percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{.975}\left(\frac{s}{\sqrt{n}}\right)$$

And $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.975}$ is the t statistic for a 97.5% one-tailed confidence interval with n − 1 degrees of freedom (from appendix A).

(2) *Product-specific provisions for determination of represented values.* (i) *Non-portable conventional cooking tops with a single cooking zone.*

(A) Representations for a basic model must be based on the tested configuration. For the purpose of this paragraph (a)(2)(i), the ''tested configuration'' means:

(*1*) The non-portable conventional cooking top unit containing the single cooking zone, and

(*2*) If commercially available from the same manufacturer, the non-portable conventional cooking top unit that has similar design characteristics (*e.g.,* construction materials, user interface) as the non-portable conventional cooking top containing the single cooking zone, but that contains two cooking zones that are within the same product class and use the same heating technology (*i.e.,* gas flame, electric resistive heating, or electric inductive heating) and energy source (*e.g.,* voltage, gas type) as the non-portable conventional cooking top containing the single cooking zone. If more than one such comparable unit with two cooking zones is commercially available from the same manufacturer, the least energy consumptive of those units with two cooking zones shall be included in the tested configuration. If no such comparable unit with two cooking zones is commercially available from the same manufacturer, the tested configuration shall be only the non-portable conventional cooking top unit containing the single cooking zone.

(B) *Determination of the represented value of integrated annual energy consumption (IAEC) of the tested configuration of a non-portable conventional cooking top with a single cooking zone.*

(*1*) If the tested configuration includes a comparable non-portable conventional cooking top unit containing two cooking zones, the represented value of IAEC is calculated as follows:

$$IAEC = \tfrac{1}{3} \times IAEC_{single} \times \tfrac{2}{3} \times IAEC_{double}$$

Where:

$IAEC_{single}$ is the IAEC for the non-portable conventional cooking top unit containing the single cooking zone included in the tested configuration as determined in § 430.23(i)(2) of this chapter; and

$IAEC_{double}$ is the IAEC for the comparable non-portable conventional cooking top unit containing two cooking zones included in the tested configuration as determined in § 430.23(i)(2) of this chapter.

(*2*) If the tested configuration includes only the non-portable conventional cooking top unit containing the single cooking zone, the represented value of IAEC is equal to that cooking top's IAEC as determined in § 430.23(i)(2) of this chapter.

* * * * *

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

■ 4. Amend § 430.2 by adding in alphabetical order, the definition of ''Portable conventional cooking top'' to read as follows:

§ 430.2 Definitions.

* * * * *

Portable conventional cooking top means a conventional cooking top designed to be moved place to place.

* * * * *

■ 5. Amend § 430.32 by revising paragraph (j) to read as follows:

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

* * * * *

(j) *Cooking Products.* (1) The control system of a conventional oven shall:

(i) Not be equipped with a constant burning pilot light for gas ovens manufactured on or after April 9, 2012; and

(ii) Not be equipped with a linear power supply for electric and gas ovens manufactured on or after [DATE 3 YEARS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE **FEDERAL REGISTER**].

(2) Conventional cooking tops manufactured on or after [DATE 3 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE IN THE **FEDERAL REGISTER**] shall have an integrated annual energy consumption, excluding any downdraft venting system energy consumption, no greater than:

Product class	Maximum integrated annual energy consumption (IAEC) (kWh/year)
(i) Electric Cooking Tops—Open (Coil) Elements	199
(ii) Electric Cooking Tops—Smooth Elements	207
(iii) Gas Cooking Tops	1,204

* * * * *

[FR Doc. 2023–00610 Filed 1–31–23; 8:45 am]

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