DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE–2014–BT–STD–0005]

RIN 1904–AF57

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

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

ACTION: Direct final rule.

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. In this direct final rule, the U.S. Department of Energy (''DOE'') is adopting new and amended energy conservation standards for consumer conventional cooking products. DOE has determined that the new and amended energy conservation standards for these products would result in significant conservation of energy, and are technologically feasible and economically justified.

DATES: The effective date of this rule is June 13, 2024. If adverse comments are received by June 3, 2024 and DOE determines that such comments may provide a reasonable basis for withdrawal of the direct final rule under 42 U.S.C. 6295(o), a timely withdrawal of this rule will be published in the **Federal Register**. If no such adverse comments are received, compliance with the new and amended standards established for consumer conventional cooking products in this direct final rule is required on and after January 31, 2028. Comments regarding the likely competitive impact of the standards contained in this direct final rule should be sent to the Department of Justice contact listed in the **ADDRESSES** section on or before March 15, 2024.

ADDRESSES: The docket for this rulemaking, which includes **Federal Register** notices, public meeting attendee lists and transcripts, 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.

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

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 standards contained in this direct final rule. Interested persons may contact the Antitrust Division at *www.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 direct final rule.

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: (240) 751–5157. Email: *Melanie.Lampton@hq.doe.gov*.

SUPPLEMENTARY INFORMATION:

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I. Synopsis of the Direct Final 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 direct final rule. (42 U.S.C. 6292(a)(10))

Pursuant to EPCA, any new or amended energy conservation standard must, among other things, 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 significant conservation of energy. (42 U.S.C. 6295(o)(3)(B))

In light of the above and under the authority provided by 42 U.S.C. 6295(p)(4), DOE is issuing this direct final rule establishing and amending energy conservation standards for consumer conventional cooking products.

The adopted standard levels in this direct final rule were proposed in a letter submitted to DOE jointly by groups representing manufacturers, energy and environmental advocates, consumer groups, and a utility. This letter, titled ''Energy Efficiency Agreement of 2023'' (hereafter, the ''Joint Agreement'' [3]), recommends specific energy conservation standards for consumer conventional cooking products that, in the commenters' view, would satisfy the EPCA requirements in 42 U.S.C. 6295(o). DOE subsequently received letters of support from States including New York, California, and Massachusetts [4] and utilities including San Diego Gas and Electric (''SDG&E'') and Southern California Edison (''SCE'') [5] advocating for the adoption of the recommended standards.

In accordance with the direct final rule provisions at 42 U.S.C. 6295(p)(4), DOE has determined that the recommendations contained in the Joint Agreement are compliant with 42 U.S.C. 6295(o). As required by 42 U.S.C. 6295(p)(4)(A)(i), DOE is also simultaneously publishing a notice of proposed rulemaking (''NOPR'') that contains identical standards to those adopted in this direct final rule. Consistent with the statute, DOE is providing a 110-day public comment period on the direct final rule. (42 U.S.C. 6295(p)(4)(B)) If DOE determines that any comments received provide a reasonable basis for withdrawal of the direct final rule under 42 U.S.C. 6295(o) or any other applicable law, DOE will publish the reasons for withdrawal and continue the rulemaking under the NOPR. (42 U.S.C. 6295(p)(4)(C)) *See* section II.A of this document for more details on DOE's statutory authority.

The new and amended standards that DOE is adopting in this direct final rule are the efficiency levels recommended in the Joint Agreement (shown in Table I.1 and Table I.2). They are performance-based standards for conventional cooking tops and prescriptive standards for conventional ovens. The standards for conventional cooking tops are expressed in terms of integrated annual energy consumption (''IAEC''), measured in thousand British thermal units per year (''kBtu/year'') for gas cooking tops and in kilowatt-hours per year (''kWh/year'') for electric cooking tops, as measured according to DOE's current conventional cooking top test procedure codified at title 10 of the Code of Federal Regulations (''CFR'') part 430, subpart B, appendix I1 (''appendix I1'').

The Joint Agreement replaces the existing prescriptive standard for gas cooking tops—which prohibits a constant burning pilot light—with a performance standard that is expressed as the maximum IAEC as determined in accordance with the appendix I1 test procedure. The Joint Agreement excludes portable indoor conventional cooking tops (discussed in section III.A of this document) from these amended standards, and DOE is clarifying in this direct final rule that the existing prohibition on constant burning pilot lights for gas portable indoor conventional cooking tops will continue to be applicable. For electric cooking tops, the Joint Agreement recommends

[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.

[3] This document is available in the docket at: *www.regulations.gov/comment/EERE-2014-BT-STD-0005-12811*.

[4] This document is available in the docket at: *www.regulations.gov/comment/EERE-2014-BT-STD-0005-12812*.

[5] This document is available in the docket at: *www.regulations.gov/comment/EERE-2014-BT-STD-0005-12813*.

a performance standard that similarly is expressed as the maximum IAEC, determined in accordance with the appendix I1 test procedure. For both gas and electric cooking tops, the IAEC metric includes active mode, standby mode, and off mode energy use. The Joint Agreement's standards for conventional cooking tops apply to all products listed in Table I.1 and manufactured in, or imported into, the United States starting on January 31, 2028.

Table I.1 Energy Conservation Performance Standards for Conventional Cooking Tops (Compliance Starting January 31, 2028)

Product Class	Maximum integrated annual energy consumption (IAEC)
Electric Open (Coil) Element Cooking Tops	No standard
Electric Smooth Element Standalone Cooking Tops	207 *kWh/year*
Electric Smooth Element Cooking Top Component of Combined Cooking Products	207 *kWh/year*
Gas Standalone Cooking Tops	1,770 *kBtu/year*
Gas Cooking Top Component of Combined Cooking Products	1,770 *kBtu/year*

DOE notes that none of the Department's energy conservation standards limit a consumer's use of a covered product, including consumer conventional cooking products. For example, the Joint Agreement's performance standards for conventional cooking tops, which are expressed as the maximum IAEC in kWh/year for electric cooking tops and kBtu/year for gas cooking tops, do not limit consumers' use of a conventional cooking top within the home. Rather, the IAEC metric is a measure of the estimated energy usage for a given cooking top model for a representative period of use (in this case, 1 year), as determined according to the DOE test procedure. Expressing energy conservation standards for conventional cooking tops in terms of the IAEC metric provides a common point of comparison across all conventional cooking top models, *e.g.,* a conventional cooking top with a lower IAEC is more energy efficient. And establishing a maximum IAEC ensures that all conventional cooking tops meet at least a certain level of energy efficiency, while not limiting a consumer's use of their conventional cooking top.

This direct final rule also establishes a prescriptive design requirement for conventional ovens that prohibits conventional ovens from being equipped with a control system that uses a linear power supply. (*See* Table I.2.) The new and amended standards recommended in the Joint Agreement are represented as trial standard level (''TSL'') 1 in this document and are described in section V.A of this document. These standards apply to all conventional ovens manufactured in, or imported into, the United States starting on January 31, 2028, as recommended by the Joint Agreement. DOE also notes that the current prescriptive standards for gas ovens prohibiting constant burning pilot lights will continue to be applicable. (10 CFR 430.32(j)) Table I.2 provides a summary of the standards for conventional ovens.

Table I.2 Prescriptive Energy Conservation Standards for Conventional Ovens (Compliance Starting January 31, 2028)

Product Class	New and Amended Standards
Electric Ovens	Shall not be equipped with a control system that uses linear power supply.*
Gas Ovens	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 document.

A. Benefits and Costs to Consumers

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

[6] 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).

Table I.3 Impacts of Adopted Energy Conservation Standards on Consumers of Conventional Cooking Products

Product Class	Average LCC Savings *2022$*	Simple Payback Period *years*
Electric Smooth Element Standalone Cooking Top	$62.80	0.6
Electric Smooth Element Cooking Top Component of a Combined Cooking Product	$62.80	0.6
Gas Standalone Cooking Top	$3.09	6.6
Gas Cooking Top Component of a Combined Cooking Product	$3.09	6.6
Electric Oven	$16.23	2.1
Gas Oven	$15.17	1.9

DOE's analysis of the impacts of the adopted 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 (2024) through the end of the analysis period, which is 30 years from the analyzed compliance date.[7] 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 $1,601 million.[8] Under the adopted standards, which align with the Recommended TSL for consumer conventional cooking products, DOE estimates the change in INPV to range from −9.0 percent to −9.0 percent, which is approximately a change in INPV of −$144 million to −$143 million, respectively. In order to bring products into compliance with new and amended standards, it is estimated that industry will incur total conversion costs of $66.7 million.

DOE's analysis of the impacts of the adopted standards on manufacturers is described in section IV.J and section V.B.2 of this document.

C. National Benefits and Costs[9]

DOE's analyses indicate that the adopted 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 (2028–2057), amount to 0.22 quadrillion British thermal units (''Btu''), or quads.[10] This represents a savings of approximately 2 percent relative to the energy use of these products in the case without new or amended standards (referred to as the ''no-new-standards case'').

The cumulative net present value (''NPV'') of total consumer benefits of the standards for consumer conventional cooking products ranges from $0.65 billion (at a 7-percent discount rate) to $1.56 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 2028–2057.

In addition, the adopted standards for consumer conventional cooking products are projected to yield significant environmental benefits. DOE estimates that the standards will result in cumulative emission reductions (over the same period as for energy savings) of 3.99 million metric tons (''Mt'')[11] of carbon dioxide (''CO_2''), 1.15 thousand tons of sulfur dioxide (''SO_2''), 7.61 thousand tons of nitrogen oxides (''NO_X''), 34.70 thousand tons of methane (''CH_4''), 0.04 thousand tons of nitrous oxide (''N_2O''), and 0.01 tons of mercury (''Hg'').[12] The estimated cumulative reduction in CO_2 emissions through 2030 amounts to 0.06 Mt, which is equivalent to the emissions resulting from the annual electricity use of more than 11 thousand homes.

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''). DOE used interim SC-GHG values (in terms of benefit per ton of GHG avoided) developed by an Interagency Working Group on the Social Cost of Greenhouse Gases (''IWG'').[13] 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 $0.22 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 sets of SC-GHG estimates.

DOE estimated the monetary health benefits of SO_2 and NO_X emissions reductions, using benefit per ton estimates from Environmental

[7] DOE's analysis period extends 30 years from the compliance year. The analysis period ranges from 2024–2056 for the no-new-standards case and all TSLs, except for TSL 1 (the Recommended TSL). The analysis period for the Recommended TSL ranges from 2024–2057 due to the 2028 compliance year.

[8] The no-new-standards case INPV of $1,601 million reflects the sum of discounted free cash flows from 2024–2056 (from the reference year to 30 years after the 2027 compliance date) plus a discounted terminal value.

[9] All monetary values in this document are expressed in 2022 dollars. and, where appropriate, are discounted to 2024 unless explicitly stated otherwise.

[10] 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.

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

[12] DOE calculated emissions reductions relative to the no-new-standards-case, which reflects key assumptions in the *Annual Energy Outlook 2023 (''AEO2023''). AEO2023* reflects, to the extent possible, laws and regulations adopted through mid-November 2022, including the Inflation Reduction Act. See section IV.K of this document for further discussion of *AEO2023* assumptions that effect air pollutant emissions.

[13] To monetize the benefits of reducing GHG emissions this analysis uses values that are based on 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. (''Feb. 2021 SC–GHG TSD''*). www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.*

Protection Agency,[14] as discussed in section IV.L of this document. DOE did not monetize the reduction in mercury emissions because the quantity is very small. DOE estimated the present value of the health benefits would be $0.16 billion using a 7-percent discount rate, and $0.42 billion using a 3-percent discount rate.[15] DOE is currently only monetizing health benefits from changes in ambient fine particulate matter ($PM_{2.5}$) concentrations from two precursors (SO_2 and NO_X), and from changes in ambient ozone from one precursor (for NO_X), but will continue to assess the ability to monetize other effects such as health benefits from reductions in direct $PM_{2.5}$ emissions.

Table I.4 summarizes the monetized benefits and costs expected to result from the new and amended 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 and other emissions, unquantified energy security benefits, and distributional effects, among others.

Table I.4 Summary of Monetized Benefits and Costs of Adopted Energy Conservation Standards for Consumer Conventional Cooking Products

	Billion 2022$
3% discount rate	
Consumer Operating Cost Savings	1.63
Climate Benefits*	0.22
Health Benefits**	0.42
Total Benefits†	2.27
Consumer Incremental Product Costs‡	0.07
Net Monetized Benefits	2.20
Change in Producer Cash Flow (INPV‡‡)	(0.14)
7% discount rate	
Consumer Operating Cost Savings	0.69
Climate Benefits* (3% discount rate)	0.22
Health Benefits**	0.16
Total Benefits†	1.07
Consumer Incremental Product Costs‡	0.04
Net Monetized Benefits	1.03
Change in Producer Cash Flow (INPV‡‡)	(0.14)

Note: This table presents the costs and benefits associated with consumer conventional cooking products shipped in 2028−2057. These results include consumer, climate, and health benefits that accrue after 2058 from the products shipped in 2028−2057.

* 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; however, DOE emphasizes the importance and value of considering the benefits calculated using all four sets of SC-GHG estimates. To monetize the benefits of reducing GHG emissions this analysis

[14] U.S. EPA. Estimating the Benefit per Ton of Reducing Directly-Emitted $PM_{2.5}$, $PM_{2.5}$ Precursors and Ozone Precursors from 21 Sectors. Available at *www.epa.gov/benmap/estimating-benefit-ton-reducing-pm25-precursors-21-sectors.*

[15] 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.

uses the interim 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.

** 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 sets of SC-GHG estimates.

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

‡‡ Operating Cost Savings are calculated based on the life-cycle costs analysis and national impact analysis as discussed in detail below. *See* sections IV.F and IV.H of this document. DOE's national impacts analysis includes all impacts (both costs and benefits) along the distribution chain beginning with the increased costs to the manufacturer to manufacture the product and ending with the increase in price experienced by the consumer. DOE also separately conducts a detailed analysis on the impacts on manufacturers (*i.e.*, manufacturer impact analysis, or "MIA"). *See* section IV.J of this document. In the detailed MIA, DOE models manufacturers' pricing decisions based on assumptions regarding investments, conversion costs, cash flow, and margins. The MIA produces a range of impacts, which is the rule's expected impact on the INPV. The change in INPV is the present value of all changes in industry cash flow, including changes in production costs, capital expenditures, and manufacturer profit margins. Change in INPV is calculated using the industry weighted average cost of capital value of 9.1 percent that is estimated in the MIA (*see* chapter 12 of the direct final rule technical support document ("TSD") for a complete description of the industry weighted average cost of capital). For consumer conventional cooking products, the change in INPV ranges from -$144 million to -$143 million. DOE accounts for that range of likely impacts in analyzing whether a TSL is economically justified. *See* section V.C of this document. DOE is presenting the range of impacts to the INPV under two markup scenarios: the Preservation of Gross Margin scenario, which is the manufacturer markup scenario used in the calculation of Consumer Operating Cost Savings in this table, and the Preservation of Operating Profit scenario, where DOE assumed manufacturers would not be able to increase per-unit operating profit in proportion to increases in manufacturer production costs. DOE includes the range of estimated change in INPV in the previously table, drawing on the MIA explained further in section IV.J of this document to provide additional context for assessing the estimated impacts of this direct final rule to society, including potential changes in production and consumption, which is consistent with Office of Management and Budget ("OMB") Circular A-4 and Executive Order ("E.O.") 12866. If DOE were to include the INPV into the net benefit calculation for this direct final rule, the net benefits would be $2.06 billion at 3-percent discount rate and would be $0.89 billion at 7-percent discount rate. Parentheses () indicate negative values.

The benefits and costs of the adopted 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.[16]

The national operating cost 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 2028–2057. The benefits associated with reduced emissions achieved as a result of the adopted standards are also calculated based on the lifetime of consumer conventional cooking products shipped in 2028–2057. 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 total benefits are presented for all four SC-GHG discount rates in section V.B.6 of this document.

Table I.5 presents the total estimated monetized benefits and costs associated with the adopted standards, 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 adopted in this rule is $3.9 million per year in increased equipment costs, while the estimated annual benefits are $68.1 million in reduced equipment operating costs, $12.4 million in climate benefits, and $16.1 million in health benefits. In this case, the net benefit would amount to $92.6 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the standards is $4.0 million per year in increased equipment costs, while the estimated annual benefits are $90.8 million in reduced operating costs, $12.4 million in climate benefits, and $23.5 million in health benefits. In this case, the net benefit would amount to $122.7 million per year.

[16] To convert the time-series of costs and benefits into annualized values, DOE calculated a present value in 2024, 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.,* 2020 or 2030), and then discounted the present value from each year to 2024. 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 Adopted Standards for Consumer Conventional Cooking Products

	Million 2022$/year		
	Primary Estimate	Low-Net-Benefits Estimate	High-Net-Benefits Estimate
3% discount rate			
Consumer Operating Cost Savings	90.8	84.0	95.6
Climate Benefits*	12.4	11.9	12.5
Health Benefits**	23.5	22.6	23.8
Total Benefits†	126.7	118.4	131.9
Consumer Incremental Product Costs‡	4.0	4.1	3.8
Net Benefits	122.7	114.3	128.1
Change in Producer Cash Flow (INPV‡‡)	(13.8)	(13.8)	(13.8)
7% discount rate			
Consumer Operating Cost Savings	68.1	63.3	71.5
Climate Benefits* (3% discount rate)	12.4	11.9	12.5
Health Benefits**	16.1	15.5	16.3
Total Benefits†	96.6	90.7	100.3
Consumer Incremental Product Costs‡	3.9	4.0	3.8
Net Benefits	92.6	86.7	96.5
Change in Producer Cash Flow (INPV‡‡)	(13.8)	(13.8)	(13.8)

Note: This table presents the costs and benefits associated with consumer conventional cooking products shipped in 2028−2057. These results include consumer, climate, and health benefits that accrue after 2057 from the products shipped in 2028−2057. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the *AEO2023* 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.2 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 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 sets of SC-GHG estimates. To monetize the benefits of reducing GHG emissions, this analysis uses the interim 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.

** 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 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.

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

‡‡ Operating Cost Savings are calculated based on the life-cycle costs analysis and national impact analysis as discussed in detail below. *See* sections IV.F and IV.H of this document. DOE's national impacts analysis includes all impacts (both costs and benefits) along the distribution chain beginning with the increased costs to the manufacturer to manufacture the product and ending with the increase in price experienced by the consumer. DOE also separately conducts a detailed analysis on the impacts on manufacturers (the MIA). *See* section IV.J of this document. In the detailed MIA, DOE models manufacturers' pricing decisions based on assumptions regarding investments, conversion costs, cash flow, and margins. The MIA produces a range of impacts, which is the rule's expected impact on the INPV. The change in INPV is the present value of all changes in industry cash flow, including changes in production costs, capital expenditures, and manufacturer profit margins. The annualized change in INPV is calculated using the industry weighted average cost of capital value of 9.1 percent that is estimated in the MIA (*see* chapter 12 of the direct final rule TSD for a complete description of the industry weighted average cost of capital). For consumer conventional cooking products, the annualized change in INPV is -$13.8 million. DOE accounts for that range of likely impacts in analyzing whether a TSL is economically justified. *See* section V.C of this document. DOE is presenting the range of impacts to the INPV under two markup scenarios: the Preservation of Gross Margin scenario, which is the manufacturer markup scenario used in the calculation of Consumer Operating Cost Savings in this table, and the Preservation of Operating

Profit scenario, where DOE assumed manufacturers would not be able to increase per-unit operating profit in proportion to increases in manufacturer production costs. DOE includes the range of estimated annualized change in INPV in the above table, drawing on the MIA explained further in section IV.J of this document to provide additional context for assessing the estimated impacts of this direct final rule to society, including potential changes in production and consumption, which is consistent with OMB's Circular A-4 and E.O. 12866. If DOE were to include the INPV into the annualized net benefit calculation for this direct final rule, the annualized net benefits would be $108.9 million at 3-percent discount rate and would be $78.8 million at 7-percent discount rate. Parentheses () indicate negative values.

DOE's analysis of the national impacts of the adopted standards is described in sections IV.H, IV.K, and IV.L of this document.

D. Conclusion

DOE has determined that the Joint Agreement was submitted jointly by interested persons that are fairly representative of relevant points of view, in accordance with 42 U.S.C. 6295(p)(4)(A). After considering the recommended standards and weighing the benefits and burdens, DOE has determined that the recommended standards are in accordance with 42 U.S.C. 6295(o), which contains the criteria for prescribing new or amended standards. Specifically, the Secretary of Energy (''Secretary'') has determined that the adoption of the recommended standards would result in the significant conservation of energy and is the maximum improvement in energy efficiency that is technologically feasible and economically justified. In determining whether the recommended standards are economically justified, the Secretary has determined that the benefits of the recommended standards exceed the burdens. The Secretary has further concluded that the recommended standards, when considering the benefits of energy savings, positive NPV of consumer benefits, emission reductions, the estimated monetary value of the emissions reductions, and positive average LCC savings, would yield benefits that outweigh the negative impacts on some consumers and on manufacturers, including the conversion costs that could result in a reduction in INPV for manufacturers.

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 standards for consumer conventional cooking products is $3.9 million per year in increased product costs, while the estimated annual benefits are $68.1 million in reduced product operating costs, $12.4 million in climate benefits, and $16.1 million in health benefits. The net benefit amounts to $92.6 million per year. DOE notes that the net benefits are substantial even in the absence of the climate benefits,[17] and DOE would adopt the same standards in the absence of such benefits.

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.[18] 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.

As previously mentioned, the standards are projected to result in estimated national energy savings of 0.22 quads FFC, the equivalent of the primary annual energy use of 1.4 million homes. In addition, they are projected to reduce cumulative CO_2 emissions by 3.99 Mt. Based on these findings, DOE has determined the energy savings from the standard levels adopted in this direct final rule are ''significant'' within the meaning of 42 U.S.C. 6295(o)(3)(B). A more detailed discussion of the basis for these conclusions is contained in the remainder of this document and the accompanying technical support document (''TSD'').[19]

Under the authority provided by 42 U.S.C. 6295(p)(4), DOE is issuing this direct final rule establishing and amending the energy conservation standards for consumer conventional cooking products. Consistent with this authority, DOE is also simultaneously publishing elsewhere in this **Federal Register** a NOPR proposing standards that are identical to those contained in this direct final rule. See 42 U.S.C. 6295(p)(4)(A)(i).

[17] The information on climate benefits is provided in compliance with Executive Order 12866.

[18] 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).

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

II. Introduction

The following section briefly discusses the statutory authority underlying this direct final 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 directed 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))

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 in limited instances for particular State laws or regulations, in accordance with the procedures and other provisions set forth under EPCA. (See 42 U.S.C. 6297(d))

Subject to certain criteria and conditions, DOE is required to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of each covered product. (42 U.S.C. 6295(o)(3)(A) and 42 U.S.C. 6295(r)) Manufacturers of covered products must use the prescribed DOE test procedure as the basis for certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA and when making representations to the public regarding the energy use or efficiency of those products. (42 U.S.C. 6293(c) and 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 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 determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6295(o)(3)(B))

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 manufacturers and consumers of the products subject to the standard;

(2) The savings in operating costs throughout the estimated average life of the covered products in the type (or class) compared to any increase in the price, initial charges, or maintenance expenses for the covered products that are likely to result from the standard;

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

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

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

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

(7) Other factors the Secretary considers relevant.

(42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII))

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

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

EPCA specifies requirements when promulgating an energy conservation standard for a covered product that has two or more subcategories. A rule prescribing an energy conservation standard for a type (or class) of product must specify a different standard level for a type or class of products 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 considers such factors as the utility to the consumer of such a feature and other factors DOE deems appropriate. (*Id.*) Any rule prescribing such a standard must include an explanation of the basis on which such higher or lower level was established. (42 U.S.C. 6295(q)(2))

Additionally, pursuant to the amendments contained in the Energy Independence and Security Act of 2007 (''EISA 2007''), Public Law 110–140, final rules for new or amended energy conservation standards promulgated after July 1, 2010, are required to address standby mode and off mode energy use. (42 U.S.C. 6295(gg)(3)) Specifically, when DOE adopts a standard for a covered product after that date, it must, if justified by the criteria for adoption of standards under EPCA (42 U.S.C. 6295(o)), incorporate standby mode and off mode energy use into 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, as do the new and amended standards adopted in this direct final rule.

Finally, EISA 2007 amended EPCA, in relevant part, to grant DOE authority to issue a final rule (*i.e.,* a ''direct final rule'') establishing an energy conservation standard upon receipt of a statement submitted jointly by interested persons that are fairly representative of relevant points of view (including representatives of manufacturers of covered products, States, and efficiency advocates), as determined by the Secretary, that contains recommendations with respect to an energy or water conservation standard. (42 U.S.C. 6295(p)(4)) Pursuant to 42 U.S.C. 6295(p)(4), the Secretary must also determine whether a jointly-submitted recommendation for an energy or water conservation standard satisfies 42 U.S.C. 6295(o) or 42 U.S.C. 6313(a)(6)(B), as applicable.

The direct final rule must be published simultaneously with a NOPR that proposes an energy or water conservation standard that is identical to the standard established in the direct final rule, and DOE must provide a public comment period of at least 110 days on this proposal. (42 U.S.C. 6295(p)(4)(A)–(B)) While DOE typically provides a comment period of 60 days on proposed standards, for a NOPR accompanying a direct final rule, DOE provides a comment period of the same length as the comment period on the direct final rule—*i.e.,* 110 days. Based on the comments received during this period, the direct final rule will either become effective, or DOE will withdraw it not later than 120 days after its issuance if: (1) one or more adverse comments is received, and (2) DOE determines that those comments, when viewed in light of the rulemaking record related to the direct final rule, may provide a reasonable basis for withdrawal of the direct final rule under 42 U.S.C. 6295(o). (42 U.S.C. 6295(p)(4)(C)) Receipt of an alternative joint recommendation may also trigger a DOE withdrawal of the direct final rule in the same manner. (*Id.*)

DOE has previously explained its interpretation of its direct final rule authority. In a final rule amending the Department's ''Procedures, Interpretations and Policies for Consideration of New or Revised Energy Conservation Standards for Consumer Products'' at 10 CFR part 430, subpart C, appendix A (''Process Rule'' or ''appendix A''), DOE noted that it may issue standards recommended by interested persons that are fairly representative of relative points of view as a direct final rule when the recommended standards are in accordance with 42 U.S.C. 6295(o) or 42 U.S.C. 6313(a)(6)(B), as applicable. 86 FR 70892, 70912 (Dec. 13, 2021). But the direct final rule provision in EPCA does not impose additional requirements applicable to other standards rulemakings, which is consistent with the unique circumstances of rules issued through consensus agreements under DOE's direct final rule authority. *Id.* DOE's discretion remains bounded by its statutory mandate to adopt a standard that results in the maximum improvement in energy efficiency that is technologically feasible and economically justified—a requirement found in 42 U.S.C. 6295(o). *Id.* As such, DOE's review and analysis of the Joint Agreement is limited to whether the recommended standards satisfy the criteria in 42 U.S.C. 6295(o).

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 prohibit constant burning pilot lights for all gas cooking products (*i.e.,* gas cooking products 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. Current Test Procedure

On August 22, 2022, DOE published a test procedure 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. The test procedure adopted the latest version of the relevant industry standard published by the International Electrotechnical Commission (''IEC''), Standard 60350–2 (Edition 2.0 2017–08), ''Household electric cooking appliances—Part 2: Hobs—Methods for measuring performance'' (''IEC 60350–2:2021''), 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.*

On February 7, 2023, DOE published correcting amendments to the August 2022 TP Final Rule (''February 2023 Correcting Amendments''). 88 FR 7846. Neither the errors and omissions nor the corrections affected the substance of the rulemaking, or any conclusions reached in support of the August 2022 TP Final Rule. *Id.*

3. 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 (''September 1998 Final Rule''), 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 pilot lights for gas cooking products without an electrical supply cord was economically justified, DOE did not include amended standards for gas cooking products in the September 1998 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 pilot lights for all gas cooking products (*i.e.,* gas cooking products 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.[20]

4. The Joint Agreement

On September 25, 2023, DOE received a joint statement (*i.e.,* the Joint Agreement) recommending standards for consumer conventional cooking products that was submitted by groups representing manufacturers, energy and environmental advocates, consumer groups, and a utility.[21] In addition to the

[20] 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 20, 2023, adopting amended energy conservation standards for microwave oven standby mode and off mode. 88 FR 39912. DOE is not considering energy conservation standards for microwave ovens as part of this direct final rule.

[21] The signatories to the Joint Agreement include the Association of Home Appliance Manufacturers (''AHAM''), American Council for an Energy-Efficient Economy, Alliance for Water Efficiency, Appliance Standards Awareness Project, Consumer Federation of America, Consumer Reports, Earthjustice, National Consumer Law Center, Natural Resources Defense Council, Northwest Energy Efficiency Alliance, and Pacific Gas and Electric Company. Members of AHAM's Major Appliance Division that make the affected products include: Alliance Laundry Systems, LLC; Asko Appliances AB; Beko US Inc.; Brown Stove Works, Inc.; BSH Home Appliances Corporation; Danby Products, Ltd.; Electrolux Home Products, Inc.; Elicamex S.A. de C.V.; Faber; Fotile America; GE Appliances, a Haier Company; L'Atelier Paris Haute Design LLG; LG Electronics; Liebherr USA, Co.; Midea America Corp.; Miele, Inc.; Panasonic Appliances Refrigeration Systems (PAPRSA) Corporation of America; Perlick Corporation;

Continued

recommended standards for consumer conventional cooking products, the Joint Agreement also included separate recommendations for several other covered products.[22] And, while acknowledging that DOE may implement these recommendations in separate rulemakings, the Joint Agreement also stated that the recommendations were recommended as a complete package and each recommendation is contingent upon the other parts being implemented. DOE understands this to mean that the Joint Agreement is contingent upon DOE initiating rulemaking processes to adopt all of the recommended standards in the agreement. That is distinguished from an agreement where issuance of an amended energy conservation standard for a covered product is contingent on issuance of amended energy conservation standards for the other covered products. If the Joint Agreement were so construed, it would conflict with the anti-backsliding provision in 42 U.S.C. 6295(o)(1), because it would imply the possibility that, if DOE were unable to issue an amended standard for a certain product, it would have to withdraw a previously issued standard for one of the other products. The anti-backsliding provision, however, prevents DOE from withdrawing or amending an energy conservation standard to be less stringent. As a result, DOE will be proceeding with individual rulemakings that will evaluate each of the recommended standards separately under the applicable statutory criteria. The Joint Agreement recommends new and amended standard levels for consumer conventional cooking products as presented in Table II.1. (Joint Agreement, No. 12811 at p. 10) Details of the Joint Agreement recommendations for other products are provided in the Joint Agreement posted in the docket.[23]

Table II.1 Recommended New and Amended Energy Conservation Standards for Consumer Conventional Cooking Products

Product Class	Standard Level	Compliance Date
Electric Coil	No standard	January 31, 2028
Propose new class: Electric smooth Cooktop*	207 kWh/year	
Propose new Class: Electric smooth range*	207 kWh/year	
Propose new class: Gas cooktop*	1,770 *kBtu/year*	
Propose new class: Gas range*	1,770 *kBtu/year*	
Ovens (Electric and Gas)*	Electric: Baseline + SMPS Gas: Baseline + SMPS	

* Excludes portable cooking products.

The Joint Agreement also stated that the signatories would propose separately to DOE the inclusion of an alternative simmer calculation in the DOE test procedure for use in certification. (*Id.*) The Joint Agreement specified that, for enforcement purposes, DOE would rely on the full simmer test, rather than the alternative simmer calculation (which would be similar to the triangulation method used for refrigerator/freezers at 10 CFR 429.134(b)(2)). (*Id.*) DOE received a comment on the cooking top test procedure from the Joint Agreement signatories[24] on January 5, 2024, and will address the issues raised in the comment in a separate test procedure rulemaking.

When the Joint Agreement was submitted, DOE was conducting a rulemaking to consider amending the standards for consumer conventional cooking products. As part of that process, DOE published a supplemental notice of proposed rulemaking (''SNOPR'') and announced a public meeting on February 1, 2023, (''February 2023 SNOPR'') seeking comment on its proposed new and amended standards for consumer conventional cooking products to inform its decision consistent with its obligations under EPCA and the Administrative Procedure Act (''APA''). 88 FR 6818. The February 2023 SNOPR proposed new and amended standards for consumer conventional cooking products, consisting of maximum IAEC levels for electric and gas cooking tops and design requirements for conventional ovens. *Id.* Subsequently, on February 28, 2023, DOE published a notification of data availability (''NODA'') providing additional information to clarify the February 2023 SNOPR analysis for gas cooking tops (''February 2023 NODA''). 88 FR 6818. Finally, on August 2, 2023, DOE published a second NODA (''August 2023 NODA'') updating its analysis for gas cooking tops based on the stakeholder data it received in response to the February 2023 SNOPR. 88 FR 50810. The February 2023 SNOPR TSD is available at: *www.regulations.gov/document/EERE-2014-BT-STD-0005-0090*.

Although DOE is adopting the Joint Agreement as a direct final rule and no longer proceeding with its own rulemaking, DOE did consider relevant comments, data, and information obtained during that rulemaking process

Samsung Electronics America, Inc.; Sharp Electronics Corporation; Smeg S.p.A; Sub-Zero Group, Inc.; The Middleby Corporation; U-Line Corporation; Viking Range, LLC; and Whirlpool Corporation.

[22] The Joint Agreement contained recommendations for 6 covered products: refrigerators, refrigerator-freezers, and freezers; clothes washers; clothes dryers; dishwashers; cooking products; and miscellaneous refrigeration products.

[23] The Joint Agreement is available in the docket at *www.regulations.gov/comment/EERE-2014-BT-STD-0005-12811*.

[24] In the test procedure comment letter, only the following Joint Agreement signatories were included: AHAM, Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, Consumer Federation of America, Consumer Reports, Earthjustice, National Consumer Law Center, Natural Resources Defense Council, the Northwest Energy Efficiency Alliance, and the Pacific Gas and Electric Company. Furthermore, AHAM noted that it represents the following companies who manufacture residential cooking products are members of the AHAM Major Appliance Division: Arcelik A.S.; Beko US, Inc.; Brown Stove Works, Inc.; BSH Home Appliances Corporation; Danby Products, Ltd.; De'Longhi America, Inc.; Electrolux Home Products, Inc.; Elicamex S.A. de C.V.; Faber S.p.A.; FOTILE America, LLC; GE Appliances, a Haier Company; Gradient, Inc.; Hisense USA Corporation; LG Electronics USA, Inc.; Liebherr USA, Co.; Midea America Corp.; Miele, Inc.; Panasonic Corporation of America; Samsung Electronics America Inc.; Sharp Electronics Corporation; Smeg S.p.A; Sub-Zero Group, Inc.; Viking Range, LLC; and Whirlpool Corporation.

in determining whether the recommended standards from the Joint Agreement are in accordance with 42 U.S.C. 6295(o). Any discussion of comments, data, or information in this direct final rule that were obtained during DOE's prior rulemaking will include a parenthetical reference that provides the location of the item in the public record.[25]

III. General Discussion

DOE is issuing this direct final rule after determining that the recommended standards submitted in the Joint Agreement meet the requirements in 42 U.S.C. 6295(p)(4). More specifically, DOE has determined that the recommended standards were submitted by interested persons that are fairly representative of relevant points of view and the recommended standards satisfy the criteria in 42 U.S.C. 6295(o).

A. Scope of Coverage

Before discussing how the Joint Agreement meets the requirements for issuing a direct final rule, it is important to clarify the scope of coverage for the recommended standards. DOE's regulations at 10 CFR 430.2 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 [26] and/or one or more heating compartments. 10 CFR 430.2. This direct final rule covers consumer conventional cooking products, *i.e.,* those consumer cooking products that meet the definition of ''conventional cooking top'' and ''conventional oven,'' as codified at 10 CFR 430.2. Industrial cooking equipment and microwave ovens are not in the scope of this direct final rule.

In the Joint Agreement, portable cooking products are excluded from the Recommended TSL. (Joint Agreement, No. 12811 at p. 10) However DOE does not currently have a definition for portable cooking products, nor does the Joint Agreement specify one.

In the February 2023 SNOPR, DOE proposed to define a portable conventional cooking top as a conventional cooking top designed to be moved from place to place. 88 FR 6818, 6829. Using this definition, DOE proposed 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). *Id.*

In the February 2023 SNOPR, DOE requested 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. *Id.* Stakeholder comments received in response to the February 2023 SNOPR regarding DOE's definition of portable conventional cooking top and proposal to include portable conventional cooking tops in the standards were consistent with the exclusion of portable cooking products specified in the Joint Agreement.

AHAM stated its strong opposition to the inclusion of portable cooking tops in the scope of energy conservation standards for cooking tops because AHAM asserted DOE had done no analysis on this product type and made little mention of them in the February 2023 SNOPR. (AHAM, No. 2285 at pp. 28–29; AHAM, No. 10116 at pp. 31–32) AHAM commented that DOE's proposed definition is so vague that AHAM believes it could include a wide array of products such as cooking tops in recreational vehicles and tea kettles. (*Id.*) AHAM further requested that if portable cooking products are included in the scope of this rule, DOE ensure it provides the public with notice and an opportunity to comment on its analysis and proposal. (*Id.*)

AHAM commented that it opposes including portable cooking tops in the scope of the energy conservation standards for cooking tops. (AHAM, No. 10116 at pp. 31–32) AHAM commented that there is inadequate data to consider standards for portable cooking tops, given that the expanded test sample contains only one portable cooking top with a single cooking zone. (*Id.*) AHAM asserted that given the lack of repeatability and reproducibility data on portable cooking top units, DOE should account for at least a 5.6 percent variation between laboratories, as shown for an electric unit in DOE's test procedure round robin testing, resulting in an IAEC of 216 kWh/year for the tested portable unit that does not meet the proposed standard for electric smooth element cooking tops. (*Id.*) AHAM asserted that portable cooking tops may be eliminated from the market if the proposed standard is finalized. (*Id.*)

Consumers' Research asserted that regulating the energy efficiency of portable gas cooking tops under the same rules as stationary cooking tops is unreasonable and recommended that DOE consider separate rulemakings for each of these product categories. (Consumers' Research, No. 2267 at p. 5) Consumers' Research noted that portable gas cooking tops have a different range of manufacturing costs and constraints than stationary gas cooking tops, they use different types of natural gas, and the cost structure for manufacturing them is different. (*Id.*) Consumers' Research further commented that portable gas cooking tops account for only a tiny percentage of the energy consumed by all gas cooking products and their exclusion would not substantially affect the projected energy efficiency benefits of the proposed rule. (*Id.*)

DOE also received eight comments from individual commenters who expressed concerns about the impact of the standards proposed in the February 2023 SNOPR on barbecues and grills.

As discussed, the Joint Agreement does not specify a definition for portable cooking tops. But, based on the comments received in response to the February 2023 SNOPR, DOE has determined that additional clarity is warranted regarding the definition of a portable conventional cooking top. DOE notes that, as proposed in the February 2023 SNOPR, a portable conventional cooking top is a category of conventional cooking top. DOE defines a ''conventional cooking top'' as a category of cooking products that is a household cooking appliance consisting of a horizontal surface containing one or more surface units that utilize a gas flame, electric resistance heating, or electric inductive heating. This includes any conventional cooking top component of a combined cooking product. 10 CFR 430.2.

Furthermore, as defined, a conventional cooking top is a category of cooking product. DOE defines ''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 and/or one or more heating compartments. 10 CFR 430.2.

[25] 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).

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

Therefore, in order for any product to be considered a portable conventional cooking top, it must also satisfy the definition of conventional cooking top and of cooking product, as defined in 10 CFR 430.2.

Specifically, DOE does not consider a tea kettle to be a major household cooking appliance designed to cook or heat different types of food. Therefore, a tea kettle does not meet the definition of a cooking product and cannot be considered a portable conventional cooking top.

Regarding a cooking top in a recreational vehicle (''RV''), DOE notes that EPCA excludes from coverage those consumer products designed solely for use in RVs and other mobile equipment. 42 U.S.C. 6292(a). For example, DOE is aware of gas cooking tops that incorporate an ignition system that must be connected to 12 Volts of direct current power, which is commonly used in RV battery systems and is not present in U.S. households, and has determined that these products are designed solely for use in RVs and therefore excluded from coverage. Regarding the definition of portable cooking tops, DOE further notes that although a cooking top that is not designed solely for use in RVs or other mobile equipment may be installed within a vehicle, the product itself is not necessarily designed to be moved from place to place within the installed location. Therefore, the mere fact of installing a cooking top in an RV does not classify the product as a portable conventional cooking top.

Regarding barbecues and grills, DOE does not consider these products to be used as the main sources of cooking within a household. Therefore, DOE determines that barbecues and grills do not satisfy the definition of cooking product.

To ensure clarity in this regard, in this direct final rule, DOE is further specifying that portable cooking tops are portable indoor conventional cooking tops and is defining ''portable indoor conventional cooking top'' as a conventional cooking top designed (1) for indoor use and (2) to be moved from place to place.

For these reasons, DOE has determined that portable indoor conventional cooking tops are covered products. But as specified in the Joint Agreement, DOE is not adopting standards for these products in this direct final rule. However, gas portable indoor conventional cooking tops, as gas cooking products, remain subject to the existing prohibition on constant burning pilot lights. DOE may consider adopting amended standards for portable indoor conventional cooking tops in a future rulemaking.

See section IV.A.1 of this document for discussion of the product classes analyzed in this direct final rule.

B. Fairly Representative of Relevant Points of View

Under the direct final rule provision in EPCA, recommended energy conservation standards must be submitted by interested persons that are fairly representative of relevant points of view (including representatives of manufacturers of covered products, States, and efficiency advocates) as determined by DOE. (42 U.S.C. 6295(p)(4)(A)) With respect to this requirement, DOE notes that the Joint Agreement included a trade association, AHAM, which represents 19 manufacturers of consumer conventional cooking products. The Joint Agreement also included environmental and energy-efficiency advocacy organizations, consumer advocacy organizations, and a gas and electric utility company. Additionally, DOE received a letter in support of the Joint Agreement from the States of New York, California, and Massachusetts (See comment No. 12812). DOE also received a letter in support of the Joint Agreement from the gas and electric utility, SDG&E, and the electric utility, SCE (*See* comment No. 12813). As a result, DOE has determined that the Joint Agreement was submitted by interested persons who are fairly representative of relevant points of view.

C. Technological Feasibility

1. General

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

After DOE has determined that particular technology options are technologically feasible, it further evaluates each technology option in light of the following additional screening criteria: (1) practicability to manufacture, install, and service; (2) adverse impacts on product utility or availability; (3) adverse impacts on health or safety and (4) unique-pathway proprietary technologies. Section 7(b)(2)-(5) of the Process Rule. 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 direct final rule TSD.

2. Maximum Technologically Feasible Levels

When DOE proposes to adopt a new or amended standard for a type or class of covered product, it must determine the maximum improvement in energy efficiency or maximum reduction in energy use that is technologically feasible for such product. (42 U.S.C. 6295(o)(2)(A)) 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 document and in chapter 5 of the direct final rule TSD.

D. Energy Savings

1. Determination of Savings

For each trial standard level (''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 new or amended standards (2027–2056 for all TSLs except the Recommended TSL, *i.e.,* TSL 1, and 2028–2057 for TSL 1).[27] The savings are measured over the entire lifetime of consumer conventional cooking products purchased in the 30-year analysis 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

[27] DOE also presents a sensitivity analysis that considers impacts for products shipped in a 9-year period.

evolve in the absence of new or amended energy conservation standards.

DOE used its national impact analysis (''NIA'') spreadsheet models to estimate national energy savings (''NES'') from potential new or amended 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.[28] DOE's approach is based on the calculation of an FFC multiplier for each of the energy types used by covered products or equipment. For more information on FFC energy savings, see section IV.H.2 of this document.

2. Significance of Savings

To adopt any new or amended standards for a covered product, DOE must determine that such action would result in significant energy savings. (42 U.S.C. 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.[29] 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.

As stated, the standard levels adopted in this direct final rule are projected to result in national energy savings of 0.22 quad, the equivalent of the primary annual energy use of 1.5 million homes. Based on the amount of FFC savings, the corresponding reduction in emissions, and the need to confront the global climate crisis, DOE has determined the energy savings from the standard levels adopted in this direct final rule are ''significant'' within the meaning of 42 U.S.C. 6295(o)(3)(B).

E. Economic Justification

1. Specific Criteria

As noted previously, EPCA provides seven factors to be evaluated in determining whether a potential energy conservation standard is economically justified. (42 U.S.C. 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 potential new or amended standards 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 payback period (''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 cost (including energy, maintenance, and repair expenditures) discounted over the lifetime of the product. The LCC analysis requires a variety of inputs, such as product prices, product energy consumption, energy prices, maintenance and repair costs, product lifetime, and discount rates appropriate for consumers. To account for uncertainty and variability in specific inputs, such as product lifetime and discount rate, DOE uses a distribution of values, with probabilities attached to each value.

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

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

c. Energy Savings

Although significant conservation of energy is a separate statutory requirement for adopting an energy

[28] 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).

[29] 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).

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

d. Lessening of Utility or Performance of Products

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 adopted 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 standard. (42 U.S.C. 6295(o)(2)(B)(i)(V)) It also directs the Attorney General to determine the impact, if any, of any lessening of competition likely to result from a standard and to transmit such determination to the Secretary within 60 days of the publication of a proposed rule, together with an analysis of the nature and extent of the impact. (42 U.S.C. 6295(o)(2)(B)(ii)) DOE will transmit a copy of this direct final rule to the Attorney General with a request that the Department of Justice (''DOJ'') provide its determination on this issue. DOE will consider DOJ's comments on the rule in determining whether to withdraw the direct final rule. DOE will also publish and respond to the DOJ's comments in the **Federal Register** in a separate notice.

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 adopted 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 adopted standards are likely to result in environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases (''GHGs'') associated with energy production and use. DOE conducts an emissions analysis to estimate how potential standards may affect these emissions, as discussed in section IV.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 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.''

In response to the February 2023 SNOPR, ONE Gas commented that economic justification should be based primarily upon consumer LCC savings and that economic benefits associated with highly speculative health benefits should play only a minor role. (ONE Gas, No. 2289 at pp. 8–9, 15).

As described in the preceding sections, consumer impacts are one of seven factors listed in EPCA for DOE to consider when determining whether a potential energy conservation standard is economically justified. DOE has and will continue to consider all of these factors in determining whether a potential energy conservation standard is economically justified.

2. Rebuttable Presumption

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

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 subsections address each component of DOE's analyses, including relevant comments DOE received during its separate rulemaking to amend the energy conservation standards for consumer conventional cooking products prior to receiving the Joint Agreement.

DOE used several analytical tools to estimate the impact of the standards considered in this document. The first tool is a spreadsheet that calculates the LCC savings and PBP of potential new or amended 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 U.S. Energy Information Administration (''EIA'') *Annual Energy Outlook* (''*AEO*'') 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 direct final rule TSD for further discussion of the market and technology assessment.

1. Product Classes

The Joint Agreement specifies seven product classes for consumer conventional cooking products. (Joint Agreement, No. 12811 at p. 10) In particular, the Joint Agreement recommends separate product classes for ranges—a type of combined cooking product that combines a conventional cooking top and a conventional oven—and standalone cooking tops for both electric smooth element cooking tops and gas cooking tops. (*Id.*) In this direct final rule, DOE is adopting the product classes from the Joint Agreement, with updated nomenclature that clarifies that the ''range'' product classes refer to the cooking top component of any combined cooking product, as listed in Table IV.1.

Table IV.1 Product Classes for Consumer Conventional Cooking Products

Joint Agreement Product Class	Analyzed Product Class
Electric coil	Electric open (coil) element cooking top
Electric smooth cooktop	Electric smooth element standalone cooking top
Electric smooth range	Electric smooth element cooking top component of a combined cooking product
Gas cooktop	Gas standalone cooking top
Gas range	Gas cooking top component of a combined cooking product
Electric ovens	Electric oven
Gas ovens	Gas oven

Because combined cooking products include a conventional cooking top and/or a conventional oven, the conventional cooking top and conventional oven standards apply to the individual components of the combined cooking product.

DOE further notes that product classes established through EPCA's direct final rule authority are not subject to the criteria specified at 42 U.S.C. 6295(q)(1) for establishing product classes. Nevertheless, in accordance with 42 U.S.C. 6295(o)(4)—which is applicable to direct final rules—DOE has concluded that the standards adopted in this direct final rule will not result in the unavailability in any covered product type (or class) of performance characteristics, features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States currently.[30] DOE's findings in this regard are discussed in detail in section V.B.4 of this document.

a. Portable Indoor Conventional Cooking Tops

As discussed, while DOE notes that portable indoor conventional cooking tops are covered products, the Joint Agreement recommends excluding portable cooking products from the conventional cooking top and conventional oven product classes. (Joint Agreement, No. 12811 at p. 10)

In the February 2023 SNOPR, DOE proposed standards for conventional cooking tops that would apply to portable models according to their means of heating (gas, electric open (coil) element, or electric smooth element). 88 FR 6818, 6829.

In the February 2023 SNOPR, DOE sought data and information on its initial determination not to differentiate conventional cooking tops on the basis of portability when considering product classes for the February 2023 SNOPR analysis. *Id.*

[30] EPCA specifies that DOE may not prescribe an amended or new standard if the Secretary finds (and publishes such finding) that interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States in any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding. (42 U.S.C. 6295(o)(4))

AHAM commented that DOE has done no analysis on portable cooking tops and made little mention of them in the February 2023 SNOPR. (AHAM, No. 2285 at pp. 28–29) AHAM commented that DOE presents no data on several critical aspects related to portable cooking tops: consumer usage and the possibility that the use case for portable products is likely different than for major appliances in terms of the frequency and duration of use; the efficiency of portable products; test data for portable products and their relative efficiency; the similarities and/or differences between portable products and major appliances to show that it has evaluated whether it is justified to apply the same standard to both types of products or to allow commenters to make such an evaluation; or how the test procedure would apply to portable products, given that the pressure of butane and propane canisters do not meet the specifications of appendix I1. (*Id.*) AHAM commented that if portable cooking products are included in the scope of this rule, they should be in a separate product class given their distinct utility and (for electric products) differently rated voltage. (*Id.*)

As discussed in section III.A of this document, DOE is defining ''portable indoor conventional cooking top'' as a conventional cooking top designed (1) for indoor use and (2) to be moved from place to place. DOE considers this definition to apply mainly to ''hot plate'' style cooking products, which are typically electric cooking tops. As such, DOE is aware of no reason that these products cannot be tested to the appendix I1 test procedure. However, as discussed in section III.A of this document, the Joint Agreement specifies that portable indoor conventional cooking tops are not subject to the standards for conventional cooking tops adopted in this direct final rule. DOE notes however, that gas portable indoor conventional cooking tops, as gas cooking products, remain subject to the existing prohibition on constant burning pilot lights.

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. These technologies encompass all those that DOE believes are technologically feasible. Section 3.12 of chapter 3 of the TSD for this direct final rule includes the detailed list and descriptions of all technology options identified for consumer conventional cooking products.

As discussed in chapter 3 of the TSD for this direct final rule, DOE has performed market research and evaluated available consumer conventional cooking products to assess existing technology options to improve efficiency. The results of this research are discussed in the following sections and in chapter 3 of the TSD for this direct final rule.

a. Electric Open (Coil) Element Cooking Tops

The Joint Agreement recommends establishing no standards for electric open (coil) element cooking tops. (Joint Agreement, No. 12811 at p. 10)

For electric open (coil) element cooking tops, in the February 2023 SNOPR, DOE did not identify any technology options for improving efficiency. 88 FR 6818, 6840. DOE sought comment on any existing technologies that improve the efficiency of electric open (coil) element cooking tops. *Id.*

AHAM agreed with DOE's determination that there are no available technology options for improving efficiency of electric open (coil) element cooking tops and with DOE's decision not to include improved contact conductance as a technology option based on data and information AHAM provided related to pan warpage. (AHAM, No. 2285 at p. 31) AHAM commented that the unavailability of a viable technology option to improve efficiency is enough on its own to support a determination that a standard for this product class is not technologically feasible. (*Id.*)

ASAP *et al.*[31] recommended that DOE investigate the design considerations that may drive differences in efficiency among open element cooking tops. (ASAP *et al.,* No. 2273 at p. 5) ASAP *et al.* commented that, based on DOE's test data, which included a test unit with an IAEC of 185 kWh/yr., they believe there may be potential efficiency levels beyond the baseline level. (*Id.*) ASAP *et al.* recommended that DOE further investigate what may be driving the efficiency differences among electric open element models or consider an efficiency-level approach for this product class. (*Id.*)

DOE acknowledges the range of IAEC values among the electric open (coil) element cooking tops in the expanded test sample, but DOE notes that it is unaware of any technology options that can be used to improve these products' efficiency. Therefore, DOE did not identify any incremental efficiency levels.

For these reasons, and in accordance with the recommendation in the Joint Agreement, DOE did not evaluate electric open (coil) element cooking tops as part of the efficiency analysis for this direct final rule. For simplicity, many of the tables and headings in the following sections of this document omit the designation that the electric cooking tops for which energy conservation standards are being considered have ''smooth elements.''

b. Electric Smooth Element Cooking Tops

For electric smooth element cooking tops, considered the technologies listed in Table IV.2.

Table IV.2 February 2023 SNOPR Technology Options for Electric Smooth Element Cooking Tops

1. Halogen elements
2. Improved resistance heating elements
3. Induction elements
4. Low-standby-loss electronic controls
5. Reduced air gap

[31] In this context ''ASAP *et al.*'' refers to a joint comment from Appliance Standards Awareness Project, American Council for an Energy Efficient Economy, Consumer Federation of America, National Consumer Law Center, Natural Resources Defense Council, and Northwest Energy Efficiency Alliance.

DOE did not receive any comments regarding technology options for electric smooth element cooking tops in response to the February 2023 SNOPR.

DOE additionally notes that, consistent with the design option evaluated with the proposed EL 2 in the February 2023 SNOPR, DOE has evaluated improved resistance heating elements as a design option for electric smooth element cooking tops. 88 FR 6818, 6846.

Consistent with the February 2023 SNOPR, in this direct final rule, DOE considered the technologies listed in Table IV.3 for both electric smooth element cooking top product classes.

Table IV.3 Technology Options for Electric Smooth Element Cooking Tops

1. Halogen elements
2. Improved resistance heating elements
3. Induction elements
4. Low-standby-loss electronic controls
5. Reduced air gap

c. Gas Cooking Tops

For gas cooking tops, in the February 2023 SNOPR, DOE considered the technologies listed in Table IV.4.

Table IV.4 February 2023 SNOPR Technology Options for 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

In the February 2023 SNOPR, DOE evaluated two versions of the optimized burner and grate design option, representative of a minimum of either four or one high input rate burners (''HIR burners'').[32] 88 FR 6818, 6850–6851.

In the August 2023 NODA, DOE identified an additional type of optimized burner and grate design, in which a burner with optimized turndown capability can be implemented in place of a burner with ''non-optimized'' turndown capability (*i.e.,* the lowest available simmer setting is more energy consumptive than necessary to hold the test load in a constant simmer close to 90 degrees Celsius (''°C''), resulting in significantly higher energy consumption than for a burner with a simmer setting that holds the test load close to that temperature). 88 FR 50810, 50813.

For the reasons stated in the February 2023 SNOPR, in this direct final rule, DOE considered the technologies listed in Table IV.5 for both gas cooking top product classes.

Table IV.5 Technology Options for 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

d. Conventional Ovens

In the February 2023 SNOPR, DOE stated that it considers that intermittent pilot ignition systems would not provide energy savings and did not consider them as a technology option. 88 FR 6818, 6841. DOE requested information on the potential energy savings associated with intermittent pilot ignition systems. *Id.*

Strauch supported DOE's decision to not consider intermittent/interrupted or intermittent pilot ignition systems as a technology option for gas ovens, asserting that for DOE to conduct its own testing on this matter would be a waste of taxpayer money. (Strauch, No. 2263 at p. 2)

For both gas and electric oven product classes, in this direct final rule, DOE considered the technologies listed in Table IV.6, consistent with the February 2023 SNOPR.

[32] In this direct final rule, DOE defines an HIR burner as a burner rated at or above 14,000 Btu per hour (''Btu/h'').

Table IV.6 Technology Options for Electric and Gas Ovens

1. Bi-radiant oven (electric only)
2. Convection mode capability*
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

* This technology option was referred to as "forced convection" in the February 2023 SNOPR. In this direct final rule, DOE is updating the name of this technology option, as discussed in section IV.B.1.c of this document.

B. Screening Analysis

DOE uses the following 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 sum, 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 subsequent sections 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

In conducting the screening analysis for this direct final rule, DOE considered comments it had received in response to the screening analysis conducted for the February 2023 SNOPR.

a. Electric Smooth Element Cooking Tops

In the February 2023 SNOPR, DOE tentatively determined 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 a new standard, and screened out this technology from further consideration. 88 FR 6818, 6842.

In the February 2023 SNOPR, DOE also screened 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. *Id.* 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 the February 2023 SNOPR. *Id.*

In the February 2023 SNOPR, DOE additionally screened 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. *Id.* Furthermore, DOE stated that it is not aware of the magnitude of potential energy savings from this technology. *Id.*

DOE requested comment on the magnitude of potential energy savings that could result from the use of a reduced air gap as a technology option. *Id.* DOE sought comment on its screening analysis for electric smooth element cooking tops and whether any additional technology options should be screened out on the basis of any of the screening criteria in the February 2023 SNOPR.

AHAM stated agreement with DOE's determination to screen out halogen elements in the screening analysis for electric smooth element cooking tops based on its determination that it would not be practicable to manufacture, install, and service halogen heating elements on the scale necessary to serve the relevant market. (AHAM, No. 2285 at p. 31) AHAM also stated agreement with DOE's determination to screen out a subset of low-standby-loss electronic controls that use ''automatic power-down'' because they may result in the loss in the utility of the continuous clock display for combined cooking products, such as ranges. (*Id.*)

AHAM disagreed with DOE's continued inclusion of low-standby loss electronic controls such as SMPS and urged DOE to screen out low-standby-loss electronic controls as a technology option because such controls ''switch the current at high frequencies'' according to DOE, and ranges and cooking tops connected to a ground fault circuit interrupter (''GFCI'') and operating at high frequencies contribute to nuisance tripping, where power is removed from the appliance, even when no electrical hazard exists. (*Id.* at pp. 32–35) AHAM requested that DOE use its expertise and resources to properly investigate this technological incompatibility and advised that if DOE

continues to consider low-standby-loss electronic controls as a feasible technology option, the existing nuisance tripping problems will get worse. (*Id.*)

Strauch commented that SMPSs are not as reliable as linear power supplies, pointing to MIL–HDBK–217 [33] and the Bellcore/Telcordia reliability guide [34] as evidence. (Strauch, No. 2263 at pp. 2–3) Strauch commented that energy efficiency requirements are degrading lifetimes due to more complex electronic controls, SMPSs, and light-weighting. (*Id.*)

DOE emphasizes that it only considered design options that are already demonstrated in cooking products available on the market. DOE is aware of the potential for ''nuisance tripping'' of GFCI circuit protectors by high-frequency components such as induction elements. However, DOE understands that nuisance tripping can generally be mitigated through the use of best practices for reducing leakage current, such as minimizing electrical cable lengths and ensuring that filtered and unfiltered cables are separated to whatever extent possible to reduce leakage current. Additionally, optimizing the variable-frequency controller power filter to reduce total leakage current to levels below the GFCI detection limits can further prevent GFCI tripping. To the extent that the use of additional electronic components is needed in conjunction with the use of design options with high-frequency components (*e.g.,* induction elements), and to the extent that such additional electronic components are provided in electric cooking tops currently on the market that make use of such design options, DOE's teardown analysis captures any additional cost associated with such components.

DOE notes that despite the potential for nuisance tripping, a wide range of appliances on the market today, including cooking products, implement variable-frequency drives in their designs. The inclusion of these variable-frequency drive designs in units on the market leads DOE to conclude that they do not have a significant impact on the consumer utility of these products.

ONE Gas commented that DOE should evaluate the potential health and safety issues associated with consumer conventional cooking product minimum efficiency standards by addressing electromagnetic field emission hazards from induction cooking. (ONE Gas, No. 2289 at pp. 9–10)

It is not within DOE's purview to regulate health and safety. In this direct final rule analysis, DOE has analyzed induction as a technology option insofar as it is already widely available on the market. Although DOE does not regulate electromagnetic field emissions, the Federal Communications Commission requires industrial, scientific, and medical equipment that emits electromagnetic energy on frequencies within the radio frequency spectrum, including induction cooking tops, to comply with its regulations at 47 CFR part 18 to prevent harmful interference to authorized radio communication services. Additionally, the U.S. Food and Drug Administration specifies performance standards for microwave and radio frequency emitting products, but coverage is limited to microwave ovens and thus these standards do not apply to consumer conventional cooking products, including induction cooking tops. 21 CFR 1030.10.

For this direct final rule, DOE used the screening for electric cooking top technology options considered in the February 2023 SNOPR analysis.

b. Gas Cooking Tops

For gas cooking tops, in the February 2023 SNOPR, DOE screened out catalytic burners, radiant gas burners, reduced excess air at burner, and reflective surfaces. 88 FR 6818, 6842.

In the February 2023 SNOPR, DOE stated that it 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. *Id.* In the February 2023 SNOPR, DOE screened 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. *Id.*

DOE sought comment on its screening analysis for gas cooking tops and whether any additional technology options should be screened out on the basis of any of the screening criteria in the February 2023 SNOPR. *Id.* Section V.B.4 of this document summarizes comments that DOE received regarding the utility provided by certain characteristics of gas cooking tops.

The National Propane Gas Association (''NPGA'') commented that it agrees with the American Public Gas Association (''APGA'') and the American Gas Association's (''AGA'') comments, in which APGA and AGA agreed with DOE's determination that no new standards were justified. (NPGA, No. 2270 at pp. 2–3, 7–8) NPGA commented that it agrees with AHAM's prior comments on this rulemaking, in which AHAM stated that no significant changes have occurred to justify new standards since the April 2009 Final Rule that determined energy conservation standards for consumer conventional cooking products were not justified. (*Id.*) NPGA commented that DOE fails to articulate or demonstrate technological changes for gas cooking tops that would achieve higher efficiencies since the April 2009 Final Rule and that would result in significant conservation of energy as stated by EPCA. (*Id.*) AGA *et al.*[35] echoed these sentiments in response to the August 2023 NODA. (AGA *et al.,* No. 10112 at pp. 3, 11)

AGA commented that DOE's screening analysis is inconsistent and inadequate for use as the primary factor determining the minimum efficiency level for gas cooking tops. (AGA, No. 2279 at pp. 43–45) AGA commented that gas cooking top design requires a complex engineering process to ensure the consumer has a product that meets all safety standards, meets its required purpose (to cook food), is reliable, long lasting, and easy to maintain and clean, but DOE's language about improving product efficiency through ''optimized burner/improved grates'' is inadequate. (*Id.*) AGA commented that DOE suggests that realigning gas burners or moving the gas burners closer to the cooking utensils will optimize burners, but this raises concerns, such as the impact on the combustion process, creating hot spots on cooking utensils and electronic ignition systems, cleaning, and addressing changes in fuel gas supply (for example, switching from natural gas to propane). (*Id.*) AGA commented that more evaluation must be documented before DOE's assumptions can be verified as ''efficiency improvements.'' (*Id.*)

AGA *et al.* commented that gas cooking tops must meet national consensus safety standards for proper operation (*i.e.,* proper combustion under gas pressure variation) and burner characteristics (*i.e.,* burner primary air openings, burner port sizing, variety of input rates, balanced heat distribution on cooking vessels, aesthetics). (AGA *et al.,* No. 10112 at pp. 10–11) AGA *et al.* commented that the features that DOE

[33] DOE interprets MIL–HDBK–217 as referring to Military Handbook: Reliability Prediction of Electronic Equipment, last updated in 1995. Available at *global.ihs.com/doc_detail.cfm?document_name=MIL-HDBK-217&item_s_key=00058764.*

[34] DOE interprets the Bellcore/Telcordia reliability guide as referring to SR–332, Reliability Prediction Procedure for Electronic Equipment, last updated in 2011. Available at *telecom-info.njdepot.ericsson.net/site-cgi/ido/docs.cgi?ID=SEARCH&DOCUMENT=SR-332#ORD.*

[35] ''AGA *et al.*'' refers to a joint comment from AGA, APGA, NOGA, Spire Inc., Spire Missouri Inc., and Spire Alabama Inc.

identified as being responsible for increased efficiency (*i.e.,* grate weight, flame angle, distance from burner ports) should not be mandated which would limit the freedom of the gas cooking top engineers to design products that are safe and fit consumer needs. (*Id.*)

ONE Gas commented that DOE should evaluate the potential health and safety issues associated with consumer conventional cooking product minimum efficiency standards by addressing burn and cooking fire hazards, which are likely to differ across design options and fuels, and the potential magnitudes of such hazards as DOE projections of market share shifts would suggest. (ONE Gas, No. 2289 at pp. 9–10) ONE Gas commented that these potential safety and health hazards fit well within DOE's role in minimum efficiency standards rulemaking. (*Id.*)

Sub-Zero Group, Inc. (''Sub-Zero'') commented that burner spacing between grate and vessel must be greater for HIR burners to meet critical performance and safety requirements; specifically, heat distribution and reduction of carbon monoxide. (Sub-Zero, No. 2140 at p. 11) Sub-Zero commented that reducing burner spacing between burner flame and testing vessel can increase efficiency, but flame impingement/contact with the grate and vessel causes flame quenching (cooling), which directly leads to an increase in carbon monoxide levels and other combustion by-products. (*Id.*)

AHAM commented that moving the burner closer to the cookware—as anticipated by DOE's ''optimize burners and grates'' technology option—should be screened out based on a resulting reduction in consumer utility and safety. (AHAM, No. 2285 at pp. 22–23) AHAM presented a boil-time graph showing that water can be brought to a boil more efficiently, with a lower Btu/h, by moving the burner closer to the cookware, but this design will be essentially useless when cooking foods that require a spectrum of heat inputs as closer burners are unable to adequately reduce heat input. (*Id.*) AHAM commented that testing by one of its members showed that food cooked with only mid-range input rate burners takes longer to cook and that mid-input rate burners, for some foods, provide a lower quality of cooking than HIR burners. (*Id.*) AHAM commented that consumers will lose utility associated with quality of cooking and speed of cooking as manufacturers are forced to homogenize their products and provide mid-range burners to meet the standard. (*Id.*)

AHAM recommended that DOE not rely on European designs as it evaluates whether ''burner and grate optimization'' is possible while also complying with safety standards such as combustion limits as European safety standard EN 30–1–1 ''Domestic cooking appliances burner gas—Part 1–1: Safety—General'' generally has higher CO limits than allowed in North America per American National Standards Institute (''ANSI'') ''Household Cooking Gas Appliances'' (''ANSI Z21.1''), which results in limits on-grate weight, flame angle, and distance from the burner to the cookware. (*Id.* at p. 37)

AHAM commented that DOE did not provide sufficient descriptions of the cooking tops in its test sample to allow AHAM to confirm that the units in the test sample do not include any proprietary designs, components, elements, materials, or other intellectual property. (AHAM, No. 10116 at p. 10) AHAM asserted that DOE has deviated from the data quality standards outlined in the Process Rule. (*Id.* at p. 12) AHAM specifically asserted that DOE failed to eliminate problematic design options, as identified by commenters; did not use transparent and robust analytical methods; and did not evaluate safety pertaining to the updated efficiency levels for gas cooking tops. (*Id.*) AHAM commented that DOE should review these deviations from data quality before issuing any final rule. (*Id.*)

AHAM commented that, per EPCA, DOE should not consider consumer-valued features and/or performance attributes as technology options. (*Id.* at pp. 12–13) AHAM commented that DOE does not have the authority to establish standards that would require removal of such features and attributes. (*Id.*)

AHAM asserted that over the course of this rulemaking, DOE has countered itself several times regarding which EPCA-protected features and performance could be eliminated or altered to achieve energy reductions. (*Id.* at pp. 16–19) AHAM commented that, under EPCA, DOE should not consider the removal or reduction of significant consumer-valued features and performance attributes as technology options for improving efficiency and that any technology options that would have that impact should be screened out. (*Id.*)

As discussed, DOE has performed extensive research to evaluate technology changes that have occurred since the April 2009 Final Rule, and notes that updated analysis depends not only on changes in the available technologies, but also on the relative costs and benefits of implementing them.

DOE acknowledges the safety considerations associated with burner spacing, emissions, and fire hazards, but reiterates that the only optimized burner and grate designs evaluated in this direct final rule analysis were those found through DOE's testing and analysis of a full range of products available on the U.S. market to be implemented in products already. DOE notes that ANSI Z21.1, required by many building codes in the United States, specifies safety requirements for all consumer gas cooking products.

In response to stakeholder comments that optimizing burner and grate designs would reduce consumer utility, DOE has only included in its direct final rule engineering analysis gas cooking tops that include multiple HIR burners and continuous cast-iron grates. DOE further addresses comments related to the impact of the standards on cooking top utility in section V.B.4 of this document.

For this direct final rule, DOE screened out from further consideration catalytic burners, radiant gas burners, reduced excess air at burner, and reflective surfaces for gas cooking tops, consistent with the February 2023 SNOPR analysis.

c. Conventional Ovens

For the same reasons discussed in the SNOPR published on September 2, 2016 (''September 2016 SNOPR''), DOE screened out added insulation, bi-radiant oven, halogen lamp oven, no oven door window, optimized burner and cavity design, and reflective surfaces from further analysis for conventional ovens in the February 2023 SNOPR. 88 FR 6818, 6843.

DOE also stated that it 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 screened out these technology options from further analysis of conventional ovens in the February 2023 SNOPR. *Id.* DOE stated that it will reevaluate the energy savings associated with these technology options if it considers performance standards in a future rulemaking. *Id.*

For the same reasons as discussed above for electric smooth element cooking tops, in the February 2023 SNOPR, DOE also screened out the use of automatic power-down low-standby-loss electronic controls. *Id.* DOE stated that it is aware that the use of automatic power-down low-standby-loss electronic controls may negatively impact product utility. *Id.* 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.

DOE continued to seek comment on the technology options for conventional ovens screened out in the February 2023 SNOPR. *Id.* DOE sought 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 the February 2023 SNOPR.

AHAM noted that additional high frequency power use beyond SMPSs in an oven, such as low standby loss electronic controls, will exacerbate GFCI nuisance tripping issues. (*Id.* at p. 38)

As discussed previously, DOE is aware of the potential for ''nuisance tripping'' of GFCI circuit protectors by high-frequency components such as low standby loss electronic controls. However, DOE understands that nuisance tripping can generally be mitigated through the use of best practices. To the extent that the use of additional electronic components is needed in conjunction with the use of design options with high-frequency components (*e.g.,* low standby loss electronic controls), and to the extent that such additional electronic components are provided in electric cooking tops currently on the market that make use of such design options, DOE's teardown analysis captures any additional cost associated with such components.

Strauch commented that DOE should not impose forced convection for conventional ovens, because many consumers may never or rarely use this feature. (Strauch, No. 2263 at p. 3)

AHAM reiterated its comments made in response to the September 2016 SNOPR that forced convection should be screened out because the motor wattage could negate any potential energy savings. (*Id.*) AHAM further commented that convection is not appropriate for cooking all food types, noting that any covered food loads will not benefit from this technology. (*Id.*)

DOE notes that the design option referred to in the February 2023 SNOPR as ''forced convection'' corresponds to a design option wherein the conventional oven offers a convection mode to the user. Under this design option, the user is not required to use the convection mode, for instance when cooking covered food loads or cakes which do not benefit from convection mode. However, the user would benefit from using the convection mode when baking food loads that benefit from an even distribution of heat, such as roasting vegetables or baking pies, and because the use of convection mode results in lower energy use, as measured by the conventional oven test procedure finalized in the test procedure final rule published on July 2, 2015 (''July 2015 TP Final Rule'').

However, to ensure full clarity regarding this design option and to reflect the fact that the use of convection mode would not be required by users, in this direct final rule, DOE is changing the name of this design option to ''convection mode capability.'' In the following sections where DOE evaluates convection mode capability as a prescriptive design standard, the prescriptive design standard under evaluation is a requirement for conventional ovens to offer a convection mode.

AHAM also reiterated its comments made in response to the September 2016 SNOPR stating that oven separators should be screened out because they are not a widely available feature. (*Id.*) AHAM commented that this design option essentially relies on consumer use of the feature and without knowing whether consumers do or will use the oven separator, it is impossible to know whether the energy savings would be realized in the field. (*Id.*)

Unless a technology option has proprietary protection or represents a unique pathway to achieving a given efficiency level, the fact that oven separators are not widely available has no bearing on the screening criteria analyzed by DOE and outlined in the Process Rule. DOE has determined that multiple manufacturers offer oven separators and therefore determines that oven separators do not represent a proprietary technology. AHAM did not provide any information that corresponds to DOE's screening criteria for technology options, and as such DOE is retaining the oven separator technology in this direct final rule.

AHAM reiterated other comments it made in response to the September 2016 SNOPR screening analysis for ovens, including: (1) improved door seals should be screened out, as further improving door seals could lead to a loss of performance due to a loss of sufficient airflow; and (2) reduced vent rates should be screened out as energy gains are negligible and DOE is relying on very old product designs and a test procedure DOE has repealed. (*Id.*) AHAM stated agreement with DOE's screening out of the other technology options. (*Id.* at pp. 38–39)

For this direct final rule, DOE screened out from further consideration the same conventional oven technology options as in the February 2023 SNOPR analysis. DOE notes that the concerns expressed by AHAM regarding technology options for conventional ovens are not applicable at the adopted standard levels as specified in the Joint Agreement.

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 screening criteria to be examined further as design options in DOE's direct final rule analysis. In summary, DOE did not screen out the technology options listed in Table IV.7.

Table IV.7 Retained Design Options for Consumer Conventional Cooking Products

Electric Smooth Element Cooking Tops
1. Induction elements
2. Improved resistance elements
3. Switch-mode power supply
Gas Cooking Tops
1. Optimized burner and grate design*
Conventional Ovens
1. Convection mode capability
2. Oven separator (electric only)
3. Switch-mode power supply

* As can be achieved by units with multiple HIR burners and continuous cast-iron grates.

DOE 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). For additional details, *see* chapter 4 of the direct final rule TSD.

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 interpolate to define ''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 defining the efficiency levels for this direct final rule, DOE considered comments it had received in response to the efficiency levels proposed in the February 2023 SNOPR.

For this direct final rule, DOE is adopting a design-option approach supported by testing and supplemented by reverse engineering (*i.e.,* 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. Following the request for information (''RFI'') published on February 12, 2014 (''February 2014 RFI'') and the August 2022 TP Final Rule, DOE also conducted interviews with manufacturers of consumer conventional cooking products 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 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. 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.

a. Conventional Cooking Tops

Testing

DOE's test sample for this direct final rule was originally tested in support of the February 2023 SNOPR and February 2023 NODA and included 13 electric smooth element cooking tops, the electric smooth element cooking top portion of 7 conventional ranges, 16 gas cooking tops, and the gas cooking top portion of 8 conventional ranges for a total of 44 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 direct final rule. DOE's analysis did not include any energy consumption associated with downdraft venting systems.

For the February 2023 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. 88 FR 6818, 6844. 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. *Id.*

AGA *et al.* stated that it would be helpful for stakeholders to have information regarding which cooking top units included in DOE's analysis are currently available on the market. (AGA *et al.,* No. 766 at pp. 3–4) AGA *et al.* requested that DOE provide this information through the unit identification (*i.e.,* the ''SNOPR Unit ID'') for each cooking top product included in DOE's analysis, which would allow stakeholders to confirm that DOE's results accurately reflect the product information. (*Id.*)

NPGA asserted that DOE is unable to confirm that the products evaluated remain on the market, as testing occurred prior to April 2022 and products were purchased prior to May 2018. (NPGA, No. 2270 at p. 8) NPGA asserted that it is not clear whether the tested products remain available on the U.S. market. (*Id.*)

Spire Inc. (''Spire'') asserted that the sample of gas cooking products tested by DOE is small and outdated and that there is no basis to conclude that the products tested are representative of the market. (Spire, No. 2710 at pp. 5–7) Spire further commented that the gas cooking tops in DOE's test sample products were likely manufactured between 2014 and 2018, based on their purchase dates. (*Id.*) Spire stated its concern that DOE has not identified the tested products that are still on the market. (*Id.*)

Whirlpool Corporation (''Whirlpool'') commented that DOE cannot rely on data gathered from outdated and unavailable products that do not represent the features, characteristics, and performance standards consumers expect from gas cooking products. (Whirlpool, No. 2284 at pp. 9–10) Whirlpool commented that DOE wrongly assumes that newer models are similar to the tested older models; Whirlpool added that its own catalog experiences substantial turnover in the course of just 5 to 10 years and its older models would likely perform differently than its newer ones under DOE's test procedure. (*Id.*)

AHAM commented that DOE's test sample comprises several old models, some of which are no longer commercially available and therefore would not be considered technologically feasible per sections 6(b)(3)(i) and 7(b)(1) of the Process Rule. (AHAM, No. 2285 at pp. 8–9) AHAM commented that DOE's continued use of this old test sample conflicts with DOE's statement that it considers commercially available products or working prototypes in its evaluation. (*Id.*) AHAM stated disagreement with DOE's statements in the February 2023 NODA that if a product was on the market, it can be included in the analysis—that could be the case if it can be shown that the model was replaced with a similar model that retains similar efficiency performance and similar technology options. (*Id.*) But, AHAM added, if a product is removed from the market and no longer commercially available, it should be eliminated from the sample because it may have been removed for reliability or quality issues or consumer dissatisfaction. (*Id.*) AHAM commented that without data that indicates why a particular model that is no longer commercially available should remain in the test sample, DOE should remove the old models from its test sample and ensure that the test sample informing this analysis consists only of commercially available products (or working prototypes). (*Id.*)

Although other models in DOE's test sample may no longer be on the market, DOE notes that manufacturers of major home appliances update their model numbers regularly, in some cases as frequently as every 1 to 2 years. In DOE's experience of regularly monitoring the market for major home appliances, including consumer conventional cooking products, the model number changes that occur from year to year in most cases do not reflect technological changes that would impact the product's measured energy consumption. Regardless, test results for models that are discontinued over the course of a DOE rulemaking timeline remain applicable in conducting the analysis in accordance with EPCA requirements, because such models incorporate technologically feasible design options that manufacturers may use to achieve the corresponding efficiency levels in commercial products.

DOE cannot comment on whether the units in the AHAM test sample are available on the market because AHAM did not provide DOE with model number information. However, at the time of the direct final rule analysis, 15 of the 30 units in the expanded test sample for which DOE has model information and that meet the standards finalized in this direct final rule, are available for purchase; DOE notes that 7 of these 15 models have multiple HIR burners and continuous cast-iron grates.

AHAM commented it found confusing the addition to DOE's test sample of three new gas cooking top units that did not follow the same criteria as in its February 2023 SNOPR analysis and the conflicting statements and methodology DOE employed in the February 2023 NODA (and in the media). (AHAM, No. 2285 at pp. 53–54)

As stated in the February 2023 NODA, the additional information was intended to clarify the analysis. 88 FR 12603, 12604. Specifically, DOE provided the IAEC values for the three additional units to substantiate its statement that gas cooking tops that do not include HIR burners or continuous cast-iron grates have efficiencies higher than the EL 2 level that DOE defined in the February 2023 SNOPR. *Id.* at 88 FR 12605.

Further, DOE published the August 2023 NODA to provide an updated analysis of the gas cooking top market in light of the new data provided by stakeholders in response to the February 2023 SNOPR and February 2023 NODA.

AHAM requested information on whether DOE has additional data for the units in its test sample that were tested as part of the test procedure rulemaking and, if so, AHAM requested that DOE provide these additional test results. (AHAM, No. 2285 at pp. 9–10) AHAM commented that such data could illuminate the relevance of test variation to DOE's standards selection. (*Id.*)

In the August 2022 TP Final Rule, DOE determined that its test results demonstrate the repeatability and reproducibility of the finalized test procedure. 87 FR 51492, 51497. To the extent that any additional tests beyond those used in this direct final rule analysis were conducted on a given cooking top, the results were used in the analysis for the August 2022 TP Final

Rule. Test reports for these tests are available in the docket for that rulemaking.[36]

NPGA commented that it does not believe DOE's testing conducted in support of the February 2023 SNOPR can be relied upon when it was conducted prior to publishing the August 2022 TP Final Rule and the February 2023 Correcting Amendments. (NPGA, No. 2270 at p. 8) NPGA stated that by relying on testing methods adopted prior to these changes, DOE's foundation for its test method must be called into question. (*Id.*)

As discussed, all conventional cooking top testing conducted by DOE in support of the February 2023 SNOPR, and of this direct final rule was conducted according to the test procedure at appendix I1, as finalized. Despite some of the testing occurring prior to the publication of the August 2022 TP Final Rule, all testing was confirmed to be compliant with appendix I1 as published prior to its incorporation in the analysis. DOE further notes that neither the errors and omissions nor the corrections in the February 2023 Correcting Amendments affected the substance of the rulemaking, or any conclusions reached in support of the August 2022 TP Final Rule. 88 FR 7846.

Furthermore, as discussed in the August 2023 NODA and later in this document, DOE received additional stakeholder test data which DOE incorporated into its analysis as part of the ''expanded data set,'' which was used as the basis for the updated efficiency levels presented in the August 2023 NODA and analyzed in this direct final rule.

AHAM requested that DOE explain why certain gas cooking tops in DOE's test sample have different IAEC values in the August 2023 NODA compared to the February 2023 SNOPR. (AHAM, No. 10116 at pp. 4–5) AHAM commented that DOE should indicate if the updated analysis in the August 2023 NODA was based on the updated IAEC values. (*Id.*) AHAM requested that DOE publish a response on the docket, prior to a final rule, as to whether the updated IAEC values are a result of test variation, error, or additional testing, and provide opportunity for stakeholder comment. (*Id.*)

DOE appreciates AHAM's comment and notes that as part of its review of the engineering analysis for gas cooking tops prior to the publication of the August 2023 NODA, DOE corrected a data processing error that occurred in calculating the annual energy consumption (''AEC'') of seven units in its test sample. At the time of the August 2023 NODA, DOE published the full expanded test sample for gas cooking tops, including this calculation error correction. DOE confirms that the analysis for the August 2023 NODA and for this direct final rule was based upon the IAEC values published in the August 2023 NODA.

AGA *et al.* commented that the standard proposed in February 2023 SNOPR was based on limited product testing unsupported by any other existing body of relevant product efficiency data. (AGA *et al.,* No. 10112 at p. 6) AGA *et al.* commented that, given the impact of the expanded data set on the baseline level analyzed in the August 2023 NODA, as compared to the February 2023 SNOPR, it is unclear how an even further expanded data set would impact the efficiency levels for gas cooking tops. (*Id.*)

DOE has performed extensive testing in support of the energy conservation standards for conventional cooking tops. Furthermore, DOE's analysis for this direct final rule takes into account all additional stakeholder test data received in response to the February 2023 SNOPR. DOE determines that its expanded test data set is a representative sample and sufficient to support its analysis for the standards adopted in this direct final rule.

Electric Cooking Tops

The Joint Agreement recommended a standard level for both electric smooth element cooking top product classes of 207 kWh/year that is equivalent to the IAEC at EL 1 defined in the August 2023 NODA and February 2023 SNOPR.

The baseline IAEC in this direct final rule was initially established in the February 2023 SNOPR. To establish the baseline IAEC values for electric cooking tops, in the February 2023 SNOPR, DOE set the baseline cooking top IAEC equal to the sum of the maximum cooking top AEC observed in the dataset and the maximum annual combined low-power mode energy consumption (''E_{TLP}'') observed in the dataset. 88 FR 6818, 6844.

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. *Id.* at 88 FR 6845.

In the February 2023 SNOPR, DOE defined EL 1 for electric smooth element cooking tops based on the low-standby-loss electronic controls design option. *Id.* 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. *Id.* In the February 2023 SNOPR, DOE stated that it 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. *Id.* 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. *Id.*

In the February 2023 SNOPR, 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. *Id.* DOE noted that, this AEC value can also be reached by units using induction technology. *Id.*

To determine the highest measured efficiency for electric smooth element cooking tops, ''max tech'' or EL 3 in the February 2023 SNOPR, 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. *Id.*

Table IV.8 shows the efficiency levels for electric smooth element cooking tops proposed in the February 2023 SNOPR.

[36] Available at *www.regulations.gov/docket/EERE-2021-BT-TP-0023/document.*

Table IV.8 February 2023 SNOPR Electric Smooth Element Cooking Top Efficiency Levels

Level	IAEC (*kWh/year*)
Baseline	250
1	207
2	189
3	179

DOE sought comment on the methodology and results for the proposed baseline and incremental efficiency levels for electric cooking tops. *Id.* at 88 FR 6844–6845.

Samsung Electronics America, Inc. (''Samsung'') supported DOE's methodology for analyzing AEC and E_{TLP} separately when determining the efficiency levels for baseline electric smooth element cooking tops. (Samsung, No. 2291 at p. 2) Samsung supported DOE's proposed efficiency levels for electric cooking tops. (*Id.*) Samsung commented that standby power is typically consumed by specific features (*e.g.,* clocks, timers, electronic displays), and that because DOE identified low-standby-loss electronic controls for EL 1, it is reasonable to assume that manufacturers will use the lowest level of E_{TLP} to meet EL 1. (*Id.*) Samsung commented that EL 1 also avoids consumer utility loss by maintaining the clock functionality. (*Id.*)

AHAM commented that DOE's method for determining the baseline efficiency levels for conventional cooking tops is flawed because it adds active-mode energy use and standby-mode energy use from different units, which is not a representative approach. (AHAM, No. 2285 at pp. 30–31) AHAM commented that product design is holistic and theoretical energy use should not be assumed based on tests from different units as was DOE's method. (*Id.*) AHAM commented that DOE should follow its usual, more representative methodology of selecting the least efficient single unit, despite the flaws resulting from the methodology's basis on a test sample. (*Id.*) AHAM commented that DOE can minimize this inherent flaw by ensuring its test sample is as broad and representative of the market as possible through the inclusion of AHAM's data. (*Id.*) AHAM added that DOE should rectify the lack of representativeness of its current sample, even with AHAM's test data included, before proceeding to a final rule. (*Id.*)

DOE has determined that adding active-mode energy use and standby-mode energy use from different units to determine baseline efficiency levels for conventional cooking tops is warranted in order to evaluate the most conservative baseline efficiency level so as to allow manufacturers to preserve the utility associated with clock functionality.

AHAM stated its opposition to DOE's proposed standard for smooth electric cooking tops and added that it would oppose any proposed standard more stringent than DOE's proposed level. (*Id.* at pp. 42–43) However, AHAM commented that it does not oppose standards for these products so long as the standard takes into account test procedure variation and the reality that manufacturers will not certify products at the tested values upon which DOE bases its analysis. (*Id.*) AHAM suggested that DOE evaluate a gap-fill level for electric smooth element cooking tops that is between EL 1 and the baseline, and requested that DOE account for test variation and conservative rating by applying an additional 5 percent to the evaluated efficiency level. (*Id.*)

In the August 2022 TP Final Rule, DOE determined that its test results demonstrate the repeatability and reproducibility of the finalized test procedure. 87 FR 51492, 51497. DOE notes that although it is not including a ''buffer'' in its analysis, nothing in DOE's analysis prevents manufacturers from choosing to design a buffer into their own products' rated values.

Regarding AHAM's suggestion that DOE evaluate a gap-fill level, DOE is not aware of any design options that would justify such an efficiency level.

As discussed, DOE received additional electric smooth element cooking top test data from AHAM and the Pacific Gas and Electric Company (''PG&E'') in response to the February 2023 SNOPR. In the August 2023 NODA, DOE stated that these additional data are consistent with DOE's tentative determination in the February 2023 SNOPR regarding efficiency levels for these products. 88 FR 50810, 50811. Therefore, in the August 2023 NODA, DOE maintained the efficiency levels for electric smooth element cooking tops that were proposed in the February 2023 SNOPR. *Id.*

DOE sought comment on the efficiency levels for electric smooth element cooking tops in the August 2023 NODA. *Id.* DOE did not receive any such comments.

For the reasons discussed in the February 2023 SNOPR and August 2023 NODA, and consistent with the recommendations in the Joint Agreement, DOE analyzed for this direct final rule the efficiency levels for both electric smooth element cooking top product classes that were proposed in the February 2023 SNOPR, as shown in Table IV.9.

Table IV.9 Electric Smooth Element Cooking Top Efficiency Levels

Level	IAEC (*kWh/year*)
Baseline	250
1	207
2	189
3	179

Gas Cooking Tops

The Joint Agreement recommended a standard level for both gas cooking top product classes of 1,770 kBtu/year.

As discussed, to establish the baseline IAEC values for cooking tops, in the February 2023 SNOPR, 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 (*i.e.,* E_{TLP}) observed in the dataset for the analyzed product class. 88 FR 6818, 6844.

DOE noted that the efficiency levels for gas cooking tops evaluated in the February 2023 SNOPR would replace the current prescriptive standards for gas cooking tops which prohibits the use of a constant burning pilot light. *Id.* As such, DOE's proposed standard for gas cooking tops would be only a performance standard. DOE noted that constant burning pilot lights consume approximately 2,000 kBtu/year and even the proposed baseline considered efficiency level of 1,775 kBtu/year for gas cooking tops would not be achievable by products if they were to incorporate a constant burning pilot light. *Id.* DOE further notes that the updated baseline efficiency level of 1,900 kBtu/year for gas cooking tops considered in the August 2023 NODA, as described later in this section, would also not be achievable by products incorporating a constant burning pilot light. Therefore, a new performance standard for gas cooking tops would preclude the possibility of any product designs with constant burning pilot lights. The existing prescriptive standard would remain in place until the compliance date of the new and amended standards finalized in this direct final rule.

For the February 2023 SNOPR, DOE considered efficiency levels associated with optimized burner and grate design, but only insofar as the efficiency level was achievable with at least one HIR burner [37] and continuous cast-iron grates. 88 FR 6818, 6845. DOE stated that it is aware that some methods used by gas cooking top manufacturers to achieve lower AEC can result in a smaller number of HIR burners. *Id.* HIR burners provide unique consumer utility and allow consumers to perform high heat cooking activities such as searing and stir-frying. DOE stated that it 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. *Id.* Because of this, in the February 2023 SNOPR, DOE defined the efficiency levels for gas cooking tops such that all efficiency levels are achievable with at least one HIR burner and continuous cast-iron grates.

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. *Id.* 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.

Table IV.10 shows the efficiency levels for gas cooking tops evaluated in the February 2023 SNOPR. *Id.* at 88 FR 6846.

Table IV.10 February 2023 SNOPR Gas Cooking Top Efficiency Levels

Level	IAEC (*kBtu/year*)
Baseline	1,775
1	1,440
2	1,204

DOE sought comment on the methodology and results for the proposed baseline and incremental efficiency levels for gas cooking tops in the February 2023 SNOPR. *Id.* at 88 FR 6844–6845.

AGA *et al.* requested more information regarding DOE's proposal to limit the EL 2 level to 1,204 kBtu/year, including the specific design changes or enhancements to the gas cooking tops needed to attain EL 2, the data and methodology used to propose EL 2 as the max-tech efficiency level for gas cooking tops, and DOE's justification for the proposed minimum requirement of 1,204 kBtu/year. (AGA *et al.,* No. 766 at p. 3)

As noted in the February 2023 SNOPR, 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. 88 FR 6818, 6845. The full dataset for gas cooking tops may be found in chapter 5 of the direct final rule TSD.[38]

AGA asserted that the February 2023 SNOPR exceeds DOE's authority by effectively imposing design requirements because cooking tops with more than one HIR burner cannot comply with the proposal and there is no real evidence that products with even one HIR burner and cast-iron grates could satisfy the standard proposed in the February 2023 SNOPR based on issues with the test results. (AGA, No. 2279 at pp. 26–28) AGA commented that EPCA allows DOE to issue a performance standard or a design requirement, but not both. (*Id.*) AGA asserted that the February 2023 SNOPR's limitation on the number and types of burners is both a design and a performance standard and is therefore unlawful. (*Id.*) AGA stated that the D.C. Circuit adopted a similar rationale in *Hearth, Patio, & Barbecue Association* v. *DOE,* which vacated and remanded DOE's standards for direct heating equipment when the court rejected

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

[38] DOE provided this response to AGA *et al.* on April 13, 2023. *See* docket item No. 1069.

DOE's pretextual argument that it had not imposed a design requirement for a class of products that were ineligible for design requirements. (*Id.*) AGA noted that the rule gave manufacturers the option of meeting either DOE's efficiency standard or a third-party standard that would have required elimination of constant burning pilot lights. (*Id.*)

DOE reiterates that the standard level recommended for gas cooking tops in the Joint Agreement and established in this direct final rule is a performance requirement and not a design standard. As stated, this IAEC level can be met by a variety of cooking tops with a variety of burner input rate configurations. Chapter 5 of the TSD for this direct final rule includes examples of cooking tops in the expanded test sample that meet the established performance standard.

AHAM commented that it noticed an error in DOE's standby power analysis for gas cooking tops. (AHAM, No. 2285 at p. 30) AHAM commented that to calculate highest measured efficiency, DOE added the lowest measured active energy consumption to the highest standby energy consumption of all units, but that DOE seemed to be adding values with different units of measure (kBtu + kWh) and that a correct calculation would result in an EL 2 of 1,277 kBtu/year. (*Id.*)

DOE appreciates AHAM's comment and notes that this error was corrected in its analysis for the August 2023 NODA.

AHAM noted that it used DOE's definition of HIR burner—input rate greater than or equal to 14,000 Btu/h—but questioned this as the appropriate threshold for the definition since DOE provided no justification for the selection in the form of consumer data or other evidence. (AHAM, No. 2285 at p. 3) AHAM requested that DOE present the data supporting this threshold to avoid its analysis being seen as arbitrary. (*Id.*) AHAM commented that it presents data on consumer preference that show that higher burner input rates have consumer utility—specifically, HIR burners provide quicker times to boil, an important consumer performance feature. (*Id.* at pp. 17–19)

Whirlpool requested that DOE provide data showing that gas cooking tops and ranges with a single HIR burner of 14,000 Btu/h and above are sufficient to meet consumers' cooking needs across all types of gas cooking products (*e.g.,* entry-level, mass-market, and high-output products). (Whirlpool, No. 2284 at pp. 6–7) If this is not possible, Whirlpool recommended that DOE reconsider the 14,000 Btu threshold proposed, as Whirlpool asserts that DOE's own data reveal that this is not representative of HIR burners on the market, noting that most models in DOE's data set have at least one burner with an input rate between 18,000 Btu/h and 25,000 Btu/h. (*Id.*) Whirlpool commented that DOE's proposed definition of HIR burners would include models that may not adequately perform certain types of cooking such as boiling, stir-frying, and searing, that is more easily done at high temperatures.

Throughout the history of this rulemaking, starting with the February 2014 RFI, DOE has considered HIR burners to be those rated at or above 14,000 Btu/h. 79 FR 8337, 8340. DOE based this determination on the April 2009 Final Rule and a report published as part of the September 1998 Final Rule.[39] 74 FR 16040; 16054 (Apr. 8, 2009). DOE further notes that the cooking product industry has not standardized a threshold for HIR burners within publicly available marketing material. For example, Consumer Reports considers high-power burners to be those rated above 11,000 Btu/h.[40] According to Whirlpool's website, it considers HIR burners to be rated above 12,000 Btu/h.[41] DOE additionally notes that in a comment submitted in response to the February 2023 SNOPR, Whirlpool referred to large burners as those rated above 15,000 Btu/h. (Whirlpool, No. 2284 at p. 7) Considering the apparent lack of consensus regarding a threshold that constitutes an HIR burner, and the range of possible thresholds apparent through publicly available sources, DOE has determined the use of 14,000 Btu/h to be a reasonable threshold for distinguishing HIR burners for the purposes of its analysis.

AHAM recommended that DOE evaluate additional gap-fill levels for gas cooking tops. (AHAM, No. 2285 at p. 44) AHAM commented that for these gap-fill levels, DOE should also add 5 percent to the level to account for test variation and conservative rating. (*Id.*)

Sub-Zero asserted that equity between electric and gas cooking top standards cannot be attained without a gap fill between EL 1 and baseline for gas cooking tops. (Sub-Zero, No. 2140 at p. 11)

As discussed, in response to the February 2023 SNOPR, DOE received additional gas cooking top test data from AHAM and PG&E that prompted DOE to review the engineering analysis—including the defined efficiency levels—for gas cooking tops as presented in the February 2023 SNOPR. In the August 2023 NODA, DOE presented updated efficiency levels for gas cooking tops based on its new expanded data set. 88 FR 50810, 50812. The following paragraphs summarize the key updates to the analysis for gas cooking tops that DOE presented in the August 2023 NODA.

In the August 2023 NODA, the updates to the efficiency levels for gas cooking tops included (1) an updated E_{TLP} estimate at each efficiency level for gas cooking tops, equal to the average of the non-zero E_{TLP} values measured in the expanded test sample; (2) an updated definition of the baseline efficiency level, based on the least efficient AEC value in the expanded test sample, which is less efficient than the least efficient AEC in the February 2023 SNOPR test sample; (3) an updated definition of EL 1, representing the most energy efficient AEC among units with multiple HIR burners and continuous cast-iron grates that would not preclude any combination of other features mentioned by manufacturers (*e.g.,* different nominal unit widths, sealed burners, at least one low input rate burner (''LIR burner''),[42] multiple dual-stacked and/or multi-ring HIR burners, and at least one extra-high input rate burner), as demonstrated by products from multiple manufacturers in the expanded test sample; and (4) an updated definition of the max-tech efficiency level based on the most efficient AEC value in the expanded test sample, achievable with multiple HIR burners (rather than a single HIR burner, used as the basis for the February 2023 SNOPR) and continuous cast-iron grates. *Id.*

As discussed in section IV.B of this document, to develop incremental efficiency levels for gas cooking tops, DOE analyzed the distribution of AEC values among only the cooking tops in the expanded test sample that have multiple HIR burners and continuous cast-iron grates. DOE did not consider any efficiency levels that would result in the lack of multiple HIR burners or continuous cast-iron grates. In the direct final rule TSD, DOE presents the results for all tested gas cooking tops, because these results are also used to develop

[39] Technical Support Document for Residential Cooking Products, Volume 2: Potential Impact of Alternative Efficiency Levels for Residential Cooking Products. Available at *www.regulations.gov/document/EERE-2006-STD-0070-0004.*

[40] See *www.consumerreports.org.*

[41] ''How Many BTUs Are Needed for a Gas Range | Whirlpool''. Available at *www.whirlpool.com/blog/kitchen/how-many-btus-for-gas-range.html* (last accessed August 11, 2023).

[42] In this direct final rule, DOE defines an LIR burner as a burner with an input rate below 6,500 Btu/h.

the market share distributions (see section IV.F.8 of this document).

Table IV.11 shows the efficiency levels for gas cooking tops that DOE evaluated for the August 2023 NODA. *Id.*

Table IV.11 August 2023 NODA Gas Cooking Top Efficiency Levels

Level	IAEC (*kBtu/year*)
Baseline	1,900
1	1,633
2	1,343

DOE sought comment on the methodology and results for the efficiency levels for gas cooking tops presented in the August 2023 NODA. *Id.* at 88 FR 50813.

ASAP *et al.*[43] commented in support of DOE's updated analysis in the August 2023 NODA. (ASAP *et al.,* No. 10113 at p. 1) ASAP *et al.* commented in support of the updated efficiency levels for gas cooking tops to reflect the expanded test sample and to ensure the availability of models with multiple HIR burners. (*Id.*)

WE ACT for Environmental Justice (''WE ACT'') commented that it opposes removing the prescriptive standard that gas cooking products not be equipped with a constant burning pilot light. (WE ACT, No. 10114 at p. 6) WE ACT commented that whether a gas cooking product has a pilot light influences its fuel efficiency. (*Id.*) WE ACT commented that because pilot lights burn constantly without producing usable heat, half of the energy is lost. (*Id.*)

EPCA defines an energy conservation standard as either a performance standard which prescribes a minimum energy efficiency determined in accordance with a test procedure or a design requirement. (42 U.S.C. 6291(6)) Furthermore, EPCA also contains 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)) As discussed, DOE notes that constant burning pilot lights consume approximately 2,000 kBtu/year. 88 FR 6818, 6844. Therefore, a gas cooking top with a constant burning pilot light cannot meet the maximum IAEC established as the baseline efficiency level in this direct final rule of 1,900 kBtu/year, or the adopted standard level of 1,770 kBtu/year. The Joint Agreement specifies a performance standard for gas cooking tops, which replaces the existing design requirement prohibiting the use of constant burning pilot lights on gas cooking tops with or without an electrical supply cord.

AHAM requested that DOE clarify how it determined the 101 kBtu/year E_{TLP} value stated to be an outlier, and why it ignored the E_{TLP} value of 118 kBtu/year from PG&E Test Unit #5. (AHAM, No. 10116 at p. 9)

DOE understands AHAM's comment to be referencing a statement in the August 2023 NODA indicating that 101 kBtu/year was the largest E_{TLP} value in DOE's test sample. DOE notes that while PG&E Test Unit #5 has a larger E_{TLP} value, the statement in question was referencing the DOE test sample analyzed in support of the February 2023 SNOPR, which did not include PG&E Unit #5. DOE received data from PG&E after publication of the February 2023 SNOPR. Nonetheless, DOE's assessment that values of E_{TLP} over 100 kBtu/year represent outliers remains valid when the analysis considers the expanded dataset. In response to AHAM's request, DOE is clarifying that in this case, DOE considers the E_{TLP} values of 101 kBtu/year and 118 kBtu/year both to be outliers, as confirmed by the interquartile method of identifying outliers in which any non-zero value in the expanded dataset greater than 68 kBtu/year would be considered an outlier. Furthermore, fewer than 5 percent of the E_{TLP} values in the expanded dataset are greater than 100 kBtu/year.

PG&E, SDG&E, and SCE, jointly the California Investor-Owned Utilities (''CA IOUs''), commented that DOE should revise the E_{TLP} allocated to each efficiency level for gas cooking tops to more closely align with the methodology for electric smooth element cooking tops, stating that this revision allows for the development of more representative efficiency levels where the baseline efficiency levels represent the maximum observed energy consumption while the incremental efficiency levels represent annual standby energy use improvements. (CA IOUs, No. 10106 at pp. 1–3)

As discussed, in response to the February 2023 SNOPR, DOE received additional gas cooking top test data that prompted DOE to review the engineering analysis for gas cooking tops. The updates to the efficiency levels for gas cooking tops presented in the August 2023 NODA reflect this additional stakeholder data. DOE has determined that the updated E_{TLP} estimate at each efficiency level for gas cooking tops, equal to the average of the non-zero E_{TLP} values measured in the expanded test sample, is a representative allocation of the standby mode energy consumption at each efficiency level for gas cooking tops. DOE notes that it analyzed efficiency levels for gas cooking tops and electric cooking tops separately, in accordance with the EPCA requirement that any new or amended energy conservation standards be prescribed for each individual product class in order to achieve the maximum energy efficiency for that product class. (U.S.C. 6295(o)(2)(A))

AHAM commented that it opposes the methodology of combining burners of different types from more than one unit in the test sample to represent a theoretical unit that can meet the updated EL 1 for gas cooking tops. (AHAM, No. 10116 at p. 6) AHAM commented that this methodology is not representative of the units in the test sample. (*Id.*) AHAM further commented that it opposes combining the active mode and standby mode energy consumption of different units to define efficiency levels. (*Id.* at p. 9)

In this direct final rule, DOE determines that the methodology of combining burners of different types from the units in its test sample is an appropriate estimation of the potential breadth of gas cooking top efficiencies available on the market. Although DOE acknowledges that a cooking top redesign is performed at the product

[43] In this context ''ASAP *et al.*'' refers to a joint comment from Appliance Standards Awareness Project, American Council for an Energy Efficient Economy, National Consumer Law Center, and Natural Resources Defense Council.

level and not at the burner level, by combining burners of various input rates and efficiencies in its analysis, DOE can simulate the decisions manufacturers will need to make as they redesign their cooking tops to meet new and amended standards.

The National Association of Home Builders (''NAHB'') commented that DOE should further revise the updated efficiency levels to reflect additional stakeholder feedback and data. (NAHB, No. 10115 at p. 2) NAHB commented that the updated efficiency levels would still increase costs for manufacturers, decrease product performance, and impact the availability of product features that consumers want. (*Id.*)

AHAM commented that it is unclear how DOE defined efficiency levels and how technology options could be employed to reach each efficiency level presented in the August 2023 NODA. (AHAM, No. 10116 at p. 4) AHAM commented that DOE has not provided descriptions of the combination of features present in each unit in its test sample. (*Id.*) AHAM commented that the updated efficiency level for gas cooking tops is sensitive to variation in a limited number of test models. (*Id.* at pp. 6–7) AHAM commented that only one gas cooking top in the test sample, DOE Test Unit #18, meets the updated EL 1 and has multiple HIR burners, continuous cast-iron grates, at least one LIR burner, multiple dual-stacked and/or multi-ring HIR burners, and at least one extra-high input rate burner. (*Id.*) AHAM requested that DOE explain how the updated EL 1 for gas cooking tops does not preclude any combination of certain features and allow opportunity to comment after such explanation. (*Id.*)

The Joint Agreement recommended that DOE establish standards at an efficiency level, corresponding to 1,770 kBtu/year, that was not analyzed in either the February 2023 SNOPR or the August 2023 NODA. In this direct final rule, DOE analyzed this recommended efficiency level in place of the EL 1 defined in the August 2023 NODA and determined that an IAEC of 1,770 Btu/year can be achieved by a gas cooking top with multiple HIR burners, continuous cast-iron grates, at least one LIR burner, and does not preclude any other combination of consumer-desired features.

In this direct final rule, DOE analyzed the gas cooking top efficiency levels for both gas cooking top product classes shown in Table IV.12.

Table IV.12 Gas Cooking Top Efficiency Levels

Level	IAEC (*kBtu/year*)
Baseline	1,900
1	1,770
2	1,343

Although these efficiency levels and the standards adopted in this direct final rule are expressed in terms of IAEC, it is useful to examine how these identified levels relate to performance at a per-burner level to help illustrate the wide range of burner styles that can be implemented in cooking tops that achieve the standards adopted by this direct final rule. By ''backing out'' from each IAEC value the number of annual cooking cycles and representative water load mass as defined by the DOE test procedure, each IAEC value can be associated with a corresponding average normalized gas energy consumption representative of the Energy Test Cycle across all of the burners (*i.e.,* a corresponding ''average per-burner efficiency'' that represents the average of the energy used per gram (g) of water tested, expressed in Btu/g, among all of the burners on the cooking top).[44] Table IV.13 shows the corresponding average per-burner efficiency associated with each defined IAEC level. For both IEAC and the corresponding average per-burner efficiency, lower values are indicative of higher-efficiency performance.

Table IV.13 Corresponding Average Per-Burner Efficiency Associated with Each IAEC Level for Gas Cooking Tops

Level	IAEC (*kBtu/year*)	Corresponding Average Per-Burner Efficiency *(Btu/g)**
Baseline	1,900	1.57
1	1,770	1.46
2	1,343	1.10

* The standards adopted in this direct final rule are expressed in terms of IAEC. The average per-burner efficiency is shown here to help illustrate the wide range of burner styles that can be implemented in cooking tops that achieve the adopted standards.

A wide range of burner styles can achieve these efficiency performance thresholds at each of the defined efficiency levels. Section 5.5.3.1 of chapter 5 of the direct final rule TSD includes a graph in which DOE presents the normalized gas energy consumption of each gas burner in the expanded test sample. This graph demonstrates that a

[44] Chapter 5 of the direct final rule TSD provides further details on the methodology for determining the corresponding average per-burner efficiency associated with each defined IAEC level.

wide diversity of gas burner styles currently on the market meet the EL 1 and EL 2 efficiency thresholds shown in Table IV.13. Specifically, burners meeting the EL 1 efficiency threshold (corresponding to the finalized standard) span the whole range of tested burner input rates (3,900–25,000 Btu/h). In other words, on a per-burner basis, EL 1 performance can be achieved using any combination of low input, medium input, or high input rate burners.

DOE further emphasizes that gas cooking top efficiency is calculated based on the *average* normalized gas energy consumption among each of the burners required to be tested. As such, a gas cooking top that achieves EL 1 performance (corresponding to the finalized standard) may include individual burners whose normalized gas energy consumption is greater than 1.46 Btu/g, provided that the overall average performance across all tested burners is no greater than 1.46 Btu/g.

b. Conventional Ovens

Analyzed Product Types

As discussed, the Joint Agreement defines two product classes for conventional ovens: electric ovens and gas ovens. For this direct final rule, DOE analyzed four product types per conventional oven product class, representing different energy use profiles and baseline cost, as follows.

In the April 2009 Final Rule, DOE found that standard ovens and ovens using a catalytic continuous-cleaning process use roughly the same amount of energy. However, 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. Based on DOE's review of 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.[45] 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.

In recent conventional oven test procedures, DOE has included methods for measuring fan-only mode energy use.[46] Based on DOE's testing of freestanding, built-in, and slide-in 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, in this direct final rule, DOE analyzed four product types for each conventional oven product class: standard freestanding oven, standard built-in/slide-in oven, self-clean freestanding oven, and self-clean built-in/slide-in oven.[47] However, efficiency levels and incremental costs were analyzed at the product class level.

Potential Prescriptive Standards

There are no current test procedures for conventional ovens. Therefore, in the February 2023 SNOPR, DOE considered 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): convection mode capability,[48] the use of an SMPS, and an oven separator (for electric ovens only). 88 FR 6818, 6846. DOE ordered the design options by ease of implementation. Table IV.14 and Table IV.15 define the efficiency levels analyzed in the February 2023 SNOPR for both electric and gas oven product classes, respectively.

Table IV.14 February 2023 SNOPR Electric Oven Efficiency Levels

Level	Design Option
Baseline	Baseline
1	Baseline + SMPS
2	1 + Convection mode capability
3	2 + Oven separator

[45] 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.

[46] 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.

[47] In the February 2023 SNOPR, DOE described standard ovens as including ovens with and without a catalytic line. For simplicity, DOE is using the term ''standard oven'' in this direct final rule.

[48] As discussed in section IV.B.1.c of this document, DOE renamed the design option from ''forced convection'' to ''convection mode capability,'' for clarity.

Table IV.15 February 2023 SNOPR Gas Oven Efficiency Levels

Level	Design Option
Baseline	Baseline
1	Baseline + SMPS
2	1 + Convection mode capability

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

In the February 2023 SNOPR, DOE assumed that a baseline conventional oven uses a linear power supply, based on DOE's analysis of these products. *Id.* 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 transformer-less 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 device. 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.

In the February 2023 SNOPR, DOE analyzed the use of an SMPS rather than a linear power supply for EL 1. *Id.* at 88 FR 6847. 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 the February 2023 SNOPR, DOE stated that it is considering EL 1 to correspond to the prescriptive requirement that the conventional oven not be equipped with a linear power supply. *Id.*

In the February 2023 SNOPR, DOE analyzed the implementation of convection mode capability for EL 2. *Id.* An oven in convection mode 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 direct final rule, DOE performed testing on consumer conventional ovens in support of this rulemaking to determine the improvement in cooking efficiency associated with convection mode. Included in the DOE test sample were four gas ovens and two electric ovens equipped with a convection mode. 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 implementation of a convection mode in consumer conventional ovens ranged from 3.5 to 7.5 percent depending on the product class. In the February 2023 SNOPR, DOE stated that it is considering EL 2 to correspond to the prescriptive requirement that the conventional oven be equipped with a convection fan. *Id.* This prescriptive requirement would not preclude a non-convection mode being offered selectable by the consumer. *Id.*

In the February 2023 SNOPR, for EL 3, DOE analyzed the use of an oven separator, for electric ovens only.[49] *Id.* 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 the February 2023 SNOPR, DOE stated that it is considering EL 3 to correspond to the prescriptive requirement that the electric oven be equipped with an oven separator. *Id.*

In the February 2023 SNOPR and the August 2023 NODA, DOE sought comment on the definitions of the proposed efficiency level for conventional ovens. *Id.* at 88 FR 50810, 50813.

The CA IOUs recommended that DOE consider a prescriptive requirement for built-in and slide-in oven fan runtimes. (CA IOUs, No. 2278 at pp. 4–6) The CA IOUs commented that a strong correlation exists between fan-only mode duration and energy use, and noted that DOE found a considerable variation in fan run times and energy use, ranging from 4.5 to 69 minutes and 1 Wh to 32 Wh, respectively. (*Id.*) The CA IOUs recommended that DOE set a prescriptive limit of fan-only mode run time that could potentially save approximately 7 kWh/year per built-in/slide-in oven, comparable to the 12 kWh/year that DOE's proposed prescriptive standard would attain. (*Id.*) The CA IOUs commented that many commercially available ovens have fans that operate for a shorter time while providing the same function as fans with a longer runtime. (*Id.*) The CA IOUs asserted that a prescriptive standard limiting fan runtime is technologically feasible and cost-effective for consumers, because it requires only the implementation of a timer, and could yield savings of up to $13 in lifetime operating costs. (*Id.*) The CA IOUs also asserted that a

[49] Oven separators are not used in 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.

prescriptive runtime requirement is unlikely to increase manufacturer impacts significantly because manufacturers can readily incorporate the timer into any product redesign to comply with the proposed standards. (*Id.*) The CA IOUs additionally recommended DOE consider relevant safety standards and requirements when setting a fan runtime limit. (*Id.*)

DOE notes that limiting fan runtime in conventional ovens could introduce a potential safety hazard for certain designs by limiting the amount of cooling after a cooking cycle. DOE lacks sufficient data at this time to characterize the design tradeoffs and energy consumption impacts of specific fan runtimes to allow it to establish a prescriptive requirement for fan runtimes.

In this direct final rule, DOE is analyzing, consistent with the recommendations in the Joint Agreement, the efficiency levels for conventional ovens that were proposed in the February 2023 SNOPR. Table IV.16 and Table IV.17 define the efficiency levels for the electric and gas oven product classes, respectively.

Table IV.16 Electric Oven Efficiency Levels

Level	Design Option
Baseline	Baseline
1	Baseline + SMPS
2	1 + Convection mode capability
3	2 + Oven separator

Table IV.17 Gas Oven Efficiency Levels

Level	Design Option
Baseline	Baseline
1	Baseline + SMPS
2	1 + Convection mode capability

Energy Consumption of Each Efficiency Level

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 types. DOE conducted testing according to the test procedure adopted in the July 2015 TP Final Rule. 88 FR 6818, 6847. However, as discussed previously, DOE is considering only efficiency levels corresponding to prescriptive design requirements, consistent with the Joint Agreement. 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}'' [50]) 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 cubic feet (''ft^3'') using the relationship between energy consumption and cavity volume discussed in chapter 5 of the TSD for this direct final rule 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 combined cooking product) 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

[50] In this direct final rule, DOE refers to the integrated annual oven energy consumption using the abbreviation IE_{AO}, rather than IAEC, to emphasize the difference between the IAEC values used for conventional cooking tops which were measured according to 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.

levels considered for conventional ovens. 85 FR 80982, 81011.

For the February 2023 SNOPR, DOE expanded its sample size of conventional ovens and ranges used to determine the baseline E_{TLP} value and calculated the baseline E_{TLP} using the highest combined low-power mode measured power on a conventional range with a linear power supply. 88 FR 6818, 6848.

In the February 2023 SNOPR, DOE developed the incremental efficiency levels for each design option identified as a result of the screening analysis. *Id.* at 88 FR 6849. 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. *Id.*

DOE's testing of freestanding, built-in, and slide-in installation configurations for 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 the February 2023 SNOPR, DOE developed separate energy consumption values for each installation configuration. *Id.*

DOE sought comment on the methodology and results for the estimated energy use of each proposed efficiency level for conventional ovens. *Id.* at 88 FR 6850.

AHAM commented that DOE is inappropriately relying on the withdrawn test procedure for conventional ovens to calculate savings attributable to design standards for ovens. (AHAM, No. 2285 at p. 16) AHAM commented that DOE determined that the withdrawn rule may not accurately represent consumer use because 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. (*Id.*) AHAM commented that DOE should not calculate savings based on a test it has determined does not produce representative results and that any analysis produced using an unrepresentative test procedure is likely to be inaccurate. (*Id.*)

DOE notes that because there is currently no established test procedure for conventional ovens, DOE is using the best data it has available at this time, which is based on its previous test procedure, to estimate savings associated with the prescriptive standards. DOE further notes that the prescriptive standards for conventional ovens recommended in the Joint Agreement and adopted in this direct final rule are based on an SMPS design option, and that energy use of this design option does not depend upon the thermal mass of the oven.

For the reasons presented in the February 2023 SNOPR, in this direct final rule, DOE is estimating the energy consumption values for each efficiency level for conventional ovens using the methodology described in the February 2023 SNOPR.

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 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. 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 direct final rule.

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.

To account for manufacturers' 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 direct final rule for additional detail on the manufacturer markup.

3. Cost-Efficiency Results

In defining the baseline and incremental MPCs for each defined product class for this direct final rule, DOE considered comments it had received in response to the cost-efficiency results presented in the February 2023 SNOPR.

a. Electric Cooking Tops

For the February 2023 SNOPR, DOE developed the cost-efficiency results for electric smooth element cooking tops shown in Table IV.18. 88 FR 6818, 6850. DOE developed incremental MPCs based on manufacturing cost modeling of units in its sample featuring the design options.

Table IV.18 February 2023 SNOPR Electric Smooth Element Cooking Tops Incremental Manufacturer Production Costs

Level	IAEC *(kWh/year)*	Incremental MPC (*2021$*)
1	207	$2.17
2	189	$11.05
3	179	$263.19

In the August 2023 NODA, DOE maintained the incremental MPCs for electric smooth element cooking tops that were proposed in the February 2023 SNOPR. 88 FR 50810, 50813.

DOE requested comment, data, and information on the incremental manufacturer production costs for electric smooth element cooking tops in the February 2023 SNOPR and the August 2023 NODA. 88 FR 6818, 6852, 88 FR 50810, 50813.

DOE did not receive any comments regarding electric smooth element cooking top MPCs in response to the February 2023 SNOPR or the August 2023 NODA.

For this direct final rule, DOE updated the underlying raw material prices used in its cost model to reflect current raw material prices, which resulted in slight changes to the MPC values in comparison to the values used in the February 2023 SNOPR. Table IV.19 presents the incremental MPCs for each efficiency level analyzed in this direct final rule for both electric smooth element cooking top product classes. DOE notes that the estimated incremental MPCs are equivalent for standalone cooking tops and the cooking top component of combined cooking products because none of the considered design options would be implemented differently as a function of installation configuration.

Table IV.19 Electric Smooth Element Cooking Tops Incremental Manufacturer Production Costs

Level	IAEC *(kWh/year)*	Incremental MPC (*2022$*)
1	207	$1.99
2	189	$15.82
3	179	$251.34

b. Gas Cooking Tops

For the February 2023 SNOPR, DOE developed the cost-efficiency results for gas cooking tops shown in Table IV.20. 88 FR 6818, 6850. DOE developed incremental MPCs based on manufacturing cost modeling of units in its sample featuring the design options.

Table IV.20 February 2023 SNOPR Gas Cooking Tops Manufacturer Production Costs

Level	IAEC *(kBtu/year)*	Incremental MPC (*2021$*)
1	1,440	$12.41
2	1,204	$12.41

DOE sought comment on the manufacturer production costs for gas cooking tops used in the analysis for the February 2023 SNOPR. 88 FR 6818, 6852.

AGA commented that DOE has considered the design costs of redesigning cooking tops to meet the TSL but does not consider other costs to manufacturers and consumers if the design of the product must completely change to allow for features that keep a product competitive. (AGA, No. 2279 at p. 43)

As discussed, DOE determines the incremental MPCs based on manufacturing cost modeling of the units in its test sample featuring the designated design options. DOE notes that it considers the overall cost to manufacturers and consumers as part of its LCC and PBP analysis and the MIA analysis, as discussed in the following sections of this document.

AHAM commented that DOE should revisit the February 2023 SNOPR MPC for EL 2 gas cooking tops, stating that the incremental cost from EL 1 is not zero. (AHAM, No. 2285 at p. 22) AHAM commented that a cooking top with a full range of burner capacities, including an LIR burner, will cost more than one with a homogenized set of mid-input range burners. (*Id.*)

AHAM commented that in the February 2023 SNOPR, DOE determined that there is not likely to be a cost difference between EL 1 and EL 2, but in order to retain product performance (*e.g.,* the ability to cook at lower temperatures), AHAM commented that a stacked burner would be an option. (*Id.* at p. 37) AHAM noted that DOE has not considered the cost associated with the stacked burner design configuration, but if DOE continues to consider EL 2, it must take into account the cost associated with stacked burners at EL 2. (*Id.*)

DOE defined EL 2 for gas cooking tops based on the AEC of the least energy-consumptive cooking top in its expanded test sample that contained multiple HIR burners and continuous cast-iron grates, regardless of specific burner configuration other than input rate. This efficiency level does not

presume the use of dual-stacked burners, and for that reason DOE did not include the cost of improving the efficiency of dual-stacked burners in an optimized burner and grate design in the incremental MPC for gas cooking tops at EL 2. However, as discussed in section IV.C.1.a of this document, DOE recognizes the value in maintaining the product performance attributes of all the features that manufacturers stated that consumers value, including dual-stacked HIR burners, and notes that the standards adopted in this direct final rule, which represent EL 1 for gas cooking tops, would allow manufacturers to continue to offer this burner design.

In the August 2023 NODA, DOE updated the MPCs for gas cooking tops based on its understanding of the different types of burner and grate redesigns likely to be needed to achieve each of the revised efficiency levels, using the same underlying data as was used in the February 2023 SNOPR. *Id.*

DOE stated that its analysis shows that the incremental MPC developed in the February 2023 SNOPR, $12.41, representing the optimized burner and grate design option (*e.g.,* grate weight, flame angle, distance from burner ports to the cooking surface), accurately represents the cost to redesign a unit at EL 1 to meet EL 2. *Id.*

To develop the incremental MPC between the updated baseline and EL 1 for the August 2023 NODA, DOE analyzed the test data in its expanded test sample which shows that cooking tops at the baseline efficiency level typically include one or two burners with ''non-optimized'' turndown capability (*i.e.,* the lowest available simmer setting is more energy consumptive than necessary to hold the test load in a constant simmer close to 90 °C, resulting in significantly higher energy consumption than for a burner with a simmer setting that holds the test load close to that temperature). *Id.* In the August 2023 NODA, DOE estimated that the cost of implementing a burner with optimized turndown capability in place of a burner with non-optimized turndown capability to meet typical efficiencies available in the market is smaller than the cost of an entirely redesigned burner and grate system (associated with the incremental MPC between EL 1 and EL 2). *Id.* DOE estimated that the percentage of burners with non-optimized turndown capability (defined empirically from the expanded test sample as burners with a specific energy use of more than 1.45 Btu per gram of water in the test load, as measured by appendix I1) in the baseline units in its expanded test sample ranged from 16 percent (one out of six burners) to 40 percent (two out of five burners). *Id.* In order to conservatively assess the incremental MPC between baseline and EL 1, DOE defined it as 40 percent of the $12.41 incremental MPC between EL 1 and EL 2, or $4.96. *Id.*

In the August 2023 NODA, DOE developed the incremental MPCs relative to the baseline associated with the updated efficiency levels shown in Table IV.21. *Id.*

Table IV.21 August 2023 NODA Updated Gas Cooking Tops Incremental Manufacturer Production Costs

Level	IAEC (*kBtu/year*)	Incremental MPC *(2021$)*
1	1,633	$4.96
2	1,343	$17.37

DOE requested comment, data, and information on the incremental manufacturer production costs for gas cooking tops in the August 2023 NODA. *Id.* at 88 FR 50813–50814.

The CA IOUs commented that while simmer setting optimization would improve IAEC, it is unclear why any design changes would result in the $4.96 increase to the MPC modeled in the August 2023 NODA. (CA IOUs, No. 10106 at pp. 3–5) The CA IOUs asserted that four of the nine gas cooking tops tested by PG&E had at least one burner with a non-optimized simmer setting for at least one test run, and that two of these gas cooking tops also had another burner with the same power ratings, where one burner could simmer water at temperatures less than 91 °C and the other burner could not. (*Id.*) The CA IOUs commented that, based on this data, manufacturers could implement an optimized simmer setting for all burners using the hardware already installed on the optimized burner of the same power rating and that new hardware or software that would increase the MPC should not be necessary. (*Id.*) The CA IOUs commented that DOE should consider the incremental MPC at EL 1 to be negligible or substantially lower than $4.96 to reflect the lack of costs associated with optimizing the simmer setting, or clarify its determination of the cost of an optimized simmer setting. (*Id.*)

In the August 2023 NODA, DOE defined the incremental MPC between baseline and EL 1 based on the cost of implementing a burner with optimized turndown capability in place of a burner with non-optimized turndown capability to meet typical efficiencies available in the market. 88 FR 50810, 50813. As discussed in the August 2023 NODA, DOE clarifies that it considers burners with ''non-optimized'' turndown capability to be burners for which the lowest available simmer setting is more energy consumptive than necessary to hold the test load in a constant simmer close to 90 °C, resulting in significantly higher energy consumption than for a burner with a simmer setting that holds the test load close to that temperature. *Id.* DOE empirically defines a non-optimized burner as having a specific energy use of more than 1.45 Btu per gram of water in the test load, as measured by appendix I1. *Id.* In its analysis for the August 2023 NODA, DOE estimated that the percentage of burners with non-optimized turndown capability in the baseline units in its expanded test sample ranged up to 40 percent (two out of five burners). *Id.* DOE therefore estimated the incremental MPC between baseline and EL 1 to be 40 percent of the incremental MPC between EL 1 and EL 2 that corresponds to a whole burner and grate system re-design associated with the optimized burner and grate design option. *Id.* In response to the CA IOUs' comment, DOE has reviewed its test sample and the additional stakeholder data it has received from PG&E, and notes that it has not found information to suggest that burners with optimized turndown capability already exist within a cooking top alongside burners of the same input rate with non-optimized turndown capability for all input rates and unit configurations. Therefore, DOE does not have sufficient information to conclude that there is

zero or negligible incremental cost between a non-optimized burner and a burner with optimized turndown capability, as suggested by the CA IOUs.

AHAM commented that it opposes the incremental MPCs for gas cooking tops between EL 1 and EL 2 presented in the August 2023 NODA. (AHAM, No. 10116 at pp. 21–23) AHAM commented that redesign of one burner requires consideration of the overall system, grate redesign and testing in order to assure performance, safety, and air quality issues. (*Id.*) AHAM commented that DOE should account for total system redesign in determining the costs associated with EL 1 and EL 2. (*Id.*)

ONE Gas commented that DOE should clarify how it calculated increased MPCs for gas cooking tops even though the updated efficiency levels in the August 2023 NODA are less stringent. (ONE Gas, No. 10109 at p. 4)

DOE notes that the MPCs for gas cooking tops evaluated in the February 2023 SNOPR effectively corresponded to a whole burner and grate system re-design based on its evaluation of the optimized burner and grate design option. 88 FR 6818, 6851. By contrast, in the August 2023 NODA, DOE updated the MPCs for gas cooking tops based on its understanding of the different types of burner and grate redesign likely to be needed to achieve each of the revised ELs, using the same underlying data as was used in the February 2023 SNOPR. 88 FR 50810, 50813. Specifically, in the August 2023 NODA, DOE noted that the incremental MPC developed for EL 1 in the February 2023 SNOPR (corresponding to a reduction of approximately 300 kBtu/year) accurately represented the cost to redesign a unit at the August 2023 NODA EL 1 to meet EL 2 (corresponding to an approximately equivalent reduction of around 300 kBtu/year). As discussed, in the August 2023 NODA, DOE defined the incremental MPC between baseline and EL 1 to be 40 percent of the incremental MPC between EL 1 and EL 2, based on its estimation of the percentage of burners with non-optimized turndown capability in the baseline units in its expanded test sample. *Id.* Also, as discussed in the August 2023 NODA, DOE estimated that the cost of implementing a burner with optimized turndown capability in place of a burner with non-optimized turndown capability to meet typical efficiencies available in the market is smaller than the cost of an entirely redesigned burner and grate system. *Id.* As such, DOE determined that a total system redesign would not be necessary to achieve EL 1 as presented in the August 2023 NODA.

For this direct final rule, DOE updated the incremental MPCs methodology for gas cooking tops based on its understanding of the different types of burner and grate redesigns likely to be needed to achieve the updated efficiency levels analyzed in this direct final rule, using the same underlying data as was used in the February 2023 SNOPR and August 2023 NODA. DOE revised the incremental MPC between baseline and EL 1 to reflect the updated efficiency level recommended by the Joint Agreement. In this direct final rule, DOE determines that all baseline gas cooking tops in the expanded test sample can achieve EL 1 by optimizing a single non-optimized burner, representing typically 20 percent of burners (one out of five). Therefore, DOE defined the incremental MPC between baseline and EL 1 as 20 percent of the previously established incremental MPC between EL 1 and EL 2. For this direct final rule, DOE used the analytical approach to determine the MPC increase between baseline and EL 2 that was presented in the August 2023 NODA.

Finally, for this direct final rule, DOE updated the underlying raw material prices used in its cost model to reflect current raw material prices, which resulted in slight changes to the MPC values in comparison to the values used in the August 2023 NODA. Table IV.22 presents the incremental MPCs for each efficiency level analyzed in this direct final rule for both gas cooking top product classes. DOE notes that the estimated incremental MPCs are equivalent for standalone cooking tops and the cooking top component of combined cooking products because none of the considered design options would be implemented differently as a function of installation configuration.

Table IV.22 Gas Cooking Tops Incremental Manufacturer Production Costs

Level	IAEC (*kBtu/year*)	Incremental MPC *(2022$)*
1	1,770	$2.67
2	1,343	$18.72

c. Conventional Ovens

For the February 2023 SNOPR, DOE developed the cost-efficiency results for each conventional oven product class based on manufacturing cost modeling of units in its sample featuring the design options. DOE noted 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. *Id.*

DOE did not receive any comments regarding conventional oven MPCs in response to the February 2023 SNOPR or the August 2023 NODA.

For this direct final rule, DOE updated the underlying raw material prices used in its cost model to reflect current raw material prices, which resulted in slight changes to the MPC values in comparison to the values used in the February 2023 SNOPR. The incremental MPCs for the electric and gas oven product classes are shown in Table IV.23 and Table IV.24, respectively.

Table IV.23 Electric Oven Incremental Manufacturer Production Costs

Level	Design Option	Incremental MPC (*2022$*)
1	Baseline + SMPS	$1.99
2	1 + Convection mode capability	$36.70
3	2 + Oven separator	$71.89

Table IV.24 Gas Oven Incremental Manufacturer Production Costs

Level	Design Option	Incremental MPC *(2022$)*
1	Baseline + SMPS	$1.99
2	1 + Convection mode capability	$26.23

D. Markups Analysis

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

As part of the analysis, DOE identifies key market participants and distribution channels. 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 the February 2023 SNOPR, DOE developed baseline and incremental markups for each actor in the distribution chain. Baseline markups are applied to the price of products with baseline efficiency, while incremental markups are applied to the difference in price between baseline and higher-efficiency models (the incremental cost increase). The incremental markup is typically less than the baseline markup and is designed to maintain similar per-unit operating profit before and after new or amended standards.[51] For the February 2023 SNOPR, DOE relied on economic data from the U.S. Census Bureau to estimate average baseline and incremental markups.[52]

For this direct final rule, DOE considered comments it had received regarding the markups analysis conducted for the February 2023 SNOPR. The approach for used for this direct final rule is the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, AHAM commented that DOE uses different markups from manufacturers to end customers for the base case and for any costs added to meet proposed standards, average, and incremental markups respectively. (AHAM, No. 2285 at pp. 50–51) AHAM commented that it, AHRI, and others have disputed this distinction over many years and rulemakings. (*Id.*) In particular, AHAM stated that its comments on DOE's 2015 NOPR for Energy Conservation Standards for Residential Dishwashers contain quotes from actual retailers about their actual practices, quotes that directly contradict a DOE process that is based on no empirical evidence and on discredited theory. (*Id.*) AHAM commented that DOE cannot ignore data that contradicts its analysis and must take these comments into account or its analysis will lack the support of facts and a resulting standard could be arbitrary and capricious. (*Id.*)

DOE's incremental markup approach assumes that an increase in operating profits, which is implied by keeping a fixed markup when the product price goes up, is unlikely to be viable over time in a reasonably competitive market like household appliance retailers. The Herfindahl-Hirschman Index (''HHI'') reported by the 2017 Economic Census indicates that the household appliance stores sector (NAICS 443141) is a competitive marketplace.[53] DOE recognizes that actors in the distribution chains are likely to seek to maintain the same markup on appliances in response to changes in manufacturer selling prices after an amendment to energy conservation standards. However, DOE believes that retail pricing is likely to adjust over time as those actors are forced 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 acknowledges that markup practices in response to amended standards are complex and varying with business conditions. However, DOE's analysis necessarily considers a very simplified and hypothetical version of the world of appliance retailing: namely, a situation in which nothing changes except for those changes in appliance offerings that occur in response to amended standards. Obtaining data on markup practices in the situation described above is very challenging. Hence, DOE continues to maintain that its assumption that standards do not facilitate a sustainable increase in profitability is reasonable.

AGA asserted that DOE's data source for developing markups in the February 2023 SNOPR for consumer cooking products differs from the data source used for rulemakings for other products. (AGA, No. 2279 at p. 40)

DOE's methodology for estimating markups is product specific and dependent on the type of distribution channels through which products move from manufacturers to purchasers. DOE uses the best available data to estimate markups for identified distribution channels for a given product. In the case of consumer cooking products, DOE identified the retail channel as the

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

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

[53] 2017 Economic Census, Selected sectors: Concentration of largest firms for the U.S. Data table available at *www.census.gov/data/tables/2017/econ/economic-census/naics-sector-44-45.html.*

dominant distribution channel and estimated markups using data from Census Bureau 2017 Annual Retail Trade Survey (ARTS).

Chapter 6 of the direct final rule TSD provides details on DOE's development of markups for consumer conventional cooking products.

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 and multi-family residences, and to assess the energy savings potential of increased consumer conventional cooking products 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 new or amended standards.

In the February 2023 SNOPR, DOE used 2019 California Residential Application Saturation Study (''RASS'') [54] and 2021 field-metered data from the Pecan Street Project.[55] From the Pecan Street data, DOE performed an analysis of 39 households in Texas and 28 households in New York to 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.

In the February 2023 SNOPR, DOE established a range of energy use from data in the EIA's 2015 Residential Energy Consumption Survey (''RECS 2015'').[56] RECS 2015 does not provide the annual energy consumption of cooking tops, but it does provide the frequency of cooking top use.[57] DOE 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. DOE relied on California RASS 2021 and Pecan Street Project data to establish the average annual energy consumption of a conventional cooking top and a conventional oven.

For this direct final rule, DOE considered comments it had received regarding the energy use analysis conducted for the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, AHAM questioned whether DOE uses RECS end-use energy consumption estimates and has reviewed the underlying analyses and equations for allocating energy by end use and the related regression or similar statistics for RECS consumption data. (AHAM, No. 127 at p. 3)

DOE's energy use analysis for consumer conventional cooking products does not make use of end-use energy consumption estimates in RECS. As described in the February 2023 SNOPR, DOE used available field-metered data to estimate the average annual energy use of consumer conventional cooking products. DOE used RECS responses on the frequency of use to establish a range of energy consumption values.

In response to the February 2023 SNOPR, AHAM commented that DOE should retain its current estimate of cooking cycles since DOE has computed an average number of cooking cycles per year at 418 based on the 2015 RECS, which essentially agrees with RECS 2020 data and points to stability in cooking behavior over the past several years. (AHAM, No. 2285 at p. 44)

In response to the August 2023 NODA, AGA *et al.* commented that DOE should update the consumer sample to the more recent and larger RECS 2020 sample rather than rely on RECS 2015 as done in the February 2023 SNOPR and August 2023 NODA. (AGA *et al.,* No. 10112 at pp. 11–12)

DOE agrees with AHAM's assessment that the average number of cooking cycles remains similar between RECS 2015 and RECS 2020 reflecting stability in cooking behavior in recent years. For this direct final rule, DOE has updated the consumer sample to RECS 2020 to estimate the variability in cooking energy use.[58]

AHAM noted that while there may have been some change in cooking at home during the COVID pandemic, it is too soon to determine whether there is a long-term trend for more home-cooked meals and DOE should wait to assess this until the next round of standards when more data will be available. (AHAM, No. 2285 at p. 44)

For this direct final rule, DOE includes more recent 2022 Pecan Street Project data in its estimate of the annual energy use for consumer conventional cooking products. These data are less influenced by the impacts of the COVID pandemic and more representative of current cooking product usage.

Whirlpool commented that by lessening the utility of consumer conventional cooking products such as gas stoves and ranges, the standard proposed in the February 2023 SNOPR may have the unintended effect of influencing consumers to maintain the level of cooking performance they require through less efficient, less cost effective, and more carbon-intensive alternatives (*e.g.,* eat outside of the home more frequently, cater food, or use an outdoor grill). (Whirlpool, No. 2284 at pp. 7–8)

As discussed in section V.B.4 of this document, DOE has determined that the standards adopted in this direct final rule will not lessen the utility or performance of the consumer conventional cooking products under consideration in this rulemaking. Therefore, DOE does not expect and is unaware of any data to indicate that the performance standards adopted in this direct final rule would cause a meaningful change in consumers' cooking behavior.

NPGA recommended that DOE adopt kBtu/year as the unit of measure for reporting the energy use of both electric and gas cooking products, which is consistent with DOE's use of FFC analysis in the rule, to better facilitate the comparison between fuel types. (NPGA, No. 2270 at pp. 3, 6)

For the purposes of calculating consumer costs in the LCC, DOE's presentation of site energy consumption

[54] Available at *www.energy.ca.gov/data-reports/surveys/2019-residential-appliance-saturation-study.*

[55] Available at *www.pecanstreet.org/dataport.*

[56] 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/.*

[57] 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.

[58] U.S. Department of Energy: Energy Information Administration, Residential Energy Consumption Survey: 2020 RECS Survey Data (2023). Available at *www.eia.gov/consumption/residential/data/2020/.*

values for electric and gas products is aligned with the measure of energy consumption most familiar to consumers and the unit used for calculating consumer energy bills. For example, electric utilities typically charge by the kWh rather than by kBtu. DOE also notes that the units used in presenting energy consumption align with the energy units used in the DOE test procedure. DOE continues to calculate and present full-fuel cycle national energy savings for gas and electric in quadrillions of Btus (''quads'').

Chapter 7 of the direct final rule TSD 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 new or amended 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 2020 RECS. For each sample household, DOE determined the energy consumption for the consumer conventional cooking 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.

For this direct final rule, DOE considered comments it had received regarding the LCC analysis conducted for the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, AHAM commented that RECS is a comprehensive and extremely valuable survey program providing many important insights, but DOE pushes the survey data further than it can support and in doing so, DOE is introducing ''outlier'' values into its LCC analysis and then assuming that those outlier households with very high energy consumption are just as likely as any other household to select an energy efficient appliance absent standards (*i.e.,* in the no-new-standards case). (AHAM, No. 2285 at pp. 51–52) AHAM commented that the effect of this process is that the mean (or average) LCC savings at any standard level are significantly higher than the median (50th percentile) where ordinarily in a statistical distribution, the mean and the median should be relatively close together. (*Id.*) AHAM stated that it and AHRI have commented on this and some of the reasons to treat the RECS data with caution in numerous rulemakings and both commenters and others have proposed that DOE use medians rather than means to avoid many of the random assignment and data issues. (*Id.*)

DOE notes that there is no indication that any of households in the RECS sample represent non-valid data that should be excluded as an outlier. Excluding minimum and maximum values from the field-based usage statistics would result in a less accurate representation of the actual energy consumption patterns exhibited by households participating in the survey. However, as a standardized approach, DOE presents all statistic results of LCC savings in chapter 8 of its TSD (*i.e.,* histograms or box plots). This approach allows stakeholders to observe the full range of LCC savings and understand the distribution of results, enabling a more informed evaluation of the potential impacts of the proposed standards. In addition, DOE's decision on amended standards is not solely determined by (mean) LCC savings. While LCC savings play a role, they may be considered alongside other critical factors, including the percentage of negatively impacted consumers, the simple payback period, and the overall impact on manufacturers.

Strauch recommended that DOE explicitly address dual-fuel ranges. (Strauch, No. 2263 at p. 3)

DOE notes that RECS 2020 identifies households with dual-fuel ranges and those consumers are included in the LCC analysis. Those households are represented in the analysis as having a gas cooking top and an electric oven.

Inputs to the LCC calculation include the installed cost to the consumer, operating expenses, the lifetime of the product, and a discount rate. 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. Inputs to the payback period calculation include the installed cost to the consumer and first year operating expenses. 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 products user samples. For this rulemaking, the Monte Carlo approach is implemented in MS Excel together with the Crystal Ball™ add-on.[59] 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

[59] Crystal Ball™ is commercially available software tool to facilitate the creation of these types of models by generating probability distributions and summarizing results within Excel, available at *www.oracle.com/technetwork/middleware/crystalball/overview/index.html* (last accessed July 28, 2023).

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 consumer conventional cooking products as if each were to purchase a new product in the first year of required compliance with new or amended standards. For TSLs other than TSL 1 (the Recommended TSL detailed in the Joint Agreement), new and amended standards 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)) Therefore, DOE used 2027 as the first year of compliance with any new or amended standards for consumer conventional cooking products for TSL 2 and 3. For TSL 1, DOE used 2028 as the first year of compliance for all product classes as specified for the Recommended TSL in the Joint Agreement.

Table IV.25 summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The subsections that follow provide further discussion. Details of the spreadsheet model, and of all the inputs to the LCC and PBP analyses, are contained in chapter 8 of the direct final rule TSD and its appendices.

Table IV.25 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 2022. Assumed no change with efficiency level, except for increased costs associated with the installation of an induction unit relative to baseline smooth element cooking tops.
Annual Energy Use	The average energy use is based on estimates from field-metered data. Variability: Based on RECS 2020.
Energy Prices	Electricity: Based on Edison Electric Institute data for 2022. Natural Gas: Based on EIA's Natural Gas Navigator for 2022. Variability: Regional energy prices by Census Division.
Energy Price Trends	Based on *AEO2023* price projections.
Repair and Maintenance Costs	Baseline repairs costs derived from available literature. Assumed no change with efficiency level, except for increased costs associated with the repair of an induction unit relative to baseline smooth element cooking tops. Assumed maintenance costs do not vary 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	2028 for TSL 1 (the Recommended TSL); 2027 for all other TSLs

* 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 direct final rule TSD.

1. Product Cost

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

Economic literature and historical data suggest that the real costs of many products may trend downward over time according to ''learning'' or ''experience'' curves. Experience curve analysis implicitly includes factors such as efficiencies in labor, capital investment, automation, materials prices, distribution, and economies of scale at an industry-wide level.[60] In the experience curve method, the real cost of production is related to the cumulative production or ''experience'' with a manufactured product. 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 1967–2022.[61] For the gas cooking product price trend, DOE used the ''Gas household ranges, ovens, surface cooking units and equipment'' for 1981–2022.[62]

For this direct final rule, DOE considered comments it had received

[60] Taylor, M. and Fujita, K.S. Accounting for Technological Change in Regulatory Impact Analyses: The Learning Curve Technique. LBNL–6195E. Lawrence Berkeley National Laboratory, Berkeley, CA. April 2013. Available at *escholarship.org/uc/item/3c8709p4#page-1.*

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

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

regarding the methodology for calculating consumer product costs that was presented in the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, AHAM commented that it and several other stakeholders have showed in previous rulemakings there is little to no theoretical underpinning for why an ''experience or learning curve'' should exist that would reduce the expected extra manufacturing costs required to meet proposed standard levels, what functional form it should take and, even, whether it should be a continuous function. (AHAM, No. 2285 at p. 51) AHAM commented that the experience or learning curve is merely an empirical relationship, and as such, there needs to be a clear connection between the actual products in question and the data used to develop the relationship. (*Id.*) AHAM commented that analogs are of highly questionable applicability, that when the data takes a new shape, DOE must adjust its equations to reflect that change, and that continuing to use old data and equations simply to create a longer time series is not acceptable. (*Id.*)

DOE notes that there is considerable empirical evidence of consistent price declines for appliances in the past few decades. Several studies examined refrigerator retail prices during different periods of time and showed that prices had been steadily falling while efficiency had been increasing, for example Dale *et al.* (2009) [63] and Taylor *et al.* (2015).[64] As mentioned in Taylor and Fujita (2013),[65] Federal agencies have adopted different approaches to account for ''the changing future compliance costs that might result from technological innovation or anticipated behavioral changes.'' Given the limited data availability on historical manufacturing costs broken down by different components, DOE utilized the PPI published by the BLS as a proxy for manufacturing costs to represent the analyzed product as a whole. While products may experience varying degrees of price learning during different product stages, DOE modeled the average learning rate based on the full historical PPI series for ''electric household ranges, ovens, surface cooking units and equipment'' and ''gas household ranges, ovens, surface cooking units and equipment'' to capture the overall price evolution in relation to the cumulative shipments for electric and gas products, respectively. DOE also conducted sensitivity analyses that are based on a particular segment of the PPI data for household refrigerator manufacturing to investigate the impact of alternative product price projections (low price learning and high price learning) in the NIA of this direct final rule. For details of the sensitivity results, *see* appendix 10C of the direct final rule TSD.

ASAP *et al.* noted that DOE may be overestimating the price of EL 3 for electric smooth element cooking tops. ASAP *et al.* expect that the price trend for units with induction technology will decline faster than the overall price trend associated with electric cooking products. (ASAP *et al.,* No. 2273 at p. 4)

DOE appreciates the comment on price learning for induction technology. DOE acknowledges that technologies at different maturity levels may experience different rates of price learning. However, the type of data required to develop a component-based price learning for cooking tops using induction technology is currently very limited. Hence, DOE applied the same learning rate to all electric cooking products in this direct final rule analysis.

AGA asserted the equipment costs presented in the February 2023 SNOPR do not reflect the costs of products available on the market as compared to ''Material costs'' listed in RS Means or products available from online retailers. (AGA, No. 2279 at p. 40)

Equipment costs estimated in the February 2023 SNOPR characterize the retail price of products at each efficiency level, holding all other product characteristics and features constant, in the compliance year. The analysis explicitly attempts to estimate costs for each EL at scale, as if each EL were the new baseline product. This may differ from actual market conditions where more efficient options may be bundled with other non-efficiency related features or not currently manufactured at the same scale as the baseline product. Additionally, DOE applies price learning factors to estimate the equipment cost in the year of compliance based on trends observed in historical data, making comparisons with current market prices inappropriate.

AGA asserted that in the February 2023 SNOPR analysis DOE used a simple national average sales tax in the LCC analysis that was inconsistent with other rulemakings. (AGA, No. 2279 at p. 40)

For the February 2023 SNOPR and this direct final rule, DOE used State-level data downloaded from the Sales Tax Clearinghouse to capture the geographic variability in sales tax.[66] The data are aggregated to the Census Division level based on projected State populations in the compliance year and assigned to households in the consumer sample. DOE notes that the calculated average presented in the February 2023 SNOPR TSD is a population-weighted value, rather than a simple average, and is not directly used in the LCC Monte Carlo analysis.

For additional details, *see* chapter 8 of the TSD of this direct final rule.

2. Installation Cost

Installation cost includes labor, overhead, and any miscellaneous materials and parts needed to install the product that could vary by efficiency.

In the February 2023 SNOPR, DOE used data from the 2021 RS Means Mechanical Cost Data [67] 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 and for both electric and gas products. In the case of electric smooth element cooking top product classes, the induction heating at EL 3 requires a change of cookware to ones 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 an average number of pots and pans utilized by a representative household to estimate this portion of the installation cost.

For this direct final rule, DOE considered comments it had received regarding the methodology for calculating installation costs that was presented in the February 2023 SNOPR.

[63] Dale, L., C. Antinori, M. McNeil, James E. McMahon, and K.S. Fujita. Retrospective evaluation of appliance price trends. Energy Policy. 2009. 37 (2) pp. 597–605. *doi.org/10.1016/j.enpol.2008.09.087.*

[64] Taylor, M., C.A. Spurlock, and H.-C. Yang. Confronting Regulatory Cost and Quality Expectations. An Exploration of Technical Change in Minimum Efficiency Performance Standards. 2015. Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States). Report No. LBNL–1000576. Available at *www.osti.gov/biblio/1235570/* (last accessed June 30, 2023).

[65] Taylor, M. and K.S. Fujita. Accounting for Technological Change in Regulatory Impact Analyses: The Learning Curve Technique. 2013. Lawrence Berkeley National Lab (LBNL), Berkeley, CA (United States). Report No. LBNL–6195E. Available at *escholarship.org/uc/item/3c8709p4* (last accessed July 20, 2023).

[66] Available at *thestc.com/STRates.stm* (last accessed on August 17, 2023).

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

The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, AGA commented that DOE's LCC model makes simplified cost assumptions about cooking tops, beginning with unrealistically low assumptions about installation for both labor and equipment needed. (AGA, No. 2279 at pp. 35–36) AGA commented that equipment and installation costs should vary by region, building type, installation site, and within a specific product class by more than a few dollars as determined by DOE. (*Id.*) AGA commented that DOE's model includes the same installation cost for both gas or electric appliances and ignores the fact that, for example, a gas hookup can involve different steps and safety procedures that can change the average labor cost compared to electric products. (*Id.*)

DOE acknowledges that cost of installation may vary by installation location and fuel type. In this direct final rule, DOE derived fuel-specific installation costs for electric and gas products as well as geographic-dependent labor factors to account for the variability in installation costs in its LCC analysis. DOE assumed that average values derived from RS Means 2022 [68] would be representative of the national value for installation of electric products. For gas products, DOE included an additional labor cost including a gas plumber to perform any additional set-up specific to gas appliances. DOE developed geographic labor factors from RS Means 2022. DOE notes that that there were no data indicating that the installation cost varies with efficiency for electric ovens and gas cooking products and assigned the same installation cost to all efficiency levels.

AGA questioned why additional material costs were included in the installation cost for induction units but not for other efficiency levels. (AGA, No. 2279 at p. 37)

The installation of an induction electric smooth element cooking top requires additional costs for wiring upgrades and purchasing ferromagnetic pots that are not needed for non-induction electric smooth element cooking tops. A standard at EL 3 would require all electric smooth element cooking top consumers to purchase an induction unit, including the majority of consumers that would have purchased a non-induction unit in the no-new-standards case. For this reason, DOE includes the extra cost for materials in order to more accurately reflect the increase in installation costs that consumers will incur as a result of a standard. For all other product classes, DOE did not find evidence that material costs would differ between efficiency levels and therefore assumed that material costs would not increase as a result of a standard.

ASAP *et al.* noted that, due to a lack of information about the existing amperage of electric circuits in homes, DOE assumed that 50 percent of the user population would need wiring upgrades to meet EL 3; however, ASAP *et al.* stated that wiring upgrades may be necessary even in the base case for homes with older electric cooking tops and smaller breaker capacities (*i.e.,* 30 amps). (ASAP *et al.,* No. 2273 at p. 4)

DOE acknowledges it is possible that wiring updates may be necessary in older homes in the no-new-standards case. However, households requiring wiring upgrades in both the no-new-standards case (*i.e.,* the base case) and a standards case will not incur an additional cost attributable to a standard and, thus, will not impact the LCC savings calculation.

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 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 2022 using data from EEI Typical Bills and Average Rates reports. Based upon comprehensive, industry-wide surveys, this semi-annual report presents typical monthly electric bills and average kilowatt-hour costs to the customer as charged by investor-owned utilities. For the residential sector, DOE calculated electricity prices using the methodology described in Coughlin and Beraki (2018).[69] For the commercial sector, DOE calculated electricity prices using the methodology described in Coughlin and Beraki (2019).[70]

DOE obtained data for calculating regional prices of natural gas in 2022 from the EIA publication, *Natural Gas Navigator.*[71] 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 and natural gas 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 prices for the nine census divisions. *See* chapter 8 of the direct final rule TSD for details.

To estimate energy prices in future years, DOE multiplied the 2022 energy prices by the projection of annual average price changes for each of the nine census divisions from the Reference case in *AEO2023,* which has an end year of 2050.[72] To estimate price trends after 2050, the 2046–2050 average was used for all years.

ONE Gas commented that DOE's forecasting errors were compounded by price trends used in the calculations that do not reflect the return of natural gas prices to historically low levels following the COVID–19 pandemic run up or the sharp increases in consumer electricity prices in States where electrification policies are driving all-electric new construction. (ONE Gas, No. 2289 at pp. 6–7; ONE Gas, No. 10109 at p. 4) ONE Gas commented that these are real relative consumer energy prices that tilt the consumer economics in favor of natural gas in the near term but that will have persistent impacts on future prices over the timeline of the rulemaking analysis. (*Id.*) ONE Gas

[68] RS Means Company Inc., RS Means Mechanical Cost Data (2022). Available at *rsmeans.com* (last accessed on Aug. 3, 2023).

[69] 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. Available at *ees.lbl.gov/publications/residential-electricity-prices-review.*

[70] 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.*

[71] U.S. Department of Energy–Energy Information Administration. Natural Gas Navigator 2022. Available at *www.eia.gov/naturalgas/data.php* (last accessed July 28, 2023).

[72] EIA. *Annual Energy Outlook 2023.* Available at *www.eia.gov/outlooks/aeo/* (last accessed Aug. 3, 2023).

noted that DOE did not include supply chain price inflation that is already affecting first costs of consumer conventional cooking products. (*Id.*) ONE Gas commented that wholesale commodity prices appear to be leveling off, but consumer prices for durable goods have increased via a step function due to the war in Ukraine, the COVID–19 pandemic, and other disruptions, and these costs will not be coming down via either economic recovery or recession. (*Id.*) ONE Gas commented that it anticipates that DOE's use of RECS 2015 data (instead of RECS 2020) will exacerbate these deviations from real world prices and consumer LCC. (*Id.*)

AGA commented that the February 2023 SNOPR uses an energy price forecast based on the *AEO,* which has consistently overestimated future natural gas energy costs. (AGA, No. 2279 at pp. 33–34; AGA *et al.,* No. 10112 at p. 7) ONE Gas provided similar comments, and noted that the forecast overstates LCC savings and paybacks for natural gas alternatives. (ONE Gas, No. 2289 at pp. 5–6) AGA commented that the statistically biased outcome toward higher prices in the *AEO* reveals a need for DOE's analysis to use a distribution of prices in its model simulations and not a forecasted mean. (AGA, No. 2279 at pp. 33–34; AGA *et al.,* No. 10112 at p. 7) ONE Gas commented that DOE uses single time series consumer energy price forecasts for electricity and gaseous fuels in contrast to the probability-weighted analysis input variables DOE has used in Monte Carlo simulations in the consumer LCC savings analysis. (ONE Gas, No. 2289 at pp. 5–6)

DOE maintains that the patterns of difference between *AEO* projections and actual energy prices do not reflect a systematic bias in the model used to prepare the *AEO* or the assumptions. The *AEO2023* projection for residential natural gas prices shows constant-dollar prices declining from the 2022–2023 spike and then increasing at a slow rate starting around 2030. Rather than use a distribution of prices, DOE conducted a sensitivity analysis using *AEO2023* cases that exhibit higher and lower energy prices than the Reference projection. The analysis and results are described in appendix 8E of the direct final rule TSD.

In response to the February 2023 SNOPR, the CO_2 Coalition requested that DOE explain the data supporting its proposed energy conservation standards for consumer cooking tops, including the data showing natural gas is cheaper than electricity. The CO_2 Coalition commented that DOE cannot ignore a category of costs (*e.g.,* upstream renewable energy generation costs) and stated that the CO_2 Coalition was unable to understand how electricity, which costs 3.5 times more than natural gas, is more energy efficient. The CO_2 Coalition requested additional information regarding how DOE computed the anticipated savings attributed to the proposed standards. (The CO_2 Coalition, No. 2275 at pp. 6–7)

In response to the August 2023 NODA, ONE Gas and AGA *et al.* commented that the DOE's recently published representative average unit costs of energy indicates that natural gas is more affordable that other fuels including electricity on a unit cost basis. (ONE Gas, No. 10109 at pp. 1–2; AGA *et al.,* No. 101112 at p. 7)

DOE provides the methodology and data sources for calculating energy cost savings by geographic location in Chapter 8 of the TSD and energy cost accounting in Chapter 15 of the TSD. The representative average unit referenced by ONE Gas and AGA *et al.* are used by manufacturers to comply with the U.S. Federal Trade Commission (''FTC'') labeling requirements and do not capture the diversity in energy costs utilized in the LCC analysis.

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 entail no, or only minor, changes in repair and maintenance costs compared to baseline efficiency products.

For this direct final rule, DOE updated repair costs for all product classes based on available online data. For cooking tops, DOE used data from a 2022 Consumer Reports survey.[73] DOE assumed a repair cost of $153 for a gas cooking top, $192 for a non-induction electric smooth element cooking top, and $536 for an induction electric smooth element cooking top. For ovens, DOE used data from an online appliance repair website that presented average values of $150 for electric ovens and $350 for gas ovens.[74] With the exception of induction electric smooth element cooking tops, DOE notes repair costs do not vary by efficiency level, and remain the same in the no-new-standards and standards cases leading to no additional repair cost as a result of a standard.

6. Product Lifetime

For consumer conventional cooking products, DOE used a variety of sources to establish low, average, and high estimates for product lifetime. Additionally, DOE used AHAM's input on the average useful life by product category, such as electric range, gas range, wall oven, and electric cooking top. Utilizing this detail and the market shares of these product categories, DOE estimated the average lifetime estimates to be 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.

7. Discount Rates

In the calculation of LCC, DOE applies discount rates appropriate to households to estimate the present value of future expenditures and 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.[75] 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, the application of a marginal interest rate associated with an initial source of funds is inaccurate. Regardless of the method of purchase, consumers are expected to continue to rebalance their debt and asset holdings over the LCC analysis period, based on the restrictions consumers face in their debt payment requirements and the relative size of the interest rates available on debts and assets. DOE estimates the aggregate impact of this rebalancing using the historical distribution of debts and assets.

[73] Available at *www.consumerreports.org/appliances/cooktops/should-you-repair-or-replace-your-broken-cooktop-a6490859316* (last accessed on Aug. 7, 2023).

[74] Available at *www.fixr.com/costs/oven-repair* (last accessed on Aug. 7, 2023).

[75] 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.

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 [76] (''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 new and 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 4.1 percent. See chapter 8 of the direct final rule TSD for further details on the development of consumer discount rates.

For this direct final rule, DOE considered comments it had received regarding the discount rates used in the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, AHAM commented that DOE uses an inappropriate discount rate in its analysis of the effects of standards on low-income households, claiming that this analysis does not take into account issues of capital availability or the non-financial costs from a purchase. (AHAM, No. 2285 at pp. 49–50) AHAM also presented data from its survey work with Bellomy Research showing that the lowest 30-percent income groups have no discretionary income to save, making it impossible for these groups to rebalance their balance sheets after making a purchase. (*Id.*)

With respect to the issue of DOE's methodology for estimating consumer discount rates, DOE maintains that the LCC is not predicting a purchase decision, as AHAM seems to interpret given a focus on the availability of cash for appliance purchases. Rather, the LCC estimates the net present value of the financial impact of a given standard level over the lifetime of the product (*i.e.,* 14.5 years for gas cooking products and 16.8 years for electric cooking products) assuming the standard-compliant product has already been installed, and allows for comparison of this value across different hypothetical minimum efficiency levels. The LCC is applied to future-year energy costs and non-energy operations and maintenance costs in order to calculate the net present value of the appliance to a household at the time of installation. The consumer discount rate reflects the opportunity cost of receiving energy cost savings in the future, rather than at the time of purchase and installation. The opportunity cost of receiving operating cost savings in future years, rather than in the first year of the modeled period, is dependent on the rate of return that could be earned if invested into an interest-bearing asset or the interest cost accrual avoided by paying down debt. Consumers in all income groups generally hold a variety of assets (*e.g.,* certificates of deposit, stocks, bonds) and debts (*e.g.,* mortgage, credit cards, vehicle loan), which vary in amount over time as consumers allocate their earnings, make new investments, *etc.* Thus, the consumer discount rate is estimated as a weighted average of the rates and proportions of the various types of assets and debts held by households in each income group, as reported by the Survey of Consumer Finances. In the low-income subgroup analysis, DOE separately evaluated the impact of increased efficiency standards on low-income households using discount rates estimated specifically for the low-income group.

Whirlpool commented that DOE's analysis fails to account for the fact that many consumers, especially low-income consumers, finance their appliance purchases through loans or other methods, and any increase in the upfront cost of an appliance will have a direct impact on the cost of financing the appliance. (Whirlpool, No. 2284 at p. 5) Whirlpool stated that financing comes at a cost that exceeds the face value of a product, specifically in cases in which consumers owe interest, and recommended that DOE account for these costs in the proposal. (*Id.*)

In the case of gas cooking tops (standalone and as a component of a combined cooking product), the price differential between EL 1 (the adopted standard level) and baseline is $4.04 in 2028, the first year of compliance at the Recommended TSL. If a consumer purchases the more efficient unit on a credit card with a 25-percent APR, it would amount to an additional financing cost of only about $0.09 per month in the first year of leaving the balance on the card. While the compound interest could start to accumulate if the balance was left unpaid for an extended period of time (*e.g.,* for the life of the appliance or longer), DOE contends that it would be an unusual case as the Survey of Consumer Finances shows that consumers across all income groups generally rebalance their assets and debts before a significant amount of interest is incurred.

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 new or amended energy conservation standards) in the compliance year. This approach reflects the fact that some consumers may purchase products with efficiencies greater than the baseline levels in the absence of new or amended standards.

In the February 2023 SNOPR, DOE estimated the efficiency distribution for each product class of cooking tops from the tested efficiencies of cooking tops used to develop the SNOPR 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 the compliance year in the no-new-standards case.

In the February 2023 NODA, DOE clarified that the efficiency distribution for gas cooking tops presented in the February 2023 SNOPR did not include higher-efficiency ''entry-level'' products [77] that were not included in the development of efficiency levels. Based on its testing results and model counts of the burner/grate configurations of gas cooking top models currently available on the websites of major U.S. retailers, DOE estimated in the February 2023 NODA that the products that were screened out of the engineering analysis represent over 40 percent of the market and exceed the max tech efficiency levels. DOE further estimated that nearly half of the total gas cooking top market currently meets or exceeds the max tech level. 88 FR 12605.

Multiple stakeholders questioned DOE's methodology for estimating the percentage of gas cooking tops that

[76] U.S. Board of Governors of the Federal Reserve System. Survey of Consumer Finances. 1995, 1998, 2001, 2004, 2007, 2010, 2013, 2016, and 2019. Available at *www.federalreserve.gov/econresdata/scf/scfindex.htm* (last accessed Aug. 3, 2023).

[77] As discussed in chapter 5 of the direct final rule TSD, DOE defined products that do not have at least one HIR burner and continuous cast-iron grates as ''entry-level.''

would meet the standard proposed in the February 2023 SNOPR and August 2023 NODA. AHAM stated that DOE did not provide data in the February 2023 SNOPR or TSD to support the assertion that nearly half of the gas cooking tops meet the proposed standard. (AHAM, No. 127 at p. 2) NPGA commented that the method by which DOE arrived at the market share of gas cooking tops screened out of the February 2023 SNOPR is suspect. (NPGA, No. 2270 at p. 10) The Institute for Energy Research (''IER'') stated that DOE provides no support to the assertion made in the February 2023 NODA that nearly half of the total gas cooking tops market currently achieve EL 2. (IER, No. 2274 at pp. 5–6) Western Alliance Energy commented that DOE issued conflicting information between the February 2023 SNOPR and the August 2023 NODA regarding the market share of gas cooking tops that would be able to meet the proposed standard. (Western Alliance Energy, No. 2272 at p. 3) AHAM commented that DOE has presented contradictory information and data regarding the percentage of compliant gas cooking tops, using its test sample in the February 2023 SNOPR and including model counts based on product features in the August 2023 NODA. (AHAM, No. 2285 at pp. 13–15) Spire stated its concern regarding DOE's assumption that all gas cooking top products lacking both HIR burners and cast-iron grates meet the standard proposed in the February 2023 SNOPR because DOE tested only two such products. (Spire, No. 2710 at pp. 5–7)

NAHB commented that gas ranges are crucial for affordable housing as they represent the more affordable end of the product spectrum and are often used in starter homes and dwellings with limited kitchen sizes. (NAHB, No. 2288 at p. 2) NAHB commented that DOE's methodology investigated product samples that are not representative of the overall product market, by oversampling gas cooking tops versus gas ranges, with outcomes that penalize cooking tops that are part of a range. (*Id.*) NAHB commented that many consumer-preferred ranges will likely be unable to comply with the standards proposed in the February 2023 SNOPR despite being a popular consumer choice. (*Id.*)

AHAM commented that DOE must demonstrate that its proposed rule is based on adequate data and is not arbitrary and capricious and added that DOE should not proceed to a final rule without ensuring that its test sample is representative of the market. (AHAM, No. 2285 at pp. 6–8) AHAM commented that although it conducted testing in support of its comments, the AHAM test sample does not solve the representativeness issue. (*Id.*)

AHAM commented that its data show that in its test sample, DOE significantly under-sampled gas ranges, which represent a majority of gas cooking top shipments in 2022 and over-sampled gas standalone cooking tops, then relied on these test samples as representative of the market, representing a significant error. (*Id.* at p. 6) AHAM presented shipment data stating that 86.7 percent of gas cooking tops were shipped as part of gas ranges in 2022, whereas DOE's test sample only includes 38.1 percent of gas ranges. (*Id.*) AHAM presented a table showing that gas and electric ranges represented 91 percent of the total cooking products shipped in 2022. (*Id.* at p. 27)

AHAM commented that its data show that in its test sample, DOE significantly over-sampled induction cooking tops among electric products. (*Id.* at p. 6) AHAM presented 2022 shipment data stating that 4.6 percent of electric cooking tops were induction, whereas they represent 40.9 percent of DOE's test sample. (*Id.*) AHAM also presented 2022 shipment data stating that 25.6 percent of electric cooking tops use open (coil) elements, whereas they only represent 9.1 percent of DOE's test sample. (*Id.*)

ASAP *et al.* supported DOE's estimate of the percentage of gas cooking tops on the market that meet the standard proposed in the February 2023 SNOPR. (ASAP *et al.,* No. 2273 at p. 3)

In the August 2023 NODA, DOE updated its analysis in response to stakeholder data and information received in response to the February 2023 SNOPR. 88 FR 50810, 50811. For electric cooking tops, DOE used AHAM shipment data to calculate an updated efficiency distribution incorporating weightings for electric smooth element cooking tops are that are sold as components of conventional ranges (93.4 percent) and as a standalone unit (6.6 percent), as well as weightings for radiant technology (93.8 percent) and induction technology (6.2 percent). *Id.* at 88 FR 50814. For gas cooking tops, DOE presented updated efficiency levels based on substantive feedback provided by stakeholders (*see* section IV.C.1.a of this document) and presented updated efficiency distributions incorporating weightings for gas cooking tops are that are sold as components of conventional ranges (86.7 percent) and as a standalone unit (13.3 percent), as well as weightings for entry-level cooking tops (40 percent) and non-entry-level [78] cooking tops (60 percent). *Id.* at 88 FR 50815. DOE notes that the expanded data set shows that not all entry-level gas cooking tops achieve the updated EL 2 efficiency, and that the updated efficiency distributions reflect this fact. *Id.* In the August 2023 NODA, DOE maintained the same efficiency distributions for electric and gas ovens as was used in the February 2023 SNOPR. *Id.*

ONE Gas asserted that DOE characterizing gas cooking tops as entry-level or non-entry-level is antithetical to DOE's rulemaking responsibilities for setting energy efficiency standards for covered products generally and *ad hoc* and undefined with respect to DOE's responsibility for defining consumer benefits. (ONE Gas, No. 10109 at p. 3) ONE Gas commented that it understood the characterization of entry-level products as an attempt to capture low-income consumer products. (*Id.*) ONE Gas asserted that this interpretation is unwarranted without additional description of how DOE uses such characterizations, an analysis of the economic burden that these types of minimum efficiency standards could impose, and an analysis on the income effect of standards. (*Id.*) ONE Gas commented that entry-level gas products represent the most viable and cost-effective energy solution and asserted that by characterizing these products as such, DOE presumes that consumers will upgrade to more expensive products.

In response to ONE Gas's assertion that DOE characterizing gas cooking tops as entry-level or non-entry-level is *ad hoc* and antithetical to DOE's rulemaking responsibilities, DOE notes that the categorization was used for the purposes of defining the no-new-standards case efficiency distributions. DOE notes that entry-level gas cooking tops, while being typically the cheapest products, are also often the most efficient and that all of the entry-level gas cooking tops in DOE's expanded test sample meet the adopted standard level.

ASAP *et al.* commented in support of the updated no-new-standards case market share estimates for electric smooth element cooking tops and gas cooking tops based on shipment estimates recently provided by manufacturers. (ASAP *et al.,* No. 10113 at p. 1)

For this direct final rule, DOE used the methodology from the August 2023

[78] As discussed in chapter 5 of the direct final rule TSD, DOE defined products that feature at least one HIR burner and continuous cast-iron grates as ''non-entry-level''.

NODA to estimate efficiency distributions for electric smooth element cooking top product classes, gas cooking top product classes, electric oven product classes, and gas oven product classes. As in the February 2023 SNOPR, DOE assumed no efficiency trend.

The estimated market shares for the no-new-standards case for consumer conventional cooking products are shown in Table IV.26 through Table IV.29. See chapter 8 of the direct final rule TSD for further information on the derivation of the efficiency distributions.

Table IV.26 Electric Smooth Element Cooking Top Market Shares for the No-New-Standards Case

Standalone Cooking Top			Cooking Top Component of a Combined Cooking Product		
Efficiency Level	**IAEC** *(kWh/year)*	**Market Share** *(%)*	**Efficiency Level**	**IAEC** *(kWh/year)*	**Market Share** *(%)*
Baseline	250	23%	Baseline	250	23%
1	207	62%	1	207	62%
2	189	15%	2	189	15%
3	179	0.02%	3	179	0.02%

Table IV.27 Gas Cooking Top Market Shares for the No-New-Standards Case

Standalone Cooking Top			Cooking Top Component of a Combined Cooking Product		
Efficiency Level	**IAEC** *(kBtu/year)*	**Market Share** *(%)*	**Efficiency Level**	**IAEC** *(kBtu/year)*	**Market Share** *(%)*
Baseline	1,900	3%	Baseline	1,900	3%
1	1,770	56%	1	1,770	56%
2	1,343	41%	2	1,343	41%

Table IV.28 Electric Oven Market Shares for the No-New-Standards Case

Efficiency Level	Electric Standard Ovens, Freestanding	Electric Standard Ovens, Built-In/Slide-In	Electric Self-Clean Ovens, Freestanding	Electric Self-Clean Ovens, Built-In/Slide-In
0	5%	5%	5%	5%
1	57%	65%	18%	7%
2	38%	30%	77%	86%
3	0%	0%	0%	2%

Table IV.29 Gas Oven Market Shares for the No-New-Standards Case

EL	Gas Standard Ovens, Freestanding	Gas Standard Ovens, Built-In/Slide-In	Gas Self-Clean Ovens, Freestanding	Gas Self-Clean Ovens, Built-In/Slide-In
0	4%	4%	4%	4%
1	34%	58%	3%	19%
2	62%	38%	93%	77%

The LCC Monte Carlo simulations draw from the efficiency distributions and randomly assign an efficiency to the consumer conventional cooking products purchased by each sample household in the no-new-standards case. The resulting percent shares within the sample match the market shares in the efficiency distributions.

In the February 2023 SNOPR, DOE performed a random assignment of efficiency levels to consumers in its Monte Carlo sample. 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, because it 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 consumer 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.

The following discussion provides more detail about the various market failures that affect consumer conventional cooking product purchases. First, consumers are motivated by more than simple financial trade-offs. There are several behavioral factors that can influence the purchasing decisions of complicated multi-attribute products, such as consumer 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 are presented for any given choice scenario.[79] 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, competing demands for funds), 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.[80] Thaler, who won the Nobel Prize in Economics in 2017 for his contributions to behavioral economics, and Sunstein point out that these behavioral factors are strongest when the decisions are complex and infrequent, when feedback on the decision is muted and slow, and when there is a high degree of information asymmetry.[81] These characteristics describe almost all purchasing situations of appliances and equipment, including consumer conventional cooking products. The installation of a new or replacement consumer conventional cooking products is done very infrequently, as evidenced by the mean lifetime of 14.5 years for gas cooking products and 16.8 years for electric cooking products. Further, if the purchaser of the consumer conventional cooking product is not the entity paying the energy costs (*e.g.,* a building owner and tenant), there may be little to no feedback on the purchase. Additionally, there are systematic market failures that are likely to contribute further complexity to how products are chosen by consumers, as explained in the following paragraphs. The first of these market failures—the split-incentive or principal-agent problem—is likely to significantly affect consumer conventional cooking products. 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 consumer conventional cooking product to install, whereas the renter is responsible for paying energy bills.

In addition to the split-incentive problem, there are other market failures that are likely to affect the choice of consumer conventional cooking product efficiency made by consumers. For example, unplanned replacements due to unexpected failure of equipment such as a consumer conventional cooking products are strongly biased toward like-for-like replacement (*i.e.,* replacing the non-functioning equipment with a similar or identical product). Time is a constraining factor during unplanned replacements, and consumers may not consider the full range of available options on the market, despite their availability. The consideration of alternative product options is far more likely for planned replacements and installations in new construction.

Additionally, Davis and Metcalf[82] conducted an experiment demonstrating that, even when consumers are presented with energy consumption information, the nature of the information available to consumers (*e.g.,* from EnergyGuide labels) results in an inefficient allocation of energy efficiency across households with different usage levels. Their findings indicate that households are likely to make decisions regarding the efficiency of the air conditioning equipment of their homes that do not result in the highest net present value for their specific usage pattern (*i.e.,* their decision is based on imperfect information and, therefore, is not necessarily optimal). Also, most consumers did not properly understand the labels (specifically whether energy consumption and cost estimates were national averages or specific to their State). As such, consumers did not make the most informed decisions. Consumer conventional cooking products do not

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

[80] 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).

[81] Thaler, R.H., and Sunstein, C.R. (2008). Nudge: Improving Decisions on Health, Wealth, and Happiness. New Haven, CT: Yale University Press.

[82] Davis, L.W., and G.E. Metcalf (2016): ''Does better information lead to better choices? Evidence from energy-efficiency labels,'' *Journal of the Association of Environmental and Resource Economists,* 3(3), 589–625 (Available at: *www.journals.uchicago.edu/doi/full/10.1086/686252*) (Last accessed August 1, 2023).

require EnergyGuide labels, therefore energy consumption information is more difficult to determine for a consumer, resulting in an even more inefficient allocation of energy efficiency across households with different usage levels.

In part because of the way information is presented, and in part because of the way consumers process information, there is also a market failure consisting of a systematic bias in the perception of equipment energy usage, which can affect consumer choices. Attari *et al.*[83] show that consumers tend to underestimate the energy use of large energy-intensive appliances (such as air conditioners, dishwashers, and clothes dryers), but overestimate the energy use of small appliances (such as light bulbs). Therefore, it is possible that consumers systematically underestimate the energy use associated with consumer conventional cooking products, resulting in less cost-effective purchases.

These market failures affect a sizeable share of the consumer population. A study by Houde[84] indicates that there is a significant subset of consumers that appear to purchase appliances without taking into account their energy efficiency and operating costs at all.

The existence of market failures in the residential sector is well supported by the economics literature and by a number of case studies. If DOE developed an efficiency distribution that assigned consumer conventional cooking product efficiency in the no-new-standards case solely according to energy use or economic considerations such as life-cycle cost or payback period, the resulting distribution of efficiencies within the consumer sample would not reflect any of the market failures or behavioral factors above. Thus, DOE concludes such a distribution would not be representative of the consumer conventional cooking product market. Further, even if a specific household is not subject to the market failures above, the purchasing decision of conventional cooking product efficiency can be highly complex and influenced by a number of factors (*e.g.,* aesthetics) not captured by the building characteristics available in the RECS sample. These factors can lead to households or building owners choosing a conventional cooking product efficiency that deviates from the efficiency predicted using only energy use or economic considerations such as life-cycle cost or payback period (as calculated using the information from RECS 2020).

There is a complex set of behavioral factors, with sometimes opposing effects, affecting the consumer conventional cooking product market. It is impractical to model every consumer decision incorporating all of these effects at this extreme level of granularity given the limited available data. Given these myriad factors, DOE estimates the resulting distribution of such a model, if it were possible, would be very scattered with high variability. It is for this reason DOE utilizes a random distribution (after accounting for efficiency market share constraints) to approximate these effects. The methodology is not an assertion of economic irrationality, but instead, it is a methodological approximation of complex consumer behavior. The analysis is neither biased toward high or low energy savings. The methodology does not preferentially assign lower-efficiency conventional cooking products to households in the no-new-standards case where savings from the rule would be greatest, nor does it preferentially assign lower-efficiency conventional cooking products to households in the no-new-standards case where savings from the rule would be smallest. Some consumers were assigned the conventional cooking products that they would have chosen if they had engaged in perfect economic considerations when purchasing the products. Others were assigned less-efficient conventional cooking products even where a more-efficient product would eventually result in life-cycle savings, simulating scenarios where, for example, various market failures prevent consumers from realizing those savings. Still others were assigned conventional cooking products that were *more* efficient than one would expect simply from life-cycle costs analysis, reflecting, say, ''green'' behavior, whereby consumers ascribe independent value to minimizing harm to the environment.

ASAP *et al.* commented that they believe DOE's assignment of efficiency levels in the no-new-standards case reasonably reflects actual consumer behavior. (ASAP *et al.,* No. 2273 at pp. 1–2) ASAP *et al.* supported DOE's determination that its method of assigning cooking product efficiencies is more representative of actual consumer behavior than assigning efficiencies based solely on cost-effectiveness. (*Id.*)

For this direct final rule, DOE performed a random assignment of efficiencies in the LCC analysis.

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.

NPGA commented that DOE does not disclose how it calculated the estimated installation cost of a gas cooking top at the proposed standard level in the February 2023 SNOPR and asserted that the payback period for a compliant unit would be approximately 261 years. (NPGA, No. 2270 at p. 9)

DOE's methodology for calculating installed cost and payback period is documented in chapter 8 of the TSD and in the LCC analytical spreadsheet.

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 new or amended energy conservation standards on energy use, NPV, and future

[83] 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 August 1, 2023).

[84] 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 August 1, 2023).

manufacturer cash flows.[85] The shipments model takes an accounting approach, tracking market shares of each product class and the vintage of units in the stock. Stock accounting uses product shipments as inputs to estimate the age distribution of in-service product stocks for all years. The age distribution of in-service product stocks is a key input to calculations of both the NES and NPV, because operating costs for any year depend on the age distribution of the stock. The shipments 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.

For this direct final rule, DOE considered comments it had received regarding its shipments analysis for the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, Benjamin Zycher[86] commented that despite DOE's assertion, estimated aggregate data on sales are available from market reports. (Zycher, No. 2266 at p. 3)

DOE maintains that AHAM shipments data collected from consumer cooking product manufacturers present a more accurate estimate for annual national sales compared to estimates provided by third-party market reports.

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 *AEO2023* through 2050. For subsequent years, DOE set the annual new housing completions fixed to the 2050 value.

In response to February 2023 SNOPR, the National Multifamily Housing Council (''NMHC'') and National Apartment Association (''NAA'') recommended that DOE consider the impacts of this rulemaking on housing production and affordability to ensure that new cooking product efficiency requirements do not undermine efforts to address acute housing challenges in the United States. (NMHC and NAA, No. 2265 at pp. 1–3)

DOE notes that the estimated installed cost increase associated with the Recommended TSL under the Joint Agreement is less than one percent relative to the cost of a baseline unit for all product classes and is unlikely to impact housing production or affordability.

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 necessarily replaced. DOE attributed the reason for this non-replacement to building demolition occurring over the shipments analysis period. 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 the Appliance Magazine Market Research report[87] and U.S. Appliance Industry Statistical Review.[88]

In response to the February 2023 SNOPR, ONE Gas commented that DOE's shipments analysis projects that electric cooking tops will account for 75 percent of the market share starting in 2027 to 2055, which fails to account for the introduction of technologically advanced and more energy-efficient gas appliances into the market, and subsequent increased market demand for such products. (ONE Gas, No. 2289 at p. 11)

DOE projects the market share of electric and gas cooking tops based on historical data. In both the February 2023 SNOPR and this direct final rule, DOE estimates that electric cooking tops (including electric open (coil) element cooking tops) account for approximately 60 percent of the cooking top market, similar to the 2022 estimates from AHAM shipments data. DOE is unaware of data identifying future product launches of technologically advanced, energy-efficient gas appliances and their impact on the cooking top market and did not include such a trend in the shipments analysis.

In response to the August 2023 NODA, AHAM commented that DOE projections overestimate savings because DOE has not incorporated a slower rate of adoption of new or replacement cooking tops as a result of a standard that reduces product features or performance. (AHAM, No. 10116 at p. 25) AHAM asserted that a standard that diminishes product performance will extend the operating lifetime of existing, non-compliant cooking tops, slowing the rate of adoption of new or replacement cooking tops that would result from reducing features or product performance. (*Id.*)

As discussed, DOE has concluded that the standards adopted in this direct final rule will not lessen the utility or performance of consumer conventional cooking products. Therefore, DOE finds no basis to conclude that shipments of new cooking tops would be affected by product performance in the standards case. For this direct final rule, DOE used the approach used in the August 2023 NODA for estimating shipments in standards cases.

In the February 2023 SNOPR, DOE did not include the impact of the Inflation Reduction Act (''IRA'') or local electrification policies. Whirlpool commented that IRA rebates would incentivize consumers to purchase electric cooking products and should be included in the shipments model. (Whirlpool, No. 400 at p. 45) Whirlpool commented that it was not sure what level of impact that might have but that it could be included in the analysis. (*Id.*)

For this direct final rule, DOE estimated the impact that the IRA and local electrification policies would have on product shipments in the no-new-standards and standards cases. The IRA apportions $4.3 billion to homeowners to transition from gas products to electric products with a maximum rebate of $14,000 per household and up to $840 specifically for cooking products. DOE estimated that the portion of IRA funding used for cooking products was proportional to the ratio of the maximum cooking product rebate with the total maximum household rebate. The rebate amount for which households are eligible is dependent on household income, ranging from 50 to 100 percent of the cooking product cost, with a maximum of $840. DOE conservatively assumed not all households would be eligible for the full rebate and that potential rebates would range from half the full rebate amount ($420) to the full rebate amount ($840). DOE assumed a typical cooking product rebate of $630, the midpoint between these two values. From this analysis, DOE estimates that approximately 410,000 households over the period of 2023–2031 will voluntarily switch from gas cooking products to electric cooking

[85] 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.

[86] Although this individual commenter is associated with the American Enterprise Institute, the comment states that the views expressed in it should not be construed as representing any official position of the American Enterprise Institute. (Zycher, No. 2266 at p. 1)

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

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

products, resulting in a 1.6-percent drop in gas cooking product shipments over this period. DOE also included the impact of local and State electrification policies that prohibit gas connections to new housing construction and would slightly increase shipments of electric cooking products. DOE notes that the impact of the IRA and local electrification policies is exogenous to the impact of an efficiency standard and is the same in the no-new-standards and standards cases.

DOE received multiple comments from stakeholders regarding the impact standards may have in prompting consumers to switch fuel types for their cooking product.

The AGs of LA *et al.*[89] recommended that DOE consider whether regulation of gas cooking products will result in substitution to electric cooking products, with a corresponding increase in demand for electricity and attendant effects on a stretched power grid and pollution. (AGs of LA *et al.,* No. 2264 at p. 12)

Representatives McMorris-Rodgers *et al.*[90] stated that the consumer savings estimated in the February 2023 SNOPR for gas cooking tops do not justify the decreased features and functionality, and noted that these potential cost savings do not account for the cost of converting homes from gas to electric cooking, which Representatives McMorris-Rodgers *et al.* stated can total thousands of dollars per home. (Representatives McMorris-Rodgers *et al.,* No. 765 at p. 2)

NMHC and NAA recommended that DOE consider whether the electric grid is prepared for any anticipated increase in electrification needs as a result of a marketplace shift from gas cooking products to electric cooking products in response to the possible diminished availability of gas cooking products. (NMHC and NAA, No. 2265 at pp. 3–4)

NPGA asserted that DOE's analysis of payback and net cost percentage failed to account for the costs to consumers that will need to switch from gas to electric products as a result of a standard that eliminates products from the gas cooking market. (NPGA, No. 2270 at p. 7)

Senators Marshall *et al.*[91] commented that the February 2023 SNOPR fails to account for fuel switching as a result of the proposed standards, which will likely compel consumers to switch fuels in order to purchase products that comply with the proposed standards. (Senators Marshall *et al.,* No. 2277 at p. 2)

AGA commented that the standard proposed in the February 2023 SNOPR would remove many popular features in gas cooking tops, such as HIR burners and cast-iron grates. (AGA, No. 2279 at pp. 41–43) AGA commented that such changes in features would impact consumer demand and customers may switch away from gas cooking tops at potentially great economic expense because of insufficient gas options available to fit their current needs. (*Id.*) AGA added that additional expenses to electrify a natural gas kitchen, potentially thousands of dollars, were not included in DOE's analysis; DOE only accounted for the cost to replace or hook up a new cooking top.

APGA commented that the lack of utility arising from the standard proposed in the February 2023 SNOPR, coupled with IRA rebates to incentivize individuals to purchase electric cooking products, could result in less gas cooking products being shipped in the future, which would further decrease the benefits of the proposed rule. (APGA, No. 2283 at p. 6)

Whirlpool commented that the market elimination of gas cooking products threatens to cause a substantial problem for consumers who are encouraged to switch from gas to electric cooking products without financial relief from the potentially higher operating costs from using electricity as the fuel source. (Whirlpool, No. 2284 at p. 5) Consumers' Research also commented that a standard that prompts consumers to switch from gas cooking tops to electric cooking products would lead to higher consumer operating costs due to a higher cost for electricity relative to gas. (Consumers' Research, No. 2267 at p. 3)

ONE Gas commented that DOE does not adequately account for the cost impact to consumers of fuel switching and inadequately addresses statutory prohibitions for setting minimum efficiency standards that would lead to fuel switching. (ONE Gas, No. 2289 at pp. 11–15; ONE Gas, No. 10109 at p. 4) ONE Gas commented that most gas cooking top products will need redesign to meet standards set at EL 2, and the added cost passed on to consumers for gas cooking top products will compel further fuel switching by consumers. (*Id.*) ONE Gas stated this would be particularly impactful to low-income consumers that cannot afford the cost to transition to an electric cooking product. (*Id.*) ONE Gas commented that fuel switching and elimination of consumer choice is anticompetitive and contrary to EPCA. (*Id.*) ONE Gas further commented that DOE's logic in not conducting a fuel switching analysis is flawed and represents a departure from previous analyses of gas cooking products. (*Id.*) ONE Gas commented that DOE should conduct a fuel switching analysis for all standards levels to meet EPCA's need to minimize fuel switching. (*Id.*)

In response to the August 2023 NODA, ONE Gas commented that the elimination of gas cooking top models as a result of the IAEC levels analyzed in the August 2023 NODA would likely lead to fuel switching as the only means of product availability to price-sensitive consumers. (ONE Gas, No. 10109 at p. 4) ONE Gas noted that fuel switching programs are prohibited and restricted in several territories. (*Id.*) ONE Gas commented that DOE should issue an SNOPR that incorporates the updated efficiency levels from the NODA and that it requests the ability to provide analysis of fuel switching and other impacts to consumers. (*Id.*)

In this direct final rule, DOE is adopting TSL 1, the Recommended TSL

[89] ''The AGs of LA *et al.*'' refers to a joint comment from the attorneys general of the States of Louisiana, Tennessee, Alabama, Alaska, Arkansas, Florida, Georgia, Idaho, Iowa, Kansas, Kentucky, Mississippi, Missouri, Montana, Nebraska, New Hampshire, Ohio, Oklahoma, South Carolina, Texas, Utah, and Virginia.

[90] ''Representatives McMorris-Rodgers *et al.*'' refers to a joint comment from the following members of the U.S. House of Representatives: Cathy McMorris-Rodgers (WA), Jeff Duncan (SC), Debbie Lesko (AZ), Bruce Westerman (AR), Jason Smith (MO), Rick Allen (GA), Earl L. ''Buddy'' Carter (GA), John Joyce (PA), Dan Newhouse (WA), Troy Balderson (OH), Greg Pence (IN), Gregory F. Murphy (NC), Robert E. Latta (OH), Jefferson Van Drew (NJ), Randy Weber (TX), Larry Bucshon (IN), Elise M. Stefanik (NY), John Curtis (UT), Russ Fulcher (ID), Claudia Tenney (NY), Lauren Boebert (CO), Diana Harshbarger (TN), Andy Biggs (AZ), Troy Nehls (TX), Ronny L. Jackson (TX), Bill Johnson (OH), Austin Scott (GA), Alex X. Mooney (WV), Mike Ezell (MS), Adrian Smith (NE), Randy Feenstra (IA), Andy Ogles (TN), Mike Kelly (PA), Dan Crenshaw (TX), Robert J. Wittman (VA), Glenn Grothman (WI), Mariannette Miller-Meeks (IA), Harriet M. Hageman (NY), Kat Cammack (FL), Ann Wagner (MO), William R. Timmons (SC), Tracey Mann (KS), Michael Burgess (TX), Mary E. Miller (IL), Tim Walberg (MI), Jay Obernolte (CA), Michael V. Lawler (NY), Gus M. Bilirakis (FL), Glenn ''GT'' Thompson (PA), Richard Hudson (NC), Nick Langworthy (NY), Eric A. ''Rick'' Crawford (AR), Daniel Webster (FL), Rich McCormick (GA), Bill Posey (FL), Michael Guest (MS), Darrell Issa (CA), Tom Tiffany (WI), Roger Williams (TX), Russell Fry (SC), Warren Davidson (OH), Brad Finstad (MN), Ryan Zinke (MT), Chip Roy (TX), Eric Burlison (MO), Gary Palmer (AL), Blaine Luetkemeyer (MO), Michael Bost (IL), Pete Stauber (MN), David G. Valadao (CA), Scott Perry (PA), Lori Chavez-Deremer (OR), and Ralph Norman (SC). Duplicate names have been removed from the list of signatories.

[91] ''Senators Marshall *et al.*'' refers to a joint comment from the following U.S. Senators: Roger Marshall (KS), Steve Daines (MT), John Barrasso (WY), Roger F. Wicker (MS), Todd Young (IN), Joni K. Ernst (IA), James E. Risch (ID), Cindy Hyde-Smith (MS), Markwayne Mullin (OK), John Hoeven (ND), James Lankford (OK), Ted Cruz (TX), and Bill Cassidy (LA).

described in the Joint Agreement. For gas cooking products, TSL 1 corresponds to EL 1. DOE estimates that 97 percent of the gas cooking top market currently meets or exceeds the efficiency of EL 1, ensuring that consumers will have access to gas cooking tops with the full range of product features in the first year of compliance. Furthermore, DOE notes that the incremental cost increase for EL 1 relative to the baseline is $4.04 (calculated in 2028, the first year of compliance), which is less than 1 percent of the installed cost of a baseline gas cooking top and far too small to incentivize switching to an electric cooking top. For these reasons, DOE is assuming in this direct final rule analysis that consumers will not switch fuel types as a result of the standard and, as such, has not included fuel switching in this direct final rule analysis.

Whirlpool stated that, according to a survey it conducted in 2013, most consumers prefer to replace their current cooking top with one that uses the same fuel source, and they may not be willing to trade their gas cooking appliance for one that does not meet their needs or preferences. (Whirlpool, No. 2284 at pp. 6, 9) Whirlpool commented that this could disrupt the normal appliance replacement cycle and cause consumers to delay purchases as long as possible, which will result in the reduction of the standard's potential efficiency savings. (*Id.*)

DOE agrees that consumers are most likely to replace their current cooking top with one that uses the same fuel. The adopted standard for gas cooking tops, the Recommended TSL described in the Joint Agreement, is expected to preserve the features identified by manufacturers and individual commenters as important to consumers, as demonstrated by products from multiple manufacturers in the expanded test sample, and will not disrupt the consumer appliance replacement cycle.

CEI *et al.*[92] commented that many consumer and environmental organizations are enthusiastic about the promise of induction cooking tops, a potentially more energy-efficient type of electric cooking top they claim offers numerous advantages for consumers, but such products would gain market share with or without the proposed rule, casting further doubt as to the significance of any marginal energy savings from agency action. (CEI *et al.,* No. 2287 at pp. 5–6) CEI *et al.* commented that the emergence of induction cooking tops further militates against a finding of significant energy savings as required under EPCA. (*Id.*)

DOE agrees that the market share for induction products is likely to grow over the shipments analysis period. However, DOE's expanded test sample indicates that radiant electric smooth element cooking tops span much of the same range of efficiencies as induction electric smooth element cooking tops (*see* testing results in chapter 5 of this direct final rule TSD). As such, an energy-efficiency standard will reduce energy consumption across both product technologies.

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 direct final rule. 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 product.

In response to the August 2023 NODA, AHAM commented that DOE's price elasticity estimate used in consumers' repair-replace decisions is an aggregate value that averages over the impact to consumer subgroups. (AHAM, No. 10116 at p. 29) AHAM requested DOE identify the consumer subgroups impacted by a higher price associated with a standard. (*Id.*)

DOE is unaware of a source that provides the necessary data disaggregated by household income needed to reliably estimate price elasticity by household income level and commenters did not provide such data. Available data is only available at the national level allowing DOE to estimate the aggregate impact to product shipments (see appendix 9A of the direct final rule TSD for details). DOE notes that the adopted standard at the Recommended TSL is expected to increase the average price of a cooking top in the first year of compliance (2028) by $4 and of an oven by $3, resulting in minimal impacts across all consumer subgroups.

H. National Impact Analysis

The NIA assesses the national energy savings (''NES'') and the NPV from a national perspective of total consumer[93] costs and savings that would be expected to result from new or amended standards at specific efficiency levels.[94] 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 for TSLs other than TSL 1 and 2028 through 2057 for TSL 1 (the Recommended TSL detailed in the Joint Agreement).

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

[92] ''CEI *et al.*'' refers to a joint comment from Competitive Enterprise Institute, Project 21, Caesar Rodney Institute, Center of the American Experiment, Mackinac Center for Public Policy, Thomas Jefferson Institute for Public Policy, Committee For A Constructive Tomorrow, Roughrider Policy Center, Heartland Institute, Eagle Forum, Rio Grande Foundation, Cornwall Alliance, Conservative Caucus, Science and Environmental Policy Project, 60 Plus Association, Energy & Environment Legal Institute, Consumers' Research, Institute for Energy Research, FreedomWorks, Independent Women's Forum, John Locke Foundation, America First Policy Institute, Leadership Institute, Center for Urban Renewal and Education, Association of Mature American Citizens Action, Free Enterprise Project, Americans for Prosperity, Conservative Partnership Institute, American Constitutional Rights Union Action, Becky Norton Dunlop, Faith Wins, and The Heritage Foundation.

[93] ''Consumer'' in this context refers to consumers of the product being regulated.

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

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.30 summarizes the inputs and methods DOE used for the NIA analysis for the direct final rule. Discussion of these inputs and methods follows the table. *See* chapter 10 of the direct final rule TSD for further details.

Table IV.30 Summary of Inputs and Methods for the National Impact Analysis

Inputs	Method
Shipments	Annual shipments from shipments model.
Compliance Date of Standard	2028 for TSL 1 (the Recommended TSL); 2027 for all other TSLs
Efficiency Trends	No-new-standards case: No efficiency trend Standard 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	*AEO 2023* projections (to 2050) and value fixed to average between 2046–2050 prices thereafter.
Energy Site-to-Primary and FFC Conversion	A time-series conversion factor based on *AEO 2023*.
Discount Rate	Three and seven percent.
Present Year	2024

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 a new or amended 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. In this scenario, the market shares of products in the no-new-standards case that do not meet the standard under consideration would ''roll up'' to meet the new standard level, and the market share of products above the standard would remain unchanged.

2. National Energy Savings

The national energy savings analysis involves a comparison of national energy consumption of the considered products between each potential standards case (''TSL'') and the case with no new or amended energy conservation standards. DOE calculated the national energy consumption by multiplying the number of units (stock) of each product (by vintage or age) by the unit energy consumption (also by vintage). DOE calculated annual NES based on the difference in national energy consumption for the no-new-standards case and for each higher efficiency standard case. DOE estimated energy consumption and savings based on site energy and converted the electricity consumption and savings to primary energy (*i.e.,* the energy consumed by power plants to generate site electricity) using annual conversion factors derived from *AEO2023.* For natural gas, primary energy is the same as site energy. 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 and assumed there would be no rebound due to 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 [95] that EIA uses to prepare its

[95] For more information on NEMS, refer to *The National Energy Modeling System: An Overview 2023,* DOE/EIA–0581(2023), May 2023. Available at *www.eia.gov/outlooks/aeo/nems/overview/pdf/0581(2023).pdf* (last accessed Aug. 3, 2023).

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 direct final rule TSD.

The CO_2 Coalition requested additional detailed information regarding DOE's FFC measures. (CO_2 Coalition, No. 2275 at pp. 6–7) The CO_2 Coalition additionally asserted that it could not find an explanation as to why DOE used FFC measurement when EPCA states that appliance energy conservation standards should be measured using ''the quantity of energy directly consumed by a consumer product at point of use.'' (*Id.*)

The definition cited by the CO_2 Coalition refers to the energy use of a covered product, determined in accordance with test procedures. In a statement of policy published on August 18, 2011, DOE announced its intention to use FFC measures in its analysis, and DOE noted that it will continue to set energy conservation standards for covered products based on energy consumption at the point-of-use, as required by EPCA, as amended. 76 FR 51284. 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)) EPCA states that the term ''energy'' means electricity, or fossil fuels. DOE maintains that proper consideration of total energy savings should include the full fuel cycle.

Fall commented that the evolving share of renewables in electricity generation should be accounted for in the analysis, based on the EIA's *AEO2022.* (Fall, No. 376 at pp. 1–3)

For this direct final rule, DOE utilized EIA's *AEO2023,* which incorporates an increasing share of renewables in electricity generation, to derive FFC factors. *See* appendix 10B of the direct final rule TSD for details.

NPGA supported DOE's decision to use FFC to provide a comprehensive analysis of national energy savings. (NPGA, No. 2270 at p. 6)

Multiple commenters stated that the standards proposed in the February 2023 SNOPR would lead to increased overall full-fuel-cycle energy consumption due to consumers that will have to switch from gas to electric products. Spire commented that the proposed standards will promote fuel switching to electric appliances due the elimination of features and performance characteristics that cause many consumers to prefer gas, and added that any such proposed standards are in contradiction to EPCA. (Spire, No. 2710 at pp. 26–30) Spire commented that fuel switching would result in greater overall energy consumption and carbon emissions when accounting for the FFC energy associated with electric appliances relative to gas appliances. (*Id.*) NPGA commented that the standard proposed in the February 2023 SNOPR will result in the replacement of gas cooking products with electric cooking products that consume more energy when including the energy required to generate and transmit the site electricity. (NPGA, No. 2270 at pp. 4–5) AGA commented that the result of DOE's proposed standards will be an increase in source energy usage due to AGA's assessment that the elimination of certain cooking tops from the market will likely result in the gas appliances being replaced with electric resistance appliances. (AGA, No. 2279 at pp. 45–46)

As described in section IV.G of this document, DOE maintains that consumers will not switch fuels as a result of the adopted standard.

ONE Gas commented that DOE has placed improper emphasis upon site energy consumption calculations as the basis for consumer and national energy savings. (ONE Gas, No. 2289 at pp. 7–8) ONE Gas commented that, as the National Academies of Sciences, Engineering, and Medicine (''NAS'') concluded in 2009, using the FFC metric would provide the public with more comprehensive information about the impacts of energy consumption on the environment, the economy, and other national concerns while noting that DOE used site energy consumption analysis that reflects the energy used in generating and distributing electricity, natural gas, or oil in addition to the energy used by the appliance at the site. (*Id.*) ONE Gas commented that 14 years after NAS recommended that DOE move to the FFC measure of energy consumption for assessment of national and environmental impacts, especially levels of GHGs, DOE still has not fully implemented FFC. (*Id.*) ONE Gas acknowledged that DOE accounts for FFC energy savings for entire TSLs and energy and emissions associated with the TSL level of aggregation, but it does not do so for design options independently or across consumer fuel types. (*Id.*) ONE Gas commented that the incomplete use of FFC savings as a metric leads to biased analysis and interpretation of proposed minimum efficiency standards for conventional consumer cooking appliances. (*Id.*)

DOE's use of the FFC metric is consistent with the NAS recommendations and EPCA requirements. Using site energy rather than FFC measures for design options and consumer energy use is appropriate because it serves the purpose of allowing estimation of the economic impacts of potential standards on consumers in the LCC and PBP analysis. The FFC metric is appropriate at the level of the national impact analysis where the purpose is to estimate the total energy savings and environmental impacts from potential 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 price trends for consumer conventional 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 1967–2022.[96] For the gas cooking product price trend, DOE used the ''Gas household ranges, ovens, surface cooking units and equipment'' for 1981–2022.[97] DOE applied the same trends to project prices for each product class at each considered efficiency level. By 2057, which is the end date of the projection period for the Recommended TSL detailed in the Joint Agreement, the average product price is projected to drop 16 percent relative to 2028 for electric cooking products, and 20 percent for gas cooking products. DOE's projection of product prices is described in chapter 8 of the TSD for this direct final rule.

To evaluate the effect of uncertainty regarding the price trend estimates, DOE

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

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

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 1993–2022 for electric cooking products and the period 1981–2004 for gas cooking products and (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 2005–2022 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 direct final rule.

The operating cost savings are energy cost savings, which are calculated using the estimated energy savings in each year and the projected price of the appropriate form of energy. To estimate energy prices in future years, DOE multiplied the average regional energy prices by the projection of annual national-average residential energy price changes in the Reference case from *AEO2023,* which has an end year of 2050. To estimate price trends after 2050, the 2046–2050 average was used for all years. As part of the NIA, DOE also analyzed scenarios that used inputs from variants of the *AEO2023* 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 direct final rule TSD.

In calculating the NPV, DOE multiplies the net savings in future years by a discount factor to determine their present value. For this direct final rule, DOE estimated the NPV of consumer benefits using both a 3-percent and a 7-percent real discount rate. DOE uses these discount rates in accordance with guidance provided by the Office of Management and Budget (''OMB'') to Federal agencies on the development of regulatory analysis.[98] 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 direct final rule, DOE analyzed the impacts of the considered standard levels on two subgroups: (1) low-income households and (2) senior-only households.

For low-income households, the analysis used a subset of the RECS 2020 sample composed of low-income households. DOE separately analyzed different groups in the low-income household sample using data from RECS on home ownership status and on who pays the energy bill. Low-income homeowners are analyzed equivalently to how they are analyzed in the standard LCC analysis. Low-income renters who do not pay their energy bill are assumed to not be impacted by any new or amended standards. In this case, the landlord purchases the appliance and pays its operating costs, so is effectively the consumer and the renter is not impacted. Low-income renters who do pay their energy bill are assumed to incur no first cost. DOE made this assumption to acknowledge that the vast majority of low-income renters will not pay to have their conventional cooking product replaced—such replacement would be up to the landlord.

Whirlpool commented that the standards proposed in the February 2023 SNOPR will disproportionately affect low-income consumers and elderly individuals living on a fixed income. (Whirlpool, No. 2284 at p. 5)

In response to the August 2023 NODA, AHAM commented that DOE has not performed a distributional analysis that accounts for the burdens to low-income households for whom increased prices may result in cumulative financial burden. (AHAM, No. 10116 at pp. 25–26) AHAM stated that DOE's analyses fail to account for the economic impacts to subgroups that may be disproportionately impacted by regulations due to increased first costs. (*Id.*) AHAM further commented that DOE has not modeled consumer choice to discern how proposed standards would influence consumer decisions to retain older, less energy efficient appliances. (*Id.*) In particular, AHAM stated that low-income consumers are not in a financial condition that might prepare them to invest in higher price durable goods, particularly if energy savings are slight and may not be achieved for many years. (*Id.*)

As noted above, many low-income consumers are renters who are not expected to pay the incremental cost due to an amended standard. For low-income homeowners who are expected to bear that incremental cost, the analysis incorporates the higher incremental costs at each considered TSL. In the aggregate, DOE finds that low-income consumers have higher average LCC savings and lower payback periods relative to the general population. At the adopted TSL in this direct final rule, the average increase in incremental first cost relative to the baseline level the low-income consumers (including both renters and home-owners) is $2 for cooking tops and $1 for ovens, which is unlikely to influence consumers' decisions to repair or retain older, less efficient units. Additionally, DOE finds that the consumer impacts to senior-only households are similar to the national population with positive LCC savings and a less than 1 percent of senior-only households experience a net cost at the adopted TSL. DOE presents the results of low-income and senior-only subgroup analyses in section V.B.1.b of this document.

AHAM commented that DOE has done nothing to determine to what degree split-incentive situations (landlord purchases efficient appliance while tenant pays the utility bill) occur or analyzed fully the effects of tighter standards on other potential landlord behavior, such as continuing to repair old appliances or resorting to used appliances. (AHAM, No. 2285 at pp. 48–49)

The existence of a split incentive across a substantial number of U.S. households, in which a tenant pays for the cost of electricity while the building owner furnishes appliances, has been identified through a number of studies of residential appliance and equipment use broadly. Building from early work

[98] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* Available at *www.whitehouse.gov/omb/information-for-agencies/circulars* (last accessed January 4, 2024). DOE used the prior version of Circular A–4 (September 17, 2003) in accordance with the effective date of the November 9, 2023, version.

including Jaffe and Stavins [99] and Murtishaw and Sathaye [100] discussed the presence of landlord–tenant split incentives (*i.e.,* the ''principal-agent problem''). Spurlock and Fujita [101] showed that 87 percent of low-income individuals who rented their homes were found to pay the electricity bill resulting from their energy use, such that they were likely subject to a scenario in which their landlord purchased the appliance, but they paid the operating costs. DOE notes that there continues to be a lack of data to corroborate the notion that landlords pass on some, or all, of increased appliance costs to tenants. Additionally, DOE notes that the shipment-weighted average incremental first cost increase to landlords at the adopted standard relative to the baseline level is $3 and unlikely to impact landlord behavior. DOE has continued to analyze low-income renters under the assumption that they pay no upfront costs under an amended standard in this direct final rule.

AHAM commented that DOE should assess distributional consumer impacts thoroughly prior to promulgation of energy standards to minimize harm to subpopulations. (AHAM, No. 10116 at pp. 26–29) AHAM asserted that previous research shows disparate impacts based on household income and ability to pay for appliance upgrades required by regulatory requirements. (*Id.*) AHAM commented that DOE standards should be assessed for regressive impacts on low- and middle-income households. (*Id.*)

DOE's low-income LCC subgroup analysis uses inputs specific to low-income consumers to estimate the impact of adopted standards. Additionally, DOE notes that there is evidence that prior efficiency standards, by acting on a market substantially more complex than the simplified model of perfect competition, have aligned with improvements in efficiency (and in some cases additional product attributes) while maintaining a constant price for baseline products. For example, Spurlock and Fujita (2022) examined appliance point of sales data and noted that the 2004 and 2007 clothes washer efficiency standards were associated with 30-percent increase in product efficiency contemporaneous with no change in average price within the baseline market segment.[102]

Chapter 11 in the direct final rule TSD describes the consumer subgroup analysis.

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 markups, and investments in R&D and manufacturing capital required to produce compliant products. The key GRIM outputs are the INPV, which is the sum of industry annual cash flows over the analysis period, discounted using the industry-weighted average cost of capital, and the impact to domestic manufacturing employment. The model uses standard accounting principles to estimate the impacts of more-stringent energy conservation standards on a given industry by comparing changes in INPV and domestic manufacturing employment between a no-new-standards case and the various standards cases (*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 manufacturer markup scenarios.

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

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 products 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 products 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,[103] corporate annual reports, the U.S. Census Bureau's ''Economic Census,'' [104] and reports from D&B Hoovers.[105]

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 standards and extending over a 30-year period following the compliance date of standards. 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,

[99] B. Jaffe and R.N. Stavins (1994) The energy-efficiency gap What does it mean? Energy Policy, 22 (10) 804–810, 10.1016/0301–4215(94)90138–4.

[100] Murtishaw, S., & Sathaye, J. (2006). Quantifying the Effect of the Principal-Agent Problem on US Residential Energy Use. Lawrence Berkeley National Laboratory. Retrieved from *https://escholarship.org/uc/item/6f14t11t.*

[101] C.A. Spurlock and K.S. Fujita (2022) Equity implications of market structure and appliance energy efficiency regulation, Energy Policy, 165(112943), *doi.org/10.1016/j.enpol.2022.112943.*

[102] *Id.*

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

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

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

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, 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: premium product manufacturers and small businesses. The premium product manufacturer subgroup is discussed in section V.B.2.d of this document. The small business subgroup is discussed in section chapter 12 of the direct final rule TSD.

2. Government Regulatory Impact Model and Key Inputs

DOE uses the GRIM to quantify the changes in cash flow due to new or 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 a new and amended energy conservation standard. The GRIM spreadsheet uses the inputs to arrive at a series of annual cash flows, beginning in 2024 (the base year of the analysis) and continuing 30 years after the analyzed compliance year.[106] DOE calculated INPVs by summing the stream of annual discounted cash flows during this period. For manufacturers of consumer conventional cooking 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.

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 standard on manufacturers. As discussed previously, DOE developed critical GRIM inputs using a number of sources, including publicly available data, results of the engineering analysis, and information gathered from industry stakeholders during the course of manufacturer interviews. 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 direct final rule TSD.

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 covered products can affect the revenues, gross 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 direct final rule TSD. For this direct final rule analysis, DOE used a design-option approach supported by testing and 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.

For a complete description of the MPCs, *see* chapter 5 of the direct final rule TSD.

b. Shipments Projections

The GRIM estimates manufacturer revenues based on total unit shipment projections and the distribution of those shipments by efficiency level. Changes in sales volumes and efficiency mix over time can significantly affect manufacturer finances. For this analysis, the GRIM uses the NIA's annual shipment projections derived from the updated shipments analysis from the base year (2024) to the end of the analysis period (30 years after the analyzed compliance date).[107] *See* chapter 9 of the direct final rule TSD for additional details.

c. Product and Capital Conversion Costs

New and 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 or 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 product conversion costs manufacturers would likely incur to comply with new and 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 the same number of consumer conventional cooking models that were identified in the February 2023 SNOPR for this direct final rule MIA. DOE used the efficiency distribution from the updated shipments analysis for this direct final rule MIA. DOE updated the per model testing cost and per model R&D cost based on updated wage data from the BLS.[108] DOE revised the per model R&D costs for gas cooking tops to reflect the updated direct final rule 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

[106] For the no-new-standards case and all TSLs except the Recommended TSL, the analysis period ranges from 2024–2056. For the Recommended TSL, the analysis period ranges from 2024–2057.

[107] *Id.*

[108] DOE updated the hourly wage from 2021 data used in the February 2023 SNOPR to 2022 data used in this direct final rule.

industry product conversion costs. Lastly, DOE updated all conversion cost estimates from 2021 dollars that were used in the February 2023 SNOPR to 2022 dollars for this direct final rule analysis.

Whirlpool commented that the standards proposed in the February 2023 SNOPR are not economically justified and that DOE must account for the costs that manufacturers will bear in developing and marketing products to meet these energy conservation standards. (Whirlpool, No. 2284 at pp. 4–5) Whirlpool stated that it could not identify a single gas cooking top or range model in its product line that meets the gas cooking top standard proposed in the February 2023 SNOPR. (*Id.*) Whirlpool stated that a significant time investment and an expensive product redesign would be required to bring gas cooking tops into compliance with the gas cooking top standard proposed in the February 2023 SNOPR. (*Id.*) Whirlpool commented that DOE's projected conversion cost of $183.4 million in the February 2023 SNOPR reflects flaws in analysis. (*Id.*) Specifically, Whirlpool commented that DOE's approximation that half of all gas cooking top models currently on the market are compliant with the gas cooking top standard proposed in the February 2023 SNOPR contradict DOE's conclusion in the February 2023 SNOPR TSD that only about 4 percent of gas cooking tops on the market meet or exceed the proposed standard of EL 2. (*Id.*) Thus, Whirlpool stated that DOE's February 2023 SNOPR analysis does not reflect the true cost to manufacturers of complying with the standards proposed in the February 2023 SNOPR. (*Id.*)

Conversely, the CA IOUs stated that the MIA from the February 2023 SNOPR accurately accounts for the significant investments manufacturers must make to comply with the standards proposed in the February 2023 SNOPR. (CA IOUs, No. 2278 at p. 2) The CA IOUs commented that DOE appropriately balances the significant costs to manufacturers to retool and redesign products to meet the standard against the significant consumer benefits from the standard. (*Id.*) The CA IOUs stated that DOE's analysis shows manufacturers can make more efficient gas cooking tops at an incremental cost to consumers while saving consumers significant money over the lifetime of the cooking top. (*Id.*)

As discussed in section IV.C.1.a of this document, DOE updated the efficiency levels for gas cooking tops for this direct final rule analysis. The conversion costs calculated for this direct final rule reflect these updated efficiency levels for the gas cooking top product class.

In general, DOE assumes all conversion-related investments occur between the year of publication of the direct 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 direct final rule TSD.

d. Manufacturer Markup Scenarios

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

Under the preservation of gross margin 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, which assumes that manufacturers would be able to maintain the same amount of profit as a percentage of revenues at all efficiency levels within a product class. DOE continued to use a manufacturer markup of 1.20 for all consumer conventional cooking products, which corresponds to a 17 percent gross margin percentage and the same manufacturer markup that was used in the February 2023 SNOPR.[109] This manufacturer markup 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 manufacturer production costs. Under this scenario, as the MPCs increase, manufacturers reduce their margins (on a percentage basis) to a level that maintains the no-new-standards case 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 cases in the year after the compliance date of the new and amended standards as in the no-new-standards case.[110] 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 markup scenarios is presented in section V.B.2.a of this document.

3. Comments From Interested Parties

For this direct final rule, DOE considered comments it had received regarding its manufacturer impact analysis presented in the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

Several interested parties commented on DOE's February 2023 SNOPR MIA. These comments were made either in writing during the comment period following the publication of the February 2023 SNOPR or during the consumer conventional cooking products public meeting for the February 2023 SNOPR.

NPGA stated that in the February 2023 SNOPR, DOE identified only one model of gas cooking top that meets the proposed standard for gas cooking tops. (NPGA, No. 2270 at p. 10) NPGA stated that this eliminates competition and creates an unfair, government-assisted advantage to the manufacturer of this particular model and risks that the market will be monopolized by a few select manufacturers. (*Id.*) AGA also stated that lessening of competition will have monopolistic consequences for those manufacturers who remain in business and drive-up prices for consumers who will have only 4 percent of gas cooking tops remaining. (AGA,

[109] 88 FR 6818, 6863.

[110] For TSL 1 (the Recommended TSL), the modeled compliance date is 2028. For the remaining TSLs, the modeled compliance date is 2027.

No. 2279 at pp. 24–26) Additionally, Senators Marshall *et al.* stated that the February 2023 SNOPR proposed standards are anticompetitive and will likely lead to manufacturers leaving the market. (Marshall *et al.,* No. 2277 at pp. 1–2)

Consumers' Research noted that DOE's February 2023 SNOPR analysis does not include data to justify the claim that most of the gas cooking top models currently on the market are capable of being redesigned to meet the standard for gas cooking tops that was proposed in the February 2023 SNOPR. (Consumers' Research, No. 2267 at pp. 1–2) Consumers' Research commented that the largest share of DOE's estimated INPV costs from the February 2023 SNOPR would fall on gas cooking product manufacturers, as they produce the overwhelming majority of the models that will require redesign to meet the standards proposed in the February 2023 SNOPR. (*Id.*) Consumers' Research commented that due to increased costs concentrated on gas cooking product manufacturers, some manufacturers will likely have a negative cash flow if the standards proposed in the February 2023 SNOPR are adopted. (*Id.*) Consumers' Research stated that they believe the standard for gas cooking tops that was proposed in the February 2023 SNOPR will prompt companies to decrease product lines or leave the market altogether, thereby limiting consumer choice by decreasing market competition. (*Id.*)

Conversely, the CA IOUs stated that cooking tops do not currently have minimum performance standards or efficiency labels and are not currently subject to a voluntary ENERGY STAR specification, nor are manufacturers incentivized to produce more efficient cooking tops or provide consumers with energy-efficiency information. (CA IOUs, No. 2278 at p. 2) The CA IOUs commented that these market failures mean consumers have no ability to choose a more efficient cooking top because they lack both the available options and the information to do so. (*Id.*)

Based on comments received in response to the February 2023 SNOPR, DOE further examined the potential impacts of the gas cooking top market in this direct final rule analysis and agrees that there would likely be a significant impact to the gas cooking top market if DOE adopted the standards for the gas cooking tops that were proposed in the February 2023 SNOPR. As discussed in section IV.C.1.a of this document, DOE updated the efficiency levels for gas cooking tops for this direct final rule analysis. Additionally, in section V.B.2.c of this document, DOE further discusses the manufacturing capacity concerns and potential market disruption, including the potential for manufacturers to leave the gas cooking top market, if DOE were to adopt energy conservation standards at max-tech for gas cooking tops.

NMHC and NAA stated that overly prescriptive directives for marginal efficiency gains will outpace the ability of the manufacturing sector and installation providers to alleviate existing product shortages and delays while creating new barriers to cost-effective and timely appliance procurement. (NMHC and NAA, No. 2265 at p. 3) NMHC and NAA stated their interest in preserving product choice and ensuring the flexibility to select those appliances that reflect the unique characteristics and wide array of multifamily building types and their residents. (*Id.*)

As previously stated in this section, DOE updated the efficiency levels for gas cooking tops for this direct final rule from the efficiency levels used in the February 2023 SNOPR. As discussed in section IV.C.1.a of this document, the updated efficiency levels for gas cooking tops allow gas cooking tops to retain the presence of multiple HIR burners; continuous cast-iron grates; the ability to choose between nominal unit widths; the ability to have sealed burners; at least one LIR burner (*i.e.,* with an input rate below 6,500 Btu/h); the ability to have multiple dual-stacked and/or multi-ring HIR burners; and at least one extra-high input rate burner (*i.e.,* with an input rate above 18,000 Btu/h) at EL 1, the adopted EL, thereby preserving consumer product choice for gas cooking tops. DOE discusses the potential impacts for manufacturing production capacity for gas cooking tops in section V.B.2.c 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 in 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 intended to represent the marginal impacts of the change in electricity consumption associated with new or amended 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 direct final rule TSD. The analysis presented in this notice uses projections from *AEO2023.* 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'').[111]

The on-site operation of consumer conventional cooking products involves 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.[112]

DOE received several comments on the connection between gas stove efficiency and indoor air quality, and related health impacts.

ANHE *et al.*[113] commented that burned methane gas byproducts contribute to premature mortality and increase risk for a number of illnesses. (ANHE *et al.,* No. 2276 at pp. 4–5) ANHE *et al.* further stated that a growing body of evidence shows an association between long-term exposure to air pollution and adverse birth outcomes, while short-term exposure to high levels of air pollution can exacerbate asthma and cardiopulmonary symptoms. (*Id.*) ANHE *et al.* commented that methane gas leaks pose risks to human health, stating that a recent study found consumer-grade natural gas contains at least 21 different hazardous air pollutants and that leaks can be

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

[112] 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/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors#Proposed/* (last accessed July 12, 2021).

[113] ''ANHE *et al.*'' refers to a joint comment from Alliance of Nurses for Healthy Environments, American Lung Association, Association of Public Health Laboratories, Asthma and Allergy Foundation of America, Climate Psychiatry Alliance, Foundation for Sarcoidosis Research, Greater Boston Physicians for Social Responsibility, Medical Society Consortium on Climate and Health, National Association of Pediatric Nurse Practitioners, National League for Nursing, National Medical Association, and Physicians for Social Responsibility.

undetectable by smell. ANHE *et al.* stated that higher efficiency burner systems correlate with more complete combustion and more efficient energy conversion. ANHE *et al.* noted that gas cooking products are not required to be vented outside and that most cooking top hood ventilation systems recirculate the air with only a moderate impact on immediate air quality. (*Id.*)

ASAP *et al.* commented that the standards proposed in the February 2023 SNOPR would improve indoor air quality because higher efficiency burner systems correlate with more complete combustion, which reduces in-home gas combustion and therefore reduces exposure to pollutants that harm human health. (ASAP *et al.,* No. 2273 at pp. 3–4)

Sierra Club and Earthjustice commented that DOE's analysis undervalues the health benefits of the standards proposed in the February 2023 SNOPR, citing studies that connect children with asthma to homes with gas cooking products as well as homes with high concentrations of nitrogen dioxide (''NO_2''). (Sierra Club and Earthjustice, No. 2282 at pp. 3–4) Sierra Club and Earthjustice commented that improving the energy efficiency of gas cooking tops would ensure that compliant models combust less gas to do the same amount of cooking. (*Id.*) Sierra Club and Earthjustice recommended that DOE pursue an accurate quantitative assessment of the economic value of the harms resulting from gas cooking top emissions, or, at minimum, acknowledge that its current dollar-per-ton estimates may significantly undervalue the health and welfare benefits associated with reducing these emissions. (*Id.*)

The AGs of NY *et al.*[114] commented that the standards proposed in the February 2023 SNOPR would provide potentially significant—but as-yet unquantified—public health benefits such as those associated with improved indoor air quality, as the operation of gas cooking products results in emissions of methane, carbon monoxide, particulate matter, nitrogen dioxide, and other air pollutants in the home that may be associated with a variety of serious respiratory and cardiovascular conditions and other health risks, according to studies cited by DOE. (AGs of NY *et al.,* No. 2286 at p. 3) The AGs of NY *et al.* commented that they share DOE's concerns regarding gas cooking products' potential negative health impacts and pointed to recent studies showing that children growing up in households with gas cooking products have a 42-percent increased risk of experiencing asthma symptoms, and nearly 13 percent of current childhood asthma cases nationwide can be attributed to gas cooking product usage. (*Id.*)

The AGs of NY *et al.* support DOE's efforts to quantify whether the proposed efficiency standards will reduce emissions indoors caused by leakage from gas cooking products, citing a 2022 study by Stanford University researchers that found a significant quantity of emissions from gas ranges occurs due to leakage when they are not actively being used. (*Id.* at pp. 3–4) The AGs of NY *et al.* commented that improved air quality is especially important to low-income and minority communities, which often experience energy insecurity and disproportionately suffer from asthma and other negative health outcomes associated with indoor air pollution from gas cooking products. (*Id.*) The AGs of NY *et al.* stated that making cooking appliances more efficient and reducing cooking-related emissions that exacerbate or contribute to asthma will help reduce the economic and health burdens of historically underserved communities. (*Id.*)

The AGs of NY *et al.* encouraged DOE to incorporate performance standards into a final rule that mandate design approaches, control strategies, or other measures to mitigate methane or other emissions from gas ranges due to incomplete combustion and leakage design improvements, should such approaches and strategies exist and if they are economically feasible. (*Id.* at p. 4) The AGs of NY *et al.* further commented that two benefits of more efficient cooking appliances—lower utility bills and improved air quality—are especially important to low-income and minority communities, which often experience energy insecurity and disproportionately suffer from asthma and other negative health outcomes associated with indoor air pollution from gas cooking products. (*Id.* at pp. 4–5) The AGs of NY *et al.* commented that, for example, children living in Wards 7 and 8 of the District of Columbia (neighborhoods afflicted with poor housing conditions, including inadequate ventilation) have higher asthma rates and higher asthma hospitalization rates than children living in the wealthier parts of DC. (*Id.*) The AGs of NY *et al.* also cited a recent New York Public Housing Authority study, which found that cooking with gas cooking products resulted in NO_2 concentrations nearly double the levels in outdoor air that EPA considers unhealthy for sensitive groups. (*Id.*) The AGs of NY *et al.* commented that making cooking appliances more efficient and reducing cooking-related emissions that exacerbate or contribute to asthma will help reduce the economic and health burdens of historically underserved communities. (*Id.*)

In response to the August 2023 NODA, WE ACT provided a study detailing the impact on indoor air quality from transitioning from gas to induction stoves in affordable housing in New York City. (WE ACT, No. 10114 at p. 1) WE ACT commented that DOE should consider health impacts that the energy conservation standards can address. (*Id.*) WE ACT further commented that gas cooking products carry a significant health risk due to the combustion-related pollutants, like nitrogen dioxide (NO_2), benzene, methane, and carbon monoxide. (*Id.* at pp. 2–3) WE ACT further commented that combustion-related pollutants pose a disproportionate health risk to vulnerable populations. (*Id.*)

WE ACT commented that methane used in gas cooking products is an even more potent greenhouse gas than carbon dioxide and notes that gas cooking products have been reported to leak methane even when not in use. (*Id.* at pp. 2–3) WE ACT note that methane leakage from gas cooking products when not in use poses a safety concern, as well as being disruptive to the climate. (*Id.*)

AGA commented that DOE relied on a limited and biased selection of literature to make a presumption that gas cooking applications contribute to negative health impacts. AGA commented that DOE's assertions that reducing in-home use of gas combustion may deliver health benefits are not quantified in the February 2023 SNOPR analysis and such assertions are outside the scope of this proceeding and not supported by the record. (AGA, No. 2279 at pp. 47–50) AGA cited studies that DOE ignored showing no evidence of an association between the use of gas as a cooking fuel and either asthma symptoms or asthma diagnoses. (*Id.*) AGA commented that the Federal Interagency Committee on Indoor Air Quality, which includes two dozen Federal agencies led by EPA, has not identified natural gas cooking emissions as an important issue concerning asthma or respiratory illness. (*Id.*) AGA added that the U.S. Consumer Product Safety Commission and EPA do not

[114] ''The AGs of NY *et al.*'' refers to a joint comment from the attorneys general of the States of New York, California, Colorado, Connecticut, Maine, Maryland, Minnesota, Oregon, Vermont, and Washington, the Commonwealths of Massachusetts and Pennsylvania, and the District of Columbia; and the Corporation Counsel for the City of New York.

present gas ranges as a significant contributor to adverse air quality or health hazard in their technical or public information literature, guidance, or requirements. (*Id.*) AGA commented that indoor air quality is far less dependent on the heat source for the cooking, either natural gas or electricity, than on the types of food being cooked and the cooking conditions such as time, temperature, space configuration, and ventilation. AGA commented that if health impacts were in scope, DOE would need to conduct a full analysis of the cooking process with natural gas and evaluate the cooking process and emissions unrelated to the fuel used. (*Id.*)

AHAM commented that DOE's question in the February 2023 SNOPR regarding indoor air pollutants released by gas cooking products is biased and focused only on the potential indoor air pollutants released by gas products. (AHAM, No. 2285 at pp. 37–38) AHAM commented that pollutants are released by indoor cooking no matter the fuel, with the main concern related to $PM_{2.5}$. (*Id.*) AHAM commented that $PM_{2.5}$ results from cooking and is at the same or similar levels whether the cooking product is gas or electric. (*Id.*) AHAM commented that the standard from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (''ASHRAE''), 62.2, *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings,* has for decades been used to establish the proper requirements for dealing with contaminants of concern and requires a minimum air flow and external venting (or equivalent continuous venting) regardless of the fuel. (*Id.*)

NPGA commented that gas cooking products have not been proven to contribute substantially to indoor air quality or health hazards, and reputable sources such as the Center for Disease Control and the medical journal Lancet do not identify a correlation between the use of gas cooking products and asthma. (NPGA, No. 2270 at pp. 10–11) NPGA commented that any health benefits to consumers would not be affected by enhanced efficiency standards but could be affected by improved ventilation through high-efficiency range hoods, exhaust fans, or opened windows. NPGA commented that these solutions are outside the scope of this rulemaking and that DOE lacks scientific, peer-reviewed studies showing a link between the use of gas cooking products and hazardous indoor air pollutants. (*Id.*)

Western Energy Alliance commented that DOE's review of scientific literature regarding indoor air emissions is too narrow, and the few studies referenced are biased. (Western Energy Alliance, No. 2272 at pp. 9–11) Western Energy Alliance recommended DOE include a more complete analysis. (*Id.*) Western Energy Alliance commented that DOE has overlooked a well-established air study from the International Study of Asthma and Allergies in Childhood that negates the claims from Seals *et al.* 2020. (*Id.* at p. 11)

ONE Gas commented that DOE's interest in the IAQ issues of consumer gas cooking is misplaced and should be omitted from rulemaking considerations as DOE is straying into health and safety issues beyond its rulemaking role as authorized in EPCA. (ONE Gas, No. 2289 at pp. 9–10; ONE Gas, No. 10109 at p. 4) ONE Gas commented that health or safety claims of covered products is the role of the U.S. Consumer Product Safety Commission (''CPSC''), and DOE should focus on ''technologically feasible and economically justified'' minimum efficiency standards. (*Id.*)

Michael D. submitted a California Restaurant Association/California Building Industry Association/Catalyst Environmental Solutions research study entitled ''The Effects of Cooking on Indoor Air Quality: A Critical Review of the Literature with an Emphasis on the Use of Natural Gas Appliances'' by Tormey and Huntley, which included five key findings: (1) the type of appliance—natural gas or electric—used to cook food indoors is not a significant determinant of residential indoor air; (2) IAQ is impacted far more by the act of cooking than the fuel used, and the most effective method to protect health is to provide proper ventilation; (3) many additional factors influence emissions during cooking, including the type of food, the oils used, cooking temperatures and time, and proper ventilation; (4) reports linking gas cooking to negative health outcomes often rely on analyses that do not make that connection; and (5) the International Study of Asthma and Allergies in Childhood, the largest worldwide epidemiologic project focused on links between gas stove use and asthma, found that for 512,707 primary and secondary school children from 47 countries, there was ''no evidence of an association between the use of gas as a cooking fuel and either asthma symptoms or asthma diagnosis.'' (Michael D., No. 2490 at p. 1)

DOE acknowledges the significant uncertainty in quantifying the impact of higher gas stove efficiency on indoor air quality and associated health outcomes. In particular, multiple commenters provided additional studies pointing to the role of ventilation in affecting indoor air quality. Given the high degree of uncertainty, DOE has not tried to quantify how higher gas stove efficiency standards might affect occupant health, apart from continuing to monetize the health impact of decreased NO_X and SO_2 emissions, which is applicable to both gas and electric products (due to emissions from power plants). *See* chapter 14 of this direct final rule TSD for details.

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 direct final rule TSD.

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

1. Air Quality Regulations Incorporated in DOE's Analysis

DOE's no-new-standards case for the electric power sector reflects the *AEO,* which incorporates the projected impacts of existing air quality regulations on emissions. *AEO2023* reflects, to the extent possible, laws and regulations adopted through mid-November 2022, including the emissions control programs discussed in the following paragraphs the emissions control programs discussed in the following paragraphs, and the Inflation Reduction Act.[115]

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

[115] For further information, *see* the Assumptions to *AEO2023* 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 Aug. 3, 2023).

January 1, 2015.[116] *AEO* 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, for States subject to SO_2 emissions limits under CSAPR, 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, in 2016, SO_2 emissions began to fall as a result of the Mercury and Air Toxics Standards (''MATS'') for power plants.[117] 77 FR 9304 (Feb. 16, 2012). The direct final rule establishes power plant emission standards for mercury, acid gases, and non-mercury metallic toxic pollutants. 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 will generally reduce SO_2 emissions. DOE estimated SO_2 emissions reduction using emissions factors based on *AEO2023.*

IER commented that DOE's statement that SO_2 emissions began to fall in 2016 as a result of the Mercury and Air Toxics Standards for power plants is not supported by the data. IER commented that SO_2 emissions were falling for decades prior to 2016 and have flattened since 2016. (IER, No. 2274 at p. 7)

It is correct that SO_2 emissions from the electric power sector were declining prior to 2016, but EIA statistics show that the decline accelerated beginning in 2015.[118]

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. Depending on the configuration of the power sector in the different regions and the need for allowances, however, NO_X emissions might not remain at the limit in the case of lower electricity demand. That would mean that 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. Standards would be expected to reduce NO_X emissions in the States not covered by CSAPR. DOE used *AEO2023* 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 *AEO2023,* which incorporates the MATS.

L. Monetizing Emissions Impacts

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

To monetize the benefits of reducing GHG emissions, this analysis uses the interim 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.

1. Monetization of Greenhouse Gas Emissions

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

DOE exercises its own judgment in presenting monetized climate benefits as recommended by applicable Executive orders, and DOE would reach the same conclusion presented in this 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 adopted by DOE.

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

[116] 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), and EPA issued the CSAPR Update for the 2008 ozone NAAQS. 81 FR 74504 (Oct. 26, 2016).

[117] 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.

[118] *www.eia.gov/electricity/annual/html/epa_09_01.html* (last accessed Aug. 3, 2023).

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 for this rule, which was developed using the interim estimates. DOE continues to evaluate recent developments in the scientific literature, including EPA's December 2023 SC–GHG estimates.

The SC–GHGs estimates presented here were developed over many years, using transparent process, peer-reviewed methodologies, the best science available at the time of that process, and with input from the public. Specifically, in 2009, the IWG, which included DOE and other executive branch agencies and offices, was established to ensure that agencies were using the best available science and to promote consistency in the social cost of carbon (''SC–CO_2'') values used across agencies. The IWG published SC–CO_2 estimates in 2010 that were developed from an ensemble of three widely cited integrated assessment models (''IAMs'') that estimate global climate damages using highly aggregated representations of climate processes and the global economy combined into a single modeling framework. The three IAMs were run using a common set of input assumptions in each model for future population, economic, and CO_2 emissions growth, as well as equilibrium climate sensitivity—a measure of the globally averaged temperature response to increased atmospheric CO_2 concentrations. These estimates were updated in 2013 based on new versions of each IAM. In August 2016 the IWG published estimates of the social cost of methane (''SC–CH_4'') and nitrous oxide (''SC–N_2O'') using methodologies that are consistent with the methodology underlying the SC–CO_2 estimates. The modeling approach that extends the IWG SC–CO_2 methodology to non-CO_2 GHGs has undergone multiple stages of peer review. The SC–CH_4 and SC–N_2O estimates were developed by Marten *et al.*[119] 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.[120] 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 Executive Order (''E.O.'') 13783 used SC–GHG estimates that attempted to focus on the U.S.-specific share of climate change damages as estimated by the models and were calculated using two discount rates recommended by Circular A–4, 3 percent and 7 percent. All other methodological decisions and model versions used in SC–GHG calculations remained the same as those used by the IWG in 2010 and 2013, respectively.

On January 20, 2021, President Biden issued Executive Order 13990, which re-established the IWG and directed it to ensure that the U.S. Government's estimates of the social cost of carbon and other greenhouse gases reflect the best available science and the recommendations in the National Academies 2017 report. 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 rulemaking. The E.O. instructs the IWG to undertake a fuller update of the SC–GHG estimates that takes into consideration the advice in the National Academies 2017 report 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 direct final rule DOE centers attention on a global measure of SC–GHG. This approach is the same as that taken in DOE regulatory analyses from 2012 through 2016. A robust estimate of climate damages that accrue only to U.S. citizens and residents does not currently exist in the literature. As explained in the February 2021 SC–GHG TSD, existing estimates are both incomplete and an underestimate of total damages that accrue to the citizens and residents of the U.S. because they do not fully capture the regional interactions and spillovers discussed above, nor do they

[119] 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 U.S. Government's SC–CO2 estimates. *Climate Policy.* 2015. 15(2): pp. 272–298.

[120] 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. *nap.nationalacademies.org/catalog/24651/valuing-climate-damages-updating-estimation-of-the-social-cost-of.*

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 Office of Management and Budget (''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 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,[121] and recommended that discount rate uncertainty and relevant aspects of intergenerational ethical considerations be accounted for in selecting future discount rates.

Furthermore, the damage estimates developed for use in the SC–GHG are estimated in consumption-equivalent terms, and so an application of OMB Circular A–4's guidance for regulatory analysis would then use the consumption discount rate to calculate the SC–GHG. DOE agrees with this assessment and will continue to follow developments in the literature pertaining to this issue. DOE also notes that while OMB Circular A–4, as published in 2003, recommends using 3-percent and 7-percent discount rates as ''default'' values, Circular A–4 also reminds agencies that ''different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions.'' On discounting, Circular A–4 recognizes that ''special ethical 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, 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 SC–GHG TSD recommends ''to ensure internal consistency—*i.e.,* future damages from climate change using the SC–GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate.'' DOE has also consulted the National Academies' 2017 recommendations on how SC–GHG estimates can ''be combined in RIAs with other cost and benefits estimates that may use different discount rates.'' The National Academies reviewed several options, including ''presenting all discount rate combinations of other costs and benefits with [SC–GHG] estimates.''

As a member of the IWG involved in the development of the February 2021 SC–GHG TSD, DOE agrees with the above 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 were subject to public comment. For each discount rate, the IWG combined the distributions across models and socioeconomic emissions scenarios (applying equal weight to each) and then selected a set of four values recommended for use in benefit-cost analyses: an average value resulting from the model runs for each of three discount rates (2.5 percent, 3 percent, and 5 percent), plus a fourth value, selected as the 95th percentile of estimates based on a 3-percent discount rate. The fourth value was included to provide information on potentially higher-than-expected economic impacts from climate change. As explained in the February 2021 SC–GHG TSD, and DOE agrees, this update reflects the immediate need to have an operational SC–GHG for use in regulatory benefit-cost analyses and other applications that was developed using a transparent process, peer-reviewed methodologies, and the science available at the time of that process. Those estimates were subject to public comment in the context of dozens of proposed rulemakings as well as in a dedicated public comment period in 2013.

There are a number of limitations and uncertainties associated with the SC–GHG estimates. First, the current scientific and economic understanding of discounting approaches suggests discount rates appropriate for intergenerational analysis in the context of climate change are likely to be less than 3 percent, near 2 percent or lower.[122] 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

[121] Interagency Working Group on Social Cost of Carbon. Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866. 2010. United States Government *www.epa.gov/sites/default/files/2016-12/documents/scc_tsd_2010.pdf* (last accessed April 15, 2022); 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 *www.federalregister.gov/documents/2013/11/26/2013-28242/technical-support-document-technical-update-of-the-social-cost-of-carbon-for-regulatory-impact* (last accessed April 15, 2022); 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 *www.epa.gov/sites/default/files/2016-12/documents/sc_co2_tsd_august_2016.pdf* (last accessed Jan. 18, 2022); Interagency Working Group on Social Cost of Greenhouse Gases, United States Government. Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide. August 2016 *www.epa.gov/sites/default/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf* (last accessed Jan. 18, 2022).

[122] Interagency Working Group on Social Cost of Greenhouse Gases. 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/.*

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 SC–GHG TSD, the IWG has recommended that, taken together, the limitations suggest that the interim SC–GHG estimates used in this direct final rule likely underestimate the damages from GHG emissions. DOE concurs with this assessment.

For this direct final rule, DOE considered comments it had received regarding its approach for monetizing greenhouse gas emissions in the February 2023 SNOPR. The approach used for this direct final rule is largely the same approach DOE had used for the February 2023 SNOPR analysis.

In response to the February 2023 SNOPR, the AGs of LA *et al.* recommended that DOE avoid using or referencing the IWG estimates in its analysis and that DOE clarify the role of the SC–GHG in its analysis. (AGs of LA *et al.,* No. 2264 at pp. 2–7) The AGs of LA *et al.* commented that DOE's use of the IWG numbers is in direct conflict with EPCA's directions and that there is no way to determine if the effect of the standards proposed in the February 2023 SNOPR on GHG emissions has an economic impact. (*Id.* at pp. 8–9)

AHAM stated its objection to DOE's use of SC–GHG and other monetization of emissions reductions benefits in its analysis of the factors EPCA requires DOE to balance to determine the appropriate standard. (AHAM, No. 2885 at pp. 52–53) AHAM commented it is inappropriate for DOE to rely on the highly subjective and ever-changing monetization estimates in justifying an energy conservation standard. (*Id.*) AHAM commented that DOE has responded to these objections by indicating that environmental and public health benefits associated with the more efficient use of energy, including those connected to global climate change, are important to take into account when considering the need for national energy conservation, which is one of the factors EPCA requires DOE to evaluate in determining whether a potential energy conservation standard is economically justified, and AHAM does not object to DOE considering the benefits. AHAM commented that DOE can consider ''other factors'' under EPCA, but that does not override the key criteria EPCA requires DOE to balance and DOE must consider EPCA's factors together and achieve a balance of impacts and benefits—a balance DOE has failed to strike in this rule. (*Id.*)

APGA stated concern with DOE's use of the SC–GHG in its cost-benefit analysis because such a large percentage of the total benefits of the proposed rulemaking result from these values. (APGA, No. 2283 at pp. 6–7) APGA commented that DOE's reliance on these SC–GHG values is flawed and brings into question whether the proposed ECS is actually economically justified. (*Id.*)

ONE Gas commented that DOE should table inclusion of SC–GHG benefits until the legal validity of these benefits used in minimum efficiency standards is resolved, and that any analysis of SC–GHG benefits should reflect the full range of uncertainty associated with IWG cost estimates. (ONE Gas, No. 2289 at p. 15)

Strauch asserted that the social cost of carbon is difficult to quantify, an issue that is exacerbated by deviating climate models. (Strauch, No. 2263 at p. 3) Strauch recommended that DOE avoid weak and controversial cost constructs. (*Id.*)

In response to the foregoing comments, DOE reiterates its view that the environmental and public health benefits associated with more efficient use of energy, including those connected to global climate change, are important to take into account when considering the need for national energy conservation. (*See* 42 U.S.C. 6295(o)(2)(B)(i)(IV)) In addition, Executive Order 13563, which was re-affirmed on January 21, 2021, stated that each agency must, among other things: ''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).'' For these reasons, DOE considers the monetized value of emissions reductions in its evaluation of potential standard levels. While the benefits associated with reduction of GHG emissions inform DOE's evaluation of potential standards, DOE would reach the same conclusion regarding the economic justification of standards presented in this direct final rule without considering the social cost of greenhouse gases. As described in detail in section V.C.1 of this document, at the adopted TSL for consumer conventional cooking products, the average LCC savings for all product classes is positive, a shipment-weighted 0 percent of consumers would experience a net cost, and the NPV of consumer benefits is positive using both a 3-percent and 7-percent discount rate.

The AGs of LA *et al.* disagreed with DOE's policy choice to adopt the IWG's discount rate of 3 percent and added that calculations based on a 7-percent discount rate are consistent with guidance provided by OMB Circular A–4. (AGs of LA *et al.,* No. 2264 at pp. 4–5) The AGs of LA *et al.* commented that the choice of a 3-percent discount rate is arbitrary and recommended that DOE align its chosen discount rates with those used for calculating the impact of the proposed standards on consumers and manufacturers. (*Id.*) Western Energy Alliance commented that the mixing and matching of discount rates with respect to climate change is inappropriate. (Western Energy Alliance, No. 2272 at pp. 7–8) Western Energy Alliance and Zycher recommended DOE use the 7-percent discount rate consistently for the 7-percent discount rate scenario. (Western Energy Alliance, No. 2272 at pp. 7–8; Zycher, No. 2266 at p. 9)

The reasons for using a consumption discount rate rather than a rate based on the social rate of return on capital (7 percent under OMB Circular A–4 guidance) were presented previously in this section.[123] DOE reiterates that while OMB Circular A–4, as published in 2003, recommends using 3-percent and 7-percent discount rates as ''default'' values, Circular A–4 also reminds agencies that ''different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions.'' On discounting, Circular A–4 recognizes that ''special ethical considerations arise when comparing benefits and costs across generations,'' and Circular A–4 acknowledges that analyses may appropriately ''discount future costs and

[123] DOE used the prior version of Circular A–4 (September 17, 2003) in accordance with the effective date of the November 9, 2023, version.

consumption benefits . . . at a lower rate than for intragenerational analysis.''

The AGs of LA *et al.* disagreed with DOE's policy choice to accept IWG's measurement of global damages in lieu of domestic damages, and with DOE's choice to adopt the IWG's decision to run the IAMs through a 300-year time span. (AGs of LA *et al.,* No. 2264 at pp. 3–4, 5–6) The AGs of LA *et al.* noted that outside of the GHG emissions context, DOE uses a 30-year horizon to analyze the costs and benefits of the proposed rule on consumers, which makes the analysis of costs and benefits incomparable to the analysis of SC–GHGs. (*Id.* at pp. 5–6)

Regarding the use of global SC–GHG values, as previously discussed, many climate impacts that affect the welfare of U.S. citizens and residents are better reflected by global measures of the SC–GHG. 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.

Regarding the use of different time horizons for the SC–GHG values and the other costs and benefits of potential standards, DOE's analysis considers the costs and benefits associated with 30 years of shipments of a covered product. Because such products continue to operate beyond 30 years, DOE accounts for energy cost savings and reductions in emissions until all products shipped within the 30-year period are retired. In the case of CO_2 emissions, which remain in the atmosphere and contribute to climate change for many decades, the benefits of reductions in emissions likewise occur over a lengthy period; to not include such benefits would be inappropriate.

The Institute for Policy Integrity at New York University School of Law (''Policy Integrity'') commented that DOE should consider applying sensitivity analysis using EPA's draft climate-damage estimates released in November 2022, as EPA's work faithfully implements the roadmap laid out in 2017 by the National Academies of Sciences and applies recent advances in the science and economics on the costs of climate change. (Policy Integrity, No. 2280 at pp. 1, 3)

DOE is aware that in December 2023, EPA issued a new set of SC–GHG estimates in connection with a final rulemaking under the Clean Air Act.[124] DOE continues to evaluate recent developments in the scientific literature, including EPA's December 2023 SC–GHG estimates. DOE notes that because EPA's estimates are considerably higher than the IWG's interim SC–GHG values applied for this direct final rule, DOE anticipates that an analysis that used the EPA's estimates would result in significantly greater climate-related benefits. Even if that were the case, however, such results would not affect DOE's decision in this direct final rule. As stated elsewhere in this document, DOE would reach the same conclusion regarding the economic justification of the standards presented in this direct final rule because the standards are economically justified even without considering the IWG's interim SC–GHG values, which DOE agrees are conservative estimates. For the same reason, if DOE were to use EPA's higher SC–GHG estimates, they would likewise not change DOE's conclusion that the standards are economically justified because the standards are economically justified even without considering EPA's SC–GHG estimates.

The AGs of LA *et al.* asserted that the IWG's analysis of the three IAMs used to determine SC–GHG damages is flawed because a number of factually based assumptions cause the SC–GHG to swing from positive to negative, making them too sensitive to be reliable. (AGs of LA *et al.,* No. 2264 at pp. 2–7) The AGs of LA *et al.* commented that several policy choices made by the IWG contribute to an overestimated SC–GHG calculation. (*Id.*) The AGs of LA *et al.* also commented that the IWG's projections do not account for the emissions-reducing policies being instituted globally. (*Id.*) The AGs of LA *et al.* commented that the IWG estimates are both flawed and unlawful, considering the result of the district court's decision in *Louisiana* v. *Biden,* 585 F. Supp. 3d 840 (W.D. La. 2022), *vacated, Louisiana ex rel Landry* v. *Biden,* 64 F.4th 674 (5th Cir. 2023), in which a preliminary injunction barred DOE from adopting the IWG estimates based on EPCA's direction to preclude the consideration of global effects. (*Id.* at pp. 7–8) The AGs of LA *et al.* commented that DOE cannot overlook this injunction by relying on the Fifth Circuit's interlocutory order, and instead must justify why the Louisiana court was incorrect in its conclusion or why DOE may use the IWG estimates regardless. (*Id.*)

APGA restated comments it submitted to OMB jointly with over 20 other trade associations [125] that the interim SC–GHG values developed by IWG in response to E.O. 13990 require additional modifications before use in Federal rulemakings or policy decisions. (APGA, No. 2283 at pp. 6–7)

The CO_2 Coalition asserted that the IWG SC–GHG estimates relied on peer review and consensus, not the scientific method, and the estimates relied on scientifically invalid models, extreme weather conclusions, and catastrophic global warming theory. (CO_2 Coalition, No. 2275 at pp. 8–15) The CO_2 Coalition incorporated by reference all arguments made against use of the social cost of carbon by the State of Louisiana in *Louisiana* v. *Biden.* (CO_2 Coalition, No. 2275 at pp. 15–19, 21)

Rachael Wilfong and Kevin Dayaratna (''Wilfong and Dayaratna'') [126] commented that the climate benefits of the proposed rule are arbitrary and overstated. Wilfong and Dayaratna stated that testing with several models, subjecting their sensitivity to a variety of important and reasonable assumptions, found the models can offer a plethora of different estimates of the SC–GHG, ranging from extreme damages to overall benefits. Wilfong and Dayaratna commented that they used EPA's climate change model and found that assuming the upper bound of the IPCC's climate sensitivity estimates, DOE's estimated reduction in CO_2 would result in a global temperature mitigation of only 0.0004 °C by 2050 and 0.0009 °C by 2100. (Wilfong and Dayaratna, No. 2281 at pp. 7–10)

CEI *et al.* commented that IWG 2021 uses improperly low discount rates, relies on climate models that have consistently overstated actual warming, and on baseline emission scenarios that implausibly assume an increasingly coal-centric global energy system through 2100 and beyond, while downplaying the capacity for adaptation to mitigate climate impacts. CEI *et al.* added that IWG 2021's inclusion of claimed climate benefits nearly 300 years into the future and the use of global rather than national benefits are also skewed toward inflating the end result. (CEI *et al.,* No. 2287 at pp. 6–7)

Zycher commented that the IWG estimates are flawed for a number of reasons, including the use of inconsistent and inappropriate discount rates. Zycher commented that DOE's

[124] See *www.epa.gov/environmental-economics/scghg.*

[125] Available at *www.regulations.gov/comment/CEQ-2021-0002-33767.*

[126] Although these individual commenters are associated with the Heritage Foundation, the comment states that the views expressed in it should not be construed as representing any official position of the Heritage Foundation. (Wilfong and Dayaratna, No. 2281 at p. 1)

adoption of the IWG estimates is misguided because the IWG considers global emissions. (Zycher, No. 2266 at pp. 4–7)

Policy Integrity commented that DOE appropriately applies the social cost estimates developed by the IWG to its analysis of climate benefits. Policy Integrity commented that these values are widely agreed to underestimate the full social costs of greenhouse gas emissions, but for now they remain appropriate to use as conservative estimates. Policy Integrity incorporated by reference comments on DOE's recent proposed standards for room air conditioners, which present numerous legal, economic, and policy justifications that further bolster DOE's adoption of the Working Group's climate-damage valuations. (Policy Integrity, No. 2280 at pp. 1–3)

Western Energy Alliance commented that the SC–GHG estimates are inappropriate to include within this or any rule until the estimates have been subjected to the Administrative Procedure Act process complete with public notice and comment. (Western Energy Alliance, No. 2272 at pp. 5–9)

In response to the foregoing comments, DOE notes that the IWG's SC–GHG estimates 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. A number of criticisms raised in the comments were addressed by the IWG in its February 2021 SC–GHG TSD, and previous parts of this section summarized the IWG's conclusions on several key issues. DOE agrees that the interim SC–GHG values applied for this direct final rule are conservative estimates. In the February 2021 SC–GHG TSD, the IWG stated that the models used to produce the interim estimates do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate change literature. For these same impacts, the science underlying their ''damage functions'' lags behind the most recent research. In the judgment of the IWG, these and other limitations suggest that the range of four interim SC–GHG estimates presented in the TSD likely underestimate societal damages from GHG emissions. The IWG is in the process of assessing how best to incorporate the latest peer-reviewed science and the recommendations of the National Academies to develop an updated set of SC–GHG estimates. DOE also notes that the Fifth Circuit vacated the district court's decision on which the AGs of LA *et al.* rely.

DOE's derivations of the SC–CO_2, SC–N_2O, and SC–CH_4 values used for this direct final rule 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. DOE considers the monetized value of emissions reductions in its evaluation of potential standard levels. While the benefits associated with reduction of GHG emissions inform DOE's evaluation of potential standards, DOE would reach the same conclusion regarding the economic justification of standards presented in this direct final rule without considering the social cost of greenhouse gases.

a. Social Cost of Carbon

The SC–CO_2 values used for this direct final rule were based on the values developed for the February 2021 SC–GHG TSD, which are shown in Table IV.31 in 5-year increments from 2020 to 2050. The set of annual values that DOE used, which was adapted from estimates published by EPA,[127] is presented in appendix 14A of the direct final rule TSD. These estimates are based on methods, assumptions, and parameters identical to the estimates published by the IWG (which were based on EPA modeling), and include values for 2051 to 2070. DOE expects additional climate benefits to accrue for products still operating 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.

Table IV.31 Annual SC-CO_2 Values from 2021 Interagency Update, 2020–2050 (2020$ per Metric Ton CO_2)

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

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 2022$ 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 direct final rule were based on the values developed for the February 2021 SC–GHG TSD. Table IV.32 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 direct final rule TSD. To capture the uncertainties involved in regulatory

[127] *See* EPA, Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis, Washington, DC, December 2021. Available at *nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1013ORN.pdf* (last accessed Feb. 21, 2023).

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 (based on EPA values) after 2050 using the approach described above for the SC–CO_2.

Table IV.32 Annual SC-CH_4 and SC-N_2O Values from 2021 Interagency Update, 2020–2050 (2020$ per Metric Ton)

Year	SC-CH_4				SC-N_2O			
	Discount Rate and Statistic				Discount Rate and Statistic			
	5%	3%	2.5%	3%	5%	3%	2.5 %	3%
	Average	Average	Average	95th percentile	Average	Average	Average	95th percentile
2020	670	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 2022$ 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 direct final rule, DOE estimated the monetized value of NO_X and SO_2 emissions reductions from electricity generation using benefit per ton estimates for that sector from the EPA's Benefits Mapping and Analysis Program.[128] 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, 2035, 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 range; for years beyond 2040 the values are held constant (rather than extrapolated) to be conservative. DOE combined the EPA regional benefit-per-ton estimates with regional information on electricity consumption and emissions from *AEO2023* to define weighted-average national values for NO_X and SO_2 (see appendix 14B of the direct final rule TSD).

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 specifically to residential and commercial buildings, the sector called ''area sources'' would be a reasonable proxy for residential and commercial buildings.[129] The EPA document provides high and low estimates for 2025 and 2030 at 3- and 7-percent discount rates.[130] DOE used the same linear interpolation and extrapolation as it did with the values for electricity generation.

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

M. Utility Impact Analysis

The utility impact analysis estimates the changes in installed electrical capacity and generation projected to result for each considered TSL. The analysis is based on published output from the NEMS associated with *AEO2023.* 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 *AEO2023* Reference case and various side cases. Details of the methodology are provided in the appendices to chapters 13 and 15 of the direct final rule TSD.

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

The utility analysis also estimates the impact on gas utilities in terms of projected changes in natural gas deliveries to consumers for each TSL.

AGA commented that the Process Rule requires DOE to conduct a utility impact analysis to ''include estimated marginal impacts on electric and gas utility costs and revenues'' in its standards rulemakings. (AGA, No. 2279 at pp. 51–52) AGA commented that the February 2023 SNOPR states that DOE conducted some analysis related to electric utilities, and even less for natural gas utilities, concluding that ''the impact to natural gas utility sales is equivalent to the natural gas saved by the proposed standard.'' (*Id.*) AGA

[128] U.S. Environmental Protection Agency. Estimating the Benefit per Ton of Reducing Directly-Emitted $PM_{2.5}$, $PM_{2.5}$ Precursors, and Ozone Precursors from 21 Sectors. Available at *www.epa.gov/benmap/estimating-benefit-ton-reducing-directly-emitted-pm25-pm25-precursors-and-ozone-precursors.*

[129] ''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.

[130] ''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.*

commented that the analysis and findings were insufficient and DOE should adhere to the Process Rule and conduct a complete impact analysis that quantifies and evaluates the marginal impacts to gas utility costs and revenues of a reduction in gas deliveries due to the proposed rule. (*Id.*) AGA commented that DOE should also analyze the impact to retail natural gas ratepayers due to DOE's acknowledgement that the proposed standards could drive many consumers from natural gas to electric for cooking, with a loss of demand for natural gas local distribution companies that could lead to higher rates on remaining consumers to cover fixed distribution costs. (*Id.*) AGA commented that if DOE chooses to deviate from the Process Rule, it must explain why deviation is necessary or appropriate and allow stakeholder comments on that explanation. (*Id.*)

In the context of this direct final rule, DOE maintains that the marginal impacts on gas utility costs and revenues would be minimal, given that the estimated reduction in annual gas demand at the Recommended TSL is a very small fraction of total U.S. residential gas demand (see chapter 15 of the direct final rule TSD). DOE maintains that utilities will not be impacted from fuel switching because consumers are unlikely to switch from gas to electric products as a result of the adopted standard (*see* section IV.G of this document for details). Lastly, analysis of the impact of standards on rates is very difficult, given the diversity of regulatory structures in the U.S. and the many factors that go into setting utility rates.

N. Employment Impact Analysis

DOE considers employment impacts in the domestic economy as one factor in selecting a 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 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.[131] 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 direct final rule using an input/output model of the U.S. economy called Impact of Sector Energy Technologies version 4 (''ImSET'').[132] 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 overestimate actual job impacts over the long run for this rule. Therefore, DOE used ImSET only to generate results for near-term timeframes (2027/2028), where these uncertainties are reduced. For more details on the employment impact analysis, see chapter 16 of the direct final rule TSD.

O. Regulatory Impact Analysis

For any regulatory action that the Administrator of the Office of Information and Regulatory Affairs (''OIRA'') within OMB determines is a significant regulatory action under section 3(f)(1) of E.O. 12866, as amended by E.O. 14094, section 6(a)(3)(C) of E.O. 12866 requires Federal agencies to provide an assessment, including the underlying analysis, of costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation, identified by the agencies or the public (including improving the current regulation and reasonably viable non-regulatory actions), and an explanation why the planned regulatory action is preferable to the identified potential alternatives. 58 FR 51735, 51741. OIRA has determined that this final regulatory action constitutes a ''significant regulatory action'' within the scope of section 3(f) of E.O. 12866, as discussed further in section VI.A of this document. DOE conducted a regulatory impact analysis (''RIA'') for this direct final rule.

As part of the RIA, DOE identifies major alternatives to standards that represent feasible policy options to reduce the energy and water consumption of the covered product. DOE evaluates each alternative in terms of its ability to achieve significant energy and water savings at a reasonable cost, and compares the effectiveness of each alternative to the effectiveness of the finalized standard. DOE recognizes that voluntary or other non-regulatory efforts by manufacturers, utilities, and other interested parties can substantially affect energy and water efficiency or reduce energy and water consumption. DOE bases its assessment on the recorded impacts of any such initiatives to date, but also considers information presented by interested parties

[131] See U.S. Department of Commerce–Bureau of Economic Analysis. *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (''RIMS II'').* 1997. U.S. Government Printing Office: Washington, DC. Available at *www.bea.gov/scb/pdf/regional/perinc/meth/rims2.pdf* (last accessed July 1, 2021).

[132] 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's Guide.* 2015. Pacific Northwest National Laboratory: Richland, WA. PNNL–24563.

regarding the impacts current initiatives may have in the future. Further details regarding the RIA are provided in chapter 17 of the direct final rule TSD.

AN commented that DOE should postpone the compliance deadline for the proposed rule to account for the length and complexity of the policymaking process and ongoing global events (such as COVID 19). (AN, No. 374 at p. 1) AN commented that DOE should use a combination of economic incentives and direct regulations to promote energy conservation without manufacturers incurring losses. (*Id.* at p. 2)

Fall suggested that a labelling program would be an alternative to the proposed rule that could allow consumers the ability to make informed decisions. (Fall, No. 376 at pp. 2–3)

Gardener commented that the public would overall be better served by incentivizing manufacturers and consumers via tax credits to purchase products that meet the various levels of energy efficiency. (Gardener, No. 118 at p. 1) Gardener commented that the amount of the tax credits could also be tiered based on what level of efficiency is achieved. (*Id.*) Gardener commented that these types of incentives have worked very well in the home heating and home solar power markets and that this approach allows more consumer options and encourages the free market to respond more efficiently. (*Id.*)

Strauch recommended that DOE address the cumulative regulatory burden on consumers in addition to manufacturers. (Strauch, No. 2263 at p. 3)

Consumers' Research recommended that DOE should postpone establishing mandatory energy efficiency standards for gas cooking tops for at least another year following a successful one-year trial period of providing consumers with efficiencies measured using the test procedure in order to enhance consumer information and enable voluntary consumer selection of more efficient gas cooking products. (Consumers' Research, No. 2267 at p. 4)

NMHC and NAA commented that the proposed rulemaking accompanies a series of similar rulemakings DOE is proposing, all seeking to change the performance standards for essential residential appliances. (NMHC and NAA, No. 2265 at p. 3) NMHC and NAA recommended that DOE consider the collective impacts of these requirements and recognize that, in practice, the effect of individual pricing increases is magnified when housing providers must manage cost escalations across multiple products at once. (*Id.*)

Whirlpool recommended that DOE consider non-regulatory approaches to increasing energy efficiency, including educating consumers on efficient cooking behaviors and practices. (Whirlpool, No. 2284 at p. 12) Whirlpool commented that cooking products differ from other major appliances in that the user has substantial influence on the product's energy usage, and that the choices consumers make regarding their cooking techniques, food preferences, and choice in cookware can result in diverse energy usage results across consumers using the same model and food loads. (*Id.*) Whirlpool stated that according to its testing, the amount of energy savings DOE estimates would result from moving a gas cooking top from the baseline to EL 2 is roughly equivalent to the savings of a consumer switching from a stainless steel pot to an aluminum pot to boil the same amount of water, and that a consumer could therefore achieve roughly the same annual operating cost savings by switching their cookware to a more efficient material. (*Id.*) Whirlpool commented that it welcomes collaboration with DOE to achieve a larger savings opportunity through consumer education. (*Id.*)

As discussed, E.O. 12866 directs DOE to assess potentially effective and reasonably feasible alternatives to the planned regulation, and to provide an explanation why the planned regulatory action is preferable to the identified potential alternatives. As part of the RIA, DOE analyzed five non-regulatory policy alternatives to the finalized standards for consumer conventional cooking products, including consumer rebates, consumer tax credits, manufacturer tax credits, voluntary energy efficiency targets, and bulk government purchases. Chapter 17 of the direct final rule TSD provides DOE's analysis of the impacts of these alternatives to the planned regulation.

Notwithstanding the requirements of E.O. 12866, as discussed, DOE is required by EPCA to establish or amend standards for a covered product that are designed to achieve the maximum improvement in energy efficiency, which the Secretary determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) DOE has determined that setting energy conservation standards for consumer conventional cooking products at the Recommended TSL achieves the maximum improvement in energy efficiency which is technologically feasible and economically justified.

P. Other Comments

As discussed previously, DOE considered relevant comments, data, and information obtained during its own rulemaking process in determining whether the recommended standards from the Joint Agreement are in accordance with 42 U.S.C. 6295(o). And while some of those comments were directed at specific aspects of DOE's analysis of the Joint Agreement under 42 U.S.C. 6295(o), others were more generally applicable to DOE's energy conservation standards rulemaking program as a whole. The ensuing discussion focuses on these general comments concerning energy conservation standards issued under EPCA.

1. Commerce Clause

The AGs of LA *et al.* asserted that the proposed standards, by not differentiating between interstate and intrastate markets, fail to reflect the proper scope of Federal regulation under the Commerce Clause of the U.S. Constitution. (AGs of LA *et al.,* No. 2264 at pp. 10–11) The AGs of LA *et al.* noted that EPCA prohibits any manufacturer or private labeler from distributing in commerce any new covered product which is not in conformity with an applicable energy conservation standard established pursuant to the statute [emphasis added]. 42 U.S.C. 6302(a)(5) The AGs of LA *et al.* further noted that the term ''commerce'' is defined by EPCA to mean trade, traffic commerce, or transportation (A) between a place in a State and any place outside thereof, or (B) which affects trade, traffic, commerce, or transportation described in subparagraph (A). (42 U.S.C. 6291(17)). The AGs of LA *et al.* asserted that by not differentiating between interstate and intrastate commerce—like the statutory language of 42 U.S.C. 6291(17)—the standards cover all commercial activity, whether inter- or intrastate, which is improper. In summarizing previous Supreme Court decisions, the AGs of LA *et al.* further asserted that precedent dictates that Congress can regulate intrastate activity under the Commerce Clause only when that activity substantially affects interstate commerce. Thus, according to the AGs of LA *et al.,* for the proposed standards to apply to the intrastate market for the products subject to this rulemaking, DOE must show that the intrastate activity covered by 42 U.S.C. 6291(17) and 6302(a)(5) substantially affects the interstate market for the products covered by this rulemaking. The AGs of LA *et al.* stated that there is no such analysis in the proposed

standards, and therefore no constitutional basis for application of the standards to intrastate markets for the products subject to this rulemaking. (AGs of LA *et al.,* No. 2264 at pp. 10–11) The AGs of LA *et al.* further asserted that if such an analysis were to show that the intrastate market did not substantially affect the interstate market (and therefore was not properly the subject of Federal regulation), DOE must redo its cost-benefit analysis since the standards would apply to a more limited set of products—those traveling interstate. (*Id.*) The AGs of LA *et al.* further commented that even if DOE were to find that intrastate commerce in gas cooking products substantially affects interstate commerce, DOE should still exclude purely intrastate activities from any promulgated standard because the original understanding of the Commerce Clause does not give Congress the power to regulate activities that ''substantially affect'' interstate commerce. (*Id.*) In summary, the AGs of LA *et al.* asserted that DOE must exclude all intrastate activity from the proposed standards even if such activity has a substantial effect on interstate commerce in covered cooking products. (*Id.*)

In response, DOE notes that it has clear authority under EPCA to regulate the energy use of a variety of consumer products and certain commercial and industrial equipment, including the subject consumer conventional cooking products. See 42 U.S.C. 6295. The scope of the new and amended standards adopted in this direct final rule properly includes all consumer conventional cooking products distributed in commerce for personal use or consumption because intrastate State activity involving a fungible commodity for which there is an established market, such as consumer conventional cooking products substantially affects interstate commerce. Furthermore, binding Supreme Court precedent contravenes the AGs of LA *et al.'*s arguments relating to the original understanding of the Commerce Clause. *See e.g., Gonzales* v. *Raich,* 545 U.S. 1 (2005). As the Court noted in *Raich,* the Commerce Clause case law ''firmly establishes Congress' power to regulate purely local activities that are part of an economic 'class of activities' that have a substantial effect on interstate commerce.'' *Id.* at 17. The Court concluded that to leave intrastate goods unregulated where there is an established interstate market for the commodity would have a substantial impact on the market and could undermine the very purpose of the regulatory scheme. *See Id.* at 18–19. Such would be the case here. DOE therefore affirms its view that Congress' intent in EPCA was to provide it with authority to regulate all consumer conventional cooking products distributed in commerce. Indeed, based on its statutory authority in EPCA, DOE has a long-standing practice of issuing energy conservation standards with the same scope as the standard in this direct final rule. For example, DOE has maintained a similar scope of products in the April 2009 Final Rule that established the current standards for consumer conventional cooking products (74 FR 16040), and in the September 1998 Final Rule establishing the preceding set of standards for these products (63 FR 48038). As such, DOE disagrees with the AGs of LA *et al.'*s contention that the Commerce Clause limits DOE's clear and long-standing authority under EPCA to adopt the standard, including its scope, presented in this direct final rule. A further discussion regarding federalism concerns can be found at section VI.E of this document.

2. Fuel Neutrality Under EPCA

Gas Analytics & Advocacy Services, LLC (''GAAS'') commented that Congress has made it clear that fuel neutrality be strictly adhered to with respect to energy conservation standards for consumer conventional cooking products, despite electrification being a cornerstone of the Biden Administration's energy and environmental policies. (GAAS, No. 2271 at p. 3)

AHAM commented that disparate treatment of gas and electric cooking tops based on fuel source is not appropriate and that energy conservation standards should be fuel neutral. (AHAM, No. 2285 at p. 4)

In response, DOE first notes that the only requirement related to fuel neutrality in EPCA is that DOE establish separate product classes and standards based on the kind of energy, *i.e.,* fuel, consumed. (42 U.S.C. 6295(q)(1)(A)) And while this requirement is not applicable to direct final rules issued under 42 U.S.C. 6295(p)(4), DOE notes that the recommended standards in the Joint Agreement are divided into product classes based on fuel type.

3. National Academy of Sciences Report

The National Academies of Sciences, Engineering, and Medicine (''NAS'') periodically appoint a committee to peer review the assumptions, models, and methodologies that DOE uses in setting energy conservation standards for covered products and equipment. The most recent such peer review was conducted in a series of meetings in 2020, and NAS issued the report [133] in 2021 detailing its findings and recommendations on how DOE can improve its analyses and align them with best practices for cost-benefit analysis.

AGA commented that DOE should follow, or at least respond, to recommendations in the NAS report, specifically: appliance standards should be economically justified or based on significant failures of private markets or irrational consumer behavior (Recommendation 2–2); the Cost Analysis segment of the Engineering Analysis should be expanded to include ranges of costs, patterns of consumption, diversity factors, energy peak demand, and variance regarding environmental factors (Recommendation 3–5); DOE should put greater weight on ex post and market-based evidence of markups to project a more realistic range of effects of a standard on prices (Recommendation 4–1); DOE should place greater emphasis on providing an argument for the plausibility and magnitude of any market failure related to the energy efficiency gap in its analyses (Recommendation 4–13); and DOE should give greater attention to a broader set of potential market failures on the supply side, including how standards might reduce the number of competing firms, and also how standards might impact price discrimination, technological diffusion, and collusion (Recommendation 4–14). (AGA, No. 2279 at pp. 18–20) AGA commented that DOE has not addressed the NAS recommendations in the February 2023 SNOPR and should revise the proposed rule and allow stakeholders an opportunity to comment. (*Id.*)

AHAM stated that it has continually commented that DOE should review the NAS report and provide notice and an opportunity to comment on whether and how DOE will incorporate the recommendations in that report in its analysis repeated its request of several years that DOE review the NAS report and provide notice and opportunity to comment on whether and how DOE will incorporate into its analysis the recommendations in that report. (AHAM, No. 2285 at pp. 47–49) AHAM asserted commented that DOE cannot continue to perpetuate what AHAM asserted to be the errors in its analytical

[133] National Academies of Sciences, Engineering, and Medicine. 2021. *Review of Methods Used by the U.S. Department of Energy in Setting Appliance and Equipment Standards.* Washington, DC: The National Academies Press. Available at *doi.org/10.17226/25992* (last accessed August 2, 2023).

approach that have been pointed out by stakeholders and the NAS report. (*Id.*)

AHAM commented that DOE has not assessed the utility of consumer-valued features that would be redesigned and eliminated under the standards. (AHAM, No. 10116 at p. 24) AHAM commented that, per OMB Circular A–4, DOE should perform an analysis of the consumer utility of specific features and performance that recognizes the opportunity cost to choose a feature or performance attribute. (*Id.*) AHAM commented that NAS recommends that DOE should collect data on consumer choices in appliance markets and estimate a discrete choice model of consumer behavior to quantify the trade-offs that consumers face from changes in appliance performance. (*Id.*) AHAM further commented that per NAS, DOE should assess consumer utility of features prior to establishing any standard where such features are required by law to be preserved. (*Id.*) AHAM commented that DOE's only technology option for improving efficiency of gas cooking tops eliminates consumer-valued features and performance. (*Id.*)

GAAS commented that DOE has not considered the NAS report's recommendation regarding methodologies to simultaneously improve and simplify economics analyses via the use of consumer marginal energy rates. (GAAS, No. 10107 at p. 4)

As discussed, the rulemaking process for establishing new or amended standards for covered products and equipment are specified at appendix A to subpart C of 10 CFR part 430, and DOE periodically examines and revises these provisions in separate rulemaking proceedings. The recommendations in the NAS report, which pertain to the processes by which DOE analyzes energy conservation standards, will be considered by DOE in a separate rulemaking process.

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 adopting in this direct final rule. Additional details regarding DOE's analyses are contained in the direct final rule TSD 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 price elasticity of consumer purchasing decisions that may change when different standard levels are set.

In the February 2023 SNOPR, DOE defined the TSLs presented in Table V.1 and Table V.2. 88 FR 6818, 6870.

Table V.1 February 2023 SNOPR Trial Standard Levels for Cooking Tops

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 February 2023 SNOPR Trial Standard Levels for Conventional Ovens

Trial Standard Level	Electric Ovens		Gas Ovens	
	EL	Design Option	EL	Design Option
1	1	SMPS	1	SMPS
2	1	SMPS	1	SMPS
3	3	SMPS, Convection mode capability, and Oven separator	2	SMPS and Convection mode capability

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

The CA IOUs commented that they recommend DOE create a TSL 2.5 that is identical to February 2023 SNOPR TSL 2 except that it incorporates EL 2 (instead of EL 1) for electric smooth element cooking tops because EL 2 is highly cost-effective and would improve the efficiency of a larger portion of cooking tops. (CA IOUs, No. 2278 at p. 4) The CA IOUs noted that 80 percent of these cooking tops already meet EL 1, while 30 percent meet EL 2 and above. (*Id.*) The CA IOUs commented that EL 2 is based on the lowest measured AEC for radiant cooking tops in the test sample, with the same E_{TLP} as EL 1, yet five of the 11 tested smooth electric resistant cooking tops have an AEC of 189 kWh/year or below and could meet an IAEC of 189 kWh/year by making improvements in standby mode power use (which the CA IOUs noted was cited by DOE as the technology option for EL 1). (*Id.*) Additionally, the CA IOUs commented that eight of the nine smooth-induction cooking tops have an AEC of 189 kWh/year or less and stated that most induction cooking tops should meet this efficiency level through energy use improvements in standby power mode. (*Id.*) The CA IOUs commented that adopting EL 2 for electric smooth element cooking tops

will not require higher conversion costs for many electric smooth element cooking tops. (*Id.*)

NPGA commented that the proposed TSL mapping that does not include significant efficiency improvements for electric smooth element cooking tops until TSL 3 is arbitrary and inconsistent across fuel types. (NPGA, No. 2270 at p. 5)

DOE must follow specific statutory criteria for prescribing new or amended standards for covered products, including consumer conventional cooking products. When considering energy conservation standards for consumer conventional cooking products, the standards 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 this assessment, DOE considers seven statutory factors, which include consideration of the economic impacts on manufacturers and consumers, as well as energy savings and the need for national energy conservation. In this direct final rule, DOE has modified TSL 2 to analyze the impacts of a standard set at EL 2 for all product classes, including electric smooth element cooking tops, as suggested by the CA IOUs and NGPA. Section V.C of this document includes a summary of the benefits and burdens of TSLs considered for consumer conventional cooking products.

ONE Gas commented that TSLs should be analyzed independently across design options and not among groupings of technology options. (ONE Gas, No. 2289 at p. 15; ONE Gas, No. 10109 at p. 4)

Although DOE considered new and amended standard levels for consumer conventional cooking products by grouping the efficiency levels for each product class into TSLs, DOE evaluates all analyzed efficiency levels in its analysis and provides a comparative analysis of each design option in section V.C.1 of this document.

NPGA commented that the statement in the February 2023 SNOPR that ''DOE may adopt energy efficiency levels that are higher or lower than the proposed standards'' is misleading. (NPGA, No. 2270 at p. 2) NPGA commented that DOE's decision to incorporate max-tech standards for gas cooking tops means that the adopted energy efficiency levels cannot be higher than the proposed standards, pursuant to EPCA. (*Id.*)

DOE's statement in the February 2023 SNOPR is intended to apply across all product classes and not necessarily to each individual product class.

In the analysis conducted for this direct final rule, 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. TSL 3 represents the maximum technologically feasible (max-tech) energy efficiency for all product classes. TSL 2 represents an intermediate TSL. TSL 1—which corresponds to the Recommended TSL in the Joint Agreement—corresponds to the minimum efficiency improvement in each product class corresponding to electronic controls for electric smooth element cooking tops, optimized burners for gas cooking tops, and SMPSs for ovens. DOE presents the results for the TSLs in this document, while the results for all efficiency levels that DOE analyzed are in the direct final rule TSD. While not all ELs were included among the defined TSLs, DOE considered all efficiency levels as part of its analysis.[134]

Table V.3 and Table V.4 present the TSLs and the corresponding efficiency levels and potential prescriptive standards that DOE has identified for potential new and amended energy conservation standards for consumer conventional cooking products, consistent with those analyzed in the February 2023 SNOPR. As discussed in section IV.A.2.a of this document, DOE did not evaluate electric open (coil) element cooking tops as part of the efficiency analysis for this direct final rule.

Table V.3 Trial Standard Levels for Cooking Tops

Trial Standard Level	Electric Smooth Element Cooking Tops (All Classes)		Gas Cooking Tops (All Classes)	
	EL	IAEC *(kWh/year)*	EL	IAEC *(kBtu/year)*
1	1	207	1	1,770
2	2	189	2	1,343
3	3	179	2	1,343

Table V.4 Trial Standard Levels for Conventional Ovens

Trial Standard Level	Electric Ovens		Gas Ovens	
	EL	Design Option	EL	Design Option
1	1	SMPS	1	SMPS
2	2	SMPS and Convection mode capability	2	SMPS and Convection mode capability
3	3	SMPS, Convection mode capability, and Oven separator	2	SMPS and Convection mode capability

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

[134] Efficiency levels that were analyzed for this direct final rule are discussed in section IV.C.1 of this document. Results by efficiency level are presented in chapter 8 of the direct final rule TSD.

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 direct final rule TSD provides detailed information on the LCC and PBP analyses.

Table V.5 through Table V.16 show the LCC and PBP results for the TSLs considered for each product class in the compliance year for that TSL. All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028. In the first of each pair of tables, the simple payback is measured relative to the baseline product. In the second table, the 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.5 Average LCC and PBP Results for Electric Smooth Element Standalone Cooking Tops

TSL*	Efficiency Level	Average Costs *2022$*				Simple Payback *years*	Average Lifetime *years*
		Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
--	Baseline	$571	$20	$259	$830	--	16.8
1	1	$571	$15	$194	$765	0.6	16.8
2	2	$595	$14	$180	$775	4.0	16.8
3	3	$1,212	$16	$209	$1,422	170.5	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.

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.6 Average LCC Savings Relative to the No-New-Standards Case for Electric Smooth Element Standalone Cooking Tops

TSL*,**	Efficiency Level	Life-Cycle Cost Savings	
		Average LCC Savings* *2022$*	Percent of Consumers that Experience Net Cost
1	1	$62.80	0%
2	2	$8.54	52%
3	3	($638.87)	100%

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

** All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.7 Average LCC and PBP Results for Electric Smooth Element Cooking Top Component of a Combined Cooking Product

TSL*	Efficiency Level	Average Costs *2022$*				Simple Payback *years*	Average Lifetime *years*
		Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
--	Baseline	$571	$20	$259	$830	--	16.8
1	1	$571	$15	$194	$765	0.6	16.8
2	2	$595	$14	$180	$775	4.0	16.8
3	3	$1,212	$16	$209	$1,422	170.5	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.
* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.8 Average LCC Savings Relative to the No-New-Standards Case for Electric Smooth Element Cooking Top Component of a Combined Cooking Product

TSL*,**	Efficiency Level	Life-Cycle Cost Savings	
		Average LCC Savings* *2022$*	Percent of Consumers that Experience Net Cost
1	1	$62.80	0%
2	2	$8.54	52%
3	3	($638.87)	100%

* The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.
** All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.9 Average LCC and PBP Results for Gas Standalone Cooking Tops

TSL*	Efficiency Level	Average Costs *2022$*				Simple Payback *years*	Average Lifetime *years*
		Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
--	Baseline	$464	$16	$175	$639	--	14.5
1	1	$465	$15	$169	$634	6.6	14.5
2, 3	2	$492	$13	$145	$637	10.5	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.
* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.10 Average LCC Savings Relative to the No-New-Standards Case for Gas Standalone Cooking Tops

TSL*,**	Efficiency Level	Life-Cycle Cost Savings	
		Average LCC Savings* *2022$*	Percent of Consumers that Experience Net Cost
1	1	$3.09	1%
2, 3	2	($1.03)	38%

* The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.
** All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.11 Average LCC and PBP Results for Gas Cooking Top Component of a Combined Cooking Product

TSL*	Efficiency Level	Average Costs *2022$*				Simple Payback *years*	Average Lifetime *years*
		Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
--	Baseline	$464	$16	$175	$639	--	14.5
1	1	$465	$15	$169	$634	6.6	14.5
2, 3	2	$492	$13	$145	$637	10.5	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.
* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.12 Average LCC Savings Relative to the No-New-Standards Case for Gas Cooking Top Component of a Combined Cooking Product

TSL*,**	Efficiency Level	Life-Cycle Cost Savings	
		Average LCC Savings* *2022$*	Percent of Consumers that Experience Net Cost
1	1	$3.09	1%
2, 3	2	($1.03)	38%

* The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.
** All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.13 Average LCC and PBP Results for Electric Ovens

TSL*	Efficiency Level	Average Costs *2022$*				Simple Payback *years*	Average Lifetime *years*
		Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
--	Baseline	$750	$27	$344	$1,094	--	16.8
1	1	$749	$25	$327	$1,075	2.1	16.8
2	2	$806	$24	$316	$1,122	25.4	16.8
3	3	$860	$21	$275	$1,135	20.8	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.
* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.14 Average LCC Savings Relative to the No-New-Standards Case for Electric Ovens

TSL*,**	Efficiency Level	Life-Cycle Cost Savings	
		Average LCC Savings* *2022$*	Percent of Consumers that Experience Net Cost
1	1	$16.23	0%
2	2	($39.55)	27%
3	3	($24.87)	81%

* The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.
** All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.15 Average LCC and PBP Results for Gas Ovens

TSL*	Efficiency Level	Average Costs *2022$*				Simple Payback *years*	Average Lifetime *years*
		Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
--	Baseline	$892	$22	$244	$1,135	--	14.5
1	1	$889	$20	$226	$1,115	1.9	14.5
2, 3	2	$932	$19	$218	$1,150	18.0	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.
* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

Table V.16 Average LCC Savings Relative to the No-New-Standards Case for Gas Ovens

TSL*,**	Efficiency Level	Life-Cycle Cost Savings	
		Average LCC Savings* *2022$*	Percent of Consumers that Experience Net Cost
1	1	$15.17	0%
2, 3	2	($24.16)	21%

* The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.
** All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

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.17 through Table V.22 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 of consumer cooking products. In most cases, the average LCC savings and PBP for senior-only households at the considered efficiency levels are not substantially different from the average for all households. Low-income households have higher LCC savings and lower payback periods relative to the results for all households. Consumers not impacted by the TSL are composed of the remaining consumers that neither experience a net benefit or a net cost. Chapter 11 of the direct final rule TSD presents the complete LCC and PBP results for the subgroups.

Table V.17 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Electric Smooth Standalone Cooking Tops

TSL*	Low-Income Households	Senior-Only Households	All Households
Average LCC Savings (2022$)**			
1	$62.53	$62.32	$62.80
2	$21.37	$9.03	$8.54
3	($245.84)	($637.64)	($638.87)
Payback Period (years)			
1	0.2	0.6	0.6
2	1.3	3.9	4.0
3	58.0	165.0	170.5
Consumers with Net Benefit (%)			
1	20%	22%	22%
2	57%	34%	33%
3	47%	0%	0%
Consumers with Net Cost (%)			
1	0%	0%	0%
2	17%	51%	52%
3	41%	100%	100%

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

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

Table V.18 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Electric Smooth Element Cooking Top Component of a Combined Cooking Product

TSL*	Low-Income Households	Senior-Only Households	All Households
Average LCC Savings (2022$)**			
1	$62.53	$62.32	$62.80
2	$21.37	$9.03	$8.54
3	($245.84)	($637.64)	($638.87)
Payback Period (years)			
1	0.2	0.6	0.6
2	1.3	3.9	4.0
3	58.0	165.0	170.5
Consumers with Net Benefit (%)			
1	20%	22%	22%
2	57%	34%	33%
3	47%	0%	0%
Consumers with Net Cost (%)			
1	0%	0%	0%
2	17%	51%	52%
3	41%	100%	100%

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

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

Table V.19 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Gas Standalone Cooking Tops

TSL*	Low-Income Households	Senior-Only Households	All Households
Average LCC Savings (2022$)**			
1	$4.31	$3.12	$3.09
2	$8.57	($0.36)	($1.03)
3	$8.57	($0.36)	($1.03)
Payback Period (years)			
1	3.9	6.4	6.6
2	6.1	10.2	10.5
3	6.1	10.2	10.5
Consumers with Net Benefit (%)			
1	2%	2%	2%
2	35%	22%	21%
3	35%	22%	21%
Consumers with Net Cost (%)			
1	1%	1%	1%
2	22%	37%	38%
3	22%	37%	38%

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

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

Table V.20 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Gas Standalone Cooking Top Component of a Combined Cooking Product

TSL*	Low-Income Households	Senior-Only Households	All Households
Average LCC Savings (2022$)**			
1	$4.31	$3.12	$3.09
2	$8.57	($0.36)	($1.03)
3	$8.57	($0.36)	($1.03)
Payback Period (years)			
1	3.9	6.4	6.6
2	6.1	10.2	10.5
3	6.1	10.2	10.5
Consumers with Net Benefit (%)			
1	2%	2%	2%
2	35%	22%	21%
3	35%	22%	21%
Consumers with Net Cost (%)			
1	1%	1%	1%
2	22%	37%	38%
3	22%	37%	38%

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

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

Table V.21 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Electric Ovens

TSL	Low-Income Households	Senior-Only Households	All Households
Average LCC Savings (2022$)**			
1	$17.72	$16.38	$16.23
2	($3.65)	($39.54)	($39.55)
3	$25.85	($26.16)	($24.87)
Payback Period (years)			
1	0.7	2.1	2.1
2	7.6	25.6	25.4
3	5.8	21.2	20.8
Consumers with Net Benefit (%)			
1	4%	5%	5%
2	15%	1%	1%
3	62%	18%	19%
Consumers with Net Cost (%)			
1	0%	0%	0%
2	8%	27%	27%
3	24%	82%	81%

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.
** The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.

Table V.22 Comparison of LCC Savings and PBP for Consumer Subgroups and All Households; Gas Ovens

TSL*	Low-Income Households	Senior-Only Households	All Households
Average LCC Savings (2022$)**			
1	$15.45	$15.06	$15.17
2	($8.61)	($24.58)	($24.16)
3	($8.61)	($24.58)	($24.16)
Payback Period (years)			
1	1.2	1.9	1.9
2	10.5	18.0	18.0
3	10.5	18.0	18.0
Consumers with Net Benefit (%)			
1	4%	4%	4%
2	9%	0%	1%
3	9%	0%	1%
Consumers with Net Cost (%)			
1	0%	0%	0%
2	12%	21%	21%
3	12%	21%	21%

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.
** The savings represent the average LCC for affected consumers. Negative values are denoted in parentheses.

c. Rebuttable Presumption Payback

As discussed in section III.E.2 of this document, EPCA establishes a rebuttable presumption that an energy conservation standard is economically justified if the increased purchase cost for a product that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. In calculating a rebuttable presumption payback period for each of the considered TSLs, DOE used discrete

values and, as required by EPCA, based the energy use calculation on the DOE test procedures 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.23 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 this rule 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.23 Rebuttable-Presumption Payback Periods

Product Class	Trial Standard Level*		
	1	2	3
years			
Electric Smooth Element Standalone Cooking Top	0.5	2.6	59.3
Electric Smooth Element Cooking Top Component of a Combined Cooking Product	0.5	2.6	59.3
Gas Standalone Cooking Top	3.7	6.0	6.0
Gas Cooking Top Component of a Combined Cooking Product	3.7	6.0	6.0
Electric Ovens	1.6	14.4	9.1
Gas Ovens	8.4	26.7	26.7

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

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 next section describes the expected impacts on manufacturers at each considered TSL. Chapter 12 of the direct final rule TSD explains the analysis in further detail.

a. Industry Cash Flow Analysis Results

In this section, DOE provides GRIM results from the analysis, which examines changes in the industry that would result from 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, as previously described in section IV.J.2.d of this document.

Each of the modeled scenarios results in a unique set of cash flows and corresponding INPV for each TSL. INPV is the sum of the discounted cash flows to the industry from the base year (2024) through the end of the analysis period (30 years from the analyzed compliance year). The ''change in INPV'' results refer to the difference in industry value between the no-new-standards case and standards case at each TSL. To provide perspective on the short-run cash flow impact, DOE includes 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 would take effect. This figure provides an understanding of the magnitude of the required conversion costs relative to the cash flow generated by the industry in the no-new-standards case.

DOE presents the range in INPV for consumer conventional cooking product manufacturers in Table V.24 and Table V.25. DOE presents the impacts to industry cash flows and the conversion costs in Table V.26.

Table V.24 Industry Net Present Value for Consumer Conventional Cooking Products - Preservation of Gross Margin Scenario

	Units	No-New-Standards Case	Trial Standard Level*		
			1	2	3
INPV	*2022$ millions*	1,601	1,458	1,078	(25)
Change in INPV	*2022$ millions*	-	(143)	(522)	(1,626)
	%	-	(9.0)	(32.6)	(101.6)

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

Table V.25 Industry Net Present Value for Consumer Conventional Cooking Products - Preservation of Operating Profit Scenario

	Units	No-New-Standards Case	Trial Standard Level*		
			1	2	3
INPV	*2022$ millions*	1,601	1,457	1,042	(302)
Change in INPV	*2022$ millions*	-	(144)	(559)	(1,903)
	%	-	(9.0)	(34.9)	(118.9)

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

Table V.26 Cash Flow Analysis for Consumer Conventional Cooking Product Manufacturers

	Units	No-New-Standards Case	Trial Standard Level*		
			1***	2	3
Free Cash Flow (2026)	*2022$ millions*	133.8**	100.6	(94.0)	(763.7)
Change in Free Cash Flow (2026)	*2022$ millions*	-	(28.1)	(227.9)	(897.5)
	%	-	(21.8)	(170.2)	(670.6)
Product Conversion Costs	*2022$ millions*	-	19.9	334.0	1,593.5
Capital Conversion Costs	*2022$ millions*	-	46.8	242.5	475.7
Total Conversion Costs	*2022$ millions*	-	66.7	576.5	2,069.2

* Numbers in parentheses indicate a negative number. Some numbers may not sum exactly due to rounding.
** The no-new-standards case free cash flow in 2027 is $128.7 million.
*** Change in free cash flow for TSL 1 (the Recommended TSL) is compared to the no-new-standards case free cash flow in 2027.

At TSL 3, DOE estimates the change in INPV will range from −$1,903 million to −$1,626 million, which represents a change in INPV of –118.9 percent to –101.6 percent, respectively. At TSL 3, industry free cash flow decreases to −$763.7 million, which represents a decrease of approximately 670.6 percent, compared to the no-new-standards case value of $133.8 million in 2026, the year before the compliance date.

TSL 3 would set the energy conservation standard at EL 2 for the gas cooking top product classes (standalone and component of a combined cooking product) and for the gas oven product class and at EL 3 for the electric smooth element cooking top product classes (standalone and component of a combined cooking product) and for the electric oven product class. This represents max-tech for all product classes. DOE estimates that less than 1 percent of electric smooth element cooking top shipments (standalone and component of a combined cooking product), 41 percent of gas cooking top shipments (standalone and component of a combined cooking product), there are no electric standard oven (freestanding and built-in) shipments, there are no electric self-clean oven (freestanding) shipments, 2 percent of electric self-clean (built-in) shipments, 62 percent of gas standard oven (freestanding) shipments, 38 percent of gas standard oven (built-in) shipments, 93 percent of gas self-clean oven (freestanding) shipments, and 77 percent of 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 $1,593.5 million in product conversion costs. This includes testing costs and product redesign costs. At TSL 3, 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 almost all their electric oven models to use oven separators. Additionally, consumer conventional cooking product manufacturers would incur approximately $475.7 million in capital conversion costs to purchase new tooling and equipment necessary to produce the numerous redesigned cooking top and oven models at TSL 3.

At TSL 3, the shipment weighted average MPC for consumer conventional cooking products significantly increases by 22.3 percent relative to the no-new-standards case shipment weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass along this cost increase, which causes an increase in manufacturers' free cash flow. However, the $2,069.2 million in conversion costs estimated at TSL 3, ultimately results in a significantly negative change in INPV at TSL 3 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 22.3 percent increase in the shipment weighted average MPC results in a reduction in the margin after the compliance year. This reduction in the margin and the $2,069.2 million in conversion costs incurred by manufacturers causes a significantly negative change in INPV at TSL 3 under the preservation of operating profit scenario.

At TSL 2, DOE estimates the change in INPV will range from −$559 million to −$522 million, which represents a change in INPV of –34.9 percent to –32.6 percent, respectively. At TSL 2, industry free cash flow decreases to −$94.0 million, which represents a decrease of approximately 170.2 percent, compared to the no-new-standards case value of $133.8 million in 2026, the year before the compliance date.

TSL 2 would set the energy conservation standard at EL 2 for all product classes. DOE estimates that 15 percent of electric smooth element cooking top shipments (standalone and component of a combined cooking product), 41 percent of gas cooking top shipments (standalone and component of a combined cooking product), 38 percent of electric standard oven (freestanding) shipments, 30 percent of electric standard oven (built-in) shipments, 77 percent of electric self-clean oven (freestanding) shipments, 88 percent of electric self-clean (built-in) shipments, 62 percent of gas standard oven (freestanding) shipments, 38 percent of gas standard oven (built-in) shipments, 93 percent of gas self-clean oven (freestanding) shipments, and 77 percent of gas self-clean (built-in) shipments would already meet the efficiency levels required at TSL 2 in 2027.

At TSL 2, DOE expects consumer conventional cooking product manufacturers to incur approximately $334.0 million in product conversion costs. This includes testing costs and product redesign costs. Additionally, consumer conventional cooking product manufacturers would incur approximately $242.5 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 SMPSs 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 3.1 percent relative to the no-new-standards case shipment weighted average MPC in 2027. In the preservation of gross margin scenario, manufacturers can fully pass on this cost increase, which causes an increase in manufacturers' free cash flow. However, the $576.5 million in conversion costs estimated at TSL 2, ultimately results in a significantly negative change in INPV at TSL 2 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 3.1 percent increase in the shipment weighted average MPC results in a reduction in the margin after the compliance year. This reduction in the margin and the $576.5 million in conversion costs incurred by manufacturers causes a significantly negative change in INPV at TSL 2 under the preservation of operating profit scenario.

At TSL 1 (*i.e.,* the Recommended TSL), DOE estimates the change in INPV will range from −$144 million to −$143 million, which represents a change of –9.0 percent. At TSL 1, industry free cash flow decreases to $100.6 million, which represents a decrease of approximately 21.8 percent, compared to the no-new-standards case value of $128.7 million in 2027, the year before the compliance date.

TSL 1 would set the energy conservation standard at EL 1 for all product classes. DOE estimates that 77 percent of all electric smooth element cooking top shipments, 97 percent of all gas cooking top shipments, 95 percent of all electric oven shipments, and 96 percent of all gas oven shipments would already meet or exceed the efficiency levels required at TSL 1 in 2028.

At TSL 1, DOE expects consumer conventional cooking product manufacturers to incur approximately $19.9 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 $46.8 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 SMPSs 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 0.1 percent relative to the no-new-standards case shipment weighted average MPC in 2028. In the preservation of gross margin scenario, manufacturers can fully pass on this slight cost increase, which causes an increase in manufacturers' free cash flow. However, the $66.7 million in conversion costs estimated at TSL 1, ultimately results in a slightly negative change in INPV at TSL 1 under the preservation of gross margin scenario.

Under the preservation of operating profit scenario, the 0.1 percent increase in the shipment weighted average MPC results in a reduction in the margin after the compliance year. This reduction in the margin and the $66.7 million in conversion costs incurred by manufacturers causes a slightly negative change in INPV at TSL 1 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's 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 2021 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.27 represent the potential domestic production employment that

could result following the analyzed 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 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 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 was moved outside of the United States. While the results present a range of domestic employment impacts following 2027 or 2028 (depending on the TSL being analyzed), the following sections also include qualitative discussions of the likelihood of negative employment impacts at the various TSLs.

Using 2021 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 4,208 domestic production workers involved in manufacturing consumer conventional cooking products in 2027. Table V.27 shows the range of the impacts of the analyzed new and amended energy conservation standards on U.S. production workers in the consumer conventional cooking product industry.

Table V.27 Domestic Employment for Consumer Conventional Cooking Products in the Analyzed Compliance Year

	No-New-Standards Case	Trial Standard Level*		
		1***	2	3
Domestic Production Workers in 2027	4,208**	4,195	4,333	4,808
Domestic Non-Production Workers in 2027	506**	504	521	578
Total Direct Employment in 2027	4,714**	4,699	4,854	5,386
Potential Changes in Total Direct Employment in 2027*	-	(13) - 0	(939) – 125	(1,123) – 600

*DOE presents a range of potential impacts. Numbers in parentheses indicate a negative number.
**In the no-new-standards case in 2028 there are 4,193 domestic production workers; there are 504 domestic non-production workers; and the total direct employment is 4,697 in 2028.
***Change in employment for TSL 1 (the Recommended TSL) is compared to the no-new-standards case employment in 2028.

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 these product classes. Additionally, this lower range assumes that at TSL 1, the Recommended TSL, which sets all oven product classes and all electric smooth element cooking top product classes at EL 1, domestic production employment would not change. 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 classes. 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 classes using purchased components. 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 for TSL 2, DOE estimated that up to 25 percent of the domestic employment for the electric smooth element cooking top product classes could be relocated abroad at EL 2. Additionally, DOE estimated that up to 25 percent of domestic production employment for the oven product classes could be relocated abroad at TSL 2. DOE estimates that there would be approximately 736 domestic production employees involved in the production of electric smooth element cooking tops and 3,020 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 939 domestic production employees could be eliminated at TSL 2 (due to standards being set at EL 2 for all electric smooth element cooking top product classes and for all oven product classes).[135]

At the lower end of the range for TSL 3, DOE estimated that up to 50 percent of domestic production employment for the electric smooth element cooking top product classes could be relocated abroad at max-tech. Additionally, DOE estimated that up to 25 percent of domestic production employment for

[135] $736 \times 25\% + 3{,}020 \times 25\% = 939$

the oven product classes could be relocated abroad at TSL 3. DOE estimates that there would be approximately 736 domestic production employees involved in the production of electric smooth element cooking tops and 3,020 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 1,123 domestic production employees could be eliminated at TSL 3 (due to standards being set at max-tech for all electric smooth element cooking top product classes and for all oven product classes).[136]

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.

In response to the energy conservation standard proposed in the February 2023 SNOPR for gas cooking tops, Sub-Zero Group commented that any standard that would force its Wolf brand to remove consumer-desired features from their gas cooking tops would jeopardize its ability to maintain market share and negatively impact its employees represented by SMART Union International. (Sub-Zero Group, No. 767 at p. 3; Sub-Zero Group, No. 2140 at p. 6)

As discussed in section IV.C.1.a of this document, DOE updated the efficiency levels for gas cooking tops for this direct final rule analysis. With the updates to the efficiency levels for gas cooking tops that were made for this direct final rule analysis, DOE estimates that domestic production employment would not change significantly at TSL 1, but could be reduced by up to 939 domestic employees at TSL 2 and by up to 1,123 domestic employees at TSL 3 as displayed in the lower bound for Table V.27.

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 less than 1 percent of shipments currently using this technology. Additionally, any standards requiring oven separators for the electric oven product class 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.

AGA commented that designers and manufacturers of gas cooking tops are likely to leave the market rather than spend the millions of dollars required to redesign their products to comply with the February 2023 SNOPR. (AGA, No. 2279 at p. 22)

NPGA stated that DOE's proposed standard in the February 2023 SNOPR for gas cooking tops will pose a substantial difficulty for manufacturers and upheaval in the market. (NPGA, No. 2270 at p. 9) NPGA stated that even if DOE is correct in asserting the proposed standard's technical feasibility and economic justification, 96 percent of the gas cooking tops tested by DOE were not in compliance with the proposal intended to be in effect by 2027. (*Id.*) Additionally, NPGA stated that it is more likely that manufacturers will choose to leave the market rather than spend the millions of dollars it will take to redesign their products to be in compliance with the proposed standards. (*Id.*)

Whirlpool commented that it and other multi-brand companies differentiate their products on the basis of price, new features, improved customer experience, and improved energy efficiency. (Whirlpool, No. 2284 at pp. 4–8) Whirlpool commented that standards proposed in the February 2023 SNOPR for gas cooking tops will limit the variety of cooking tops available on the market and functionally phase out product features that manufacturers use to differentiate between models and brands (*e.g.,* grates and burners), and that without these features, Whirlpool and other manufacturers will lack the ability to meaningfully differentiate between products in their own product lines and those of their competitors. (*Id.*) Whirlpool commented that the standard proposed in the February 2023 SNOPR for gas cooking tops also threaten the ability of smaller companies to compete in the market, resulting in reduced consumer choice, less innovation, and industry consolidation as manufacturers lose the ability to add new features or improve consumer experience as readily within the confines of the standards. (*Id.*) Whirlpool added that DOE fails to account for the decreased competition that will likely result from this rulemaking. (*Id.*) Additionally, Whirlpool commented that DOE's February 2023 SNOPR analysis fails to consider the likely diminution in market competition, product utility, and product performance of gas cooking products, as well as the likely wholesale removal of certain products and features from the market, resulting from the standard proposed in the February 2023 SNOPR for gas cooking tops. (*Id.*) Whirlpool recommended that DOE account for whether the standard proposed in the February 2023 SNOPR for gas cooking tops will reduce competition and increase consolidation. (*Id.*) ONE Gas stated that manufacturers would likely choose to leave the market rather than expend the millions of dollars to redesign their products in order to comply, unreasonably eliminating competition and resulting in enormous market upheaval. (ONE Gas, No. 2289 at pp. 3–4)

Based on comments received in response to the February 2023 SNOPR, DOE further examined the potential impacts of the gas cooking top market in this direct final rule analysis and agrees that some gas cooking top manufacturers might not be willing to make the investments required to comply with the max-tech gas cooking top efficiency level that was proposed in the February 2023 SNOPR and the max-tech gas cooking top efficiency level analyzed in this direct final rule analysis. If energy conservation standards are set at max-tech for gas cooking tops, it could result in some gas cooking top manufacturers leaving the gas cooking top market (either by exclusively manufacturing electric cooking tops or exiting the cooking top market all together). However, DOE notes that 97 percent of gas cooking top shipments on the market today would meet EL 1 for the gas cooking tops product classes, which DOE is finalizing in this rulemaking. Therefore, DOE does not anticipate that adopting energy conservation standards at EL 1 for the gas cooking tops product classes would cause any manufacturer to exit the gas cooking top market and all manufacturers would be able to continue to differentiate their products based on features other than energy efficiency.

As discussed in section IV.C.1 of this document, DOE updated the efficiency levels for gas cooking tops for this direct

[136] $736 \times 50\% + 3{,}020 \times 25\% = 1{,}123$

final rule. Based on the updated efficiency levels for gas cooking tops, DOE estimates that approximately 41 percent of gas cooking shipments would meet the efficiency requirements at max-tech. Based on DOE's further analysis, including the updated efficiency levels for gas cooking tops for this direct final rule, DOE understands that there is a risk that some manufacturers might not be willing or able to make the investments required to comply with standards for gas cooking tops if standards are set at max-tech for gas cooking tops. DOE notes that 97 percent of gas cooking top shipments on the market today would meet EL 1 for the gas cooking tops product classes, which DOE is finalizing in this rulemaking.

Other than the max-tech ELs for the electric cooking top product classes and the gas cooking top product classes, all other ELs require making incremental improvements to existing designs and should not present any manufacturing capacity constraints given a compliance period of 3 or more years (depending on the TSL analyzed).

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 a separate analysis for the standards proposed in the NOPR published elsewhere in today's **Federal Register** and in chapter 12 of the direct final rule TSD. DOE also identified the premium product 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 premium product manufacturer subgroup consists of consumer conventional cooking product manufacturers that primarily sell gas cooking tops, gas ovens, and electric self-clean ovens marketed as premium or professional style, either as a standalone product or as a component of a combined cooking product. These products are typically significantly more expensive than the market average costs. For the cooking top product classes, some premium product manufacturers do manufacture electric smooth element cooking tops. Of the premium product manufacturers that manufacture electric smooth element cooking tops, all have products that use induction technology and would be able to meet the max-tech efficiency level for these product classes.

Premium product manufacturers would likely face more difficulty meeting potential standards set for the gas cooking top product classes than other consumer conventional cooking product manufacturers. However, as previously stated in section IV.C.1.a of this document, all analyzed efficiency levels for the gas cooking top product classes are achievable with multiple HIR burners and continuous cast-iron grates. Therefore, while premium product manufacturers would likely have to redesign a higher portion of their gas cooking top models compared to other consumer conventional cooking product manufacturers, all efficiency levels for the gas cooking top product classes are achievable for premium product manufacturers.

For the oven product classes, the vast majority of premium product 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, premium product manufacturers typically have a higher percentage of gas oven models with convection mode capability compared to other consumer conventional cooking product manufacturers. However, like the rest of the market, there are very few, if any, premium product electric ovens equipped with an oven separator, and it would be difficult for premium product manufacturers to convert all their oven cavities into ovens equipped with oven separators.

e. Cumulative Regulatory Burden

One aspect of assessing manufacturer burden involves looking at the cumulative impact of multiple DOE standards and the regulatory actions of other Federal agencies and States 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. 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 2028 compliance date of the new and amended energy conservation standards for consumer conventional cooking products. This information is presented in Table V.28.

Table V.28 Compliance Dates and Expected Conversion Expenses of Federal Energy Conservation Standards Affecting Consumer Conventional Cooking Product Manufacturers

Federal Energy Conservation Standard	Number of Mfrs.*	Number of Manufacturers Affected from this Rule**	Approx. Standards Year	Industry Conversion Costs (millions)	Industry Conversion Costs / Product Revenue***
Portable Air Conditioners 85 FR 1378 (Jan. 10, 2020)	11	4	2025	$320.9 (2015$)	6.7%
Room Air Conditioners 88 FR 34298 (May 26, 2023)	8	4	2026	$24.8 (2021$)	0.4%
Microwave Ovens 88 FR 39912 (Jun. 20, 2023)	18	10	2026	$46.1 (2021$)	0.7%
Clothes Dryers† 87 FR 51734 (Aug. 23, 2022)	15	10	2027	$149.7 (2020$)	1.8%
Automatic Commercial Ice Makers† 88 FR 30508 (May 11, 2023)	23	4	2027	$15.9 (2022$)	0.6%
Dishwashers† 88 FR 32514 (May 19, 2023)	21	14	2027	$125.6 (2021$)	2.1%
Electric Motors 88 FR 36066 (Jun. 1, 2023)	74	1	2027	$468.5 (2021$)	2.6%
Residential Clothes Washers† 88 FR 13520 (Mar. 3, 2023)	19	11	2027	$690.8 (2021$)	5.2%
Ceiling Fans† 88 FR 40932 (Jun. 22, 2023)	91	1	2028	$107.2 (2022$)	1.9%
Commercial Refrigeration Equipment† 88 FR 70196 (Oct. 10, 2023)	89	7	2028	$226.4 (2022$)	1.6%
Dehumidifiers† 88 FR 76510 (Nov. 6, 2023)	20	4	2028	$7.0 (2022$)	0.4%
General Service Lamps† 88 FR 1638 (Jan. 11, 2023)	100+	1	2028	$407 (2021$)	4.5%
Consumer Furnaces 88 FR 87502 (Dec. 18, 2023)	15	1	2029	$162.0 (2022$)	1.8%

Miscellaneous Refrigeration Products† 88 FR 19382 (Mar. 31, 2023)	38	9	2029	$126.9 (2021$)	3.1%
Refrigerators, Refrigerator-Freezers, and Freezers 88 FR 3026 (Jan. 17, 2024)	49	14	2029 & 2030‡	$830.3 (2022$)	1.3%

* 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 direct 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 publication. Values may change on publication of a final rule.
‡ For the refrigerators, refrigerator-freezers, and freezers energy conservation standards direct final rule, the compliance year (2029 and 2030) varies by product class.

AHAM commented that DOE should abide by Process Rule requirements and take action to fully review the cumulative impacts its rules will have on manufacturers and consumers, with this review including examination of the potential impact on the economy and inflation as a result of the unprecedented stringency and close compliance dates of DOE's recently proposed standards. (AHAM, No. 2285 at pp. 44–47) AHAM commented that DOE's proposed levels for consumer clothes dryers, residential clothes washers, conventional cooking products, consumer refrigerator/freezers, and its final rule for room air conditioners will require significant redesign of products—and in the case of gas cooking tops and top-loading clothes washers, the complete redesign of entire product lines. (*Id.*) AHAM repeated its request that DOE acknowledge this cumulative regulatory burden and take action, such as spacing out its final rules, allowing more lead-time by issuing final rules well before publishing them in the **Federal Register**, and reducing the stringency of standards such that fewer percentages of products would require complete re-design. (*Id.*) AHAM cited the example of CPSC's investigation of IAQ and cooking, which will require potential redesign to meet any new NO_2 requirements. (*Id.*) AHAM commented DOE's proposed rule for cooking tops should be combined with CPSC's IAQ effort into a single compliance date. (*Id.*) AHAM commented that Section 13(g) of the Process Rule provides specific actions DOE should take should there be cumulative impacts from other Federal regulatory action that DOE will recognize cumulative burden and ''seek to mitigate the overlapping effects on manufacturers of new or revised DOE standards and other regulatory actions affecting the same products or equipment.'' (*Id.*) AHAM noted that during the comment period for the February 2023 SNOPR, there were also rulemakings open for battery chargers, clothes washers, dishwashers, external power supplies, miscellaneous refrigeration products, refrigerator/freezers, and small electric motors, all of which impact AHAM's members. (*Id.*) AHAM commented that the Process Rule indicates if ''a proposed standard would impose a significant impact on product or equipment manufacturers within approximately 3 years of the compliance date of another DOE standard that imposes significant impacts on the same manufacturers (or divisions thereof, as appropriate), the Department will, in addition to evaluating the impact on manufacturers of the proposed standard, assess the joint impacts of both standards on manufacturers.'' (*Id.*) AHAM commented that the manufacturer impact analysis, as currently structured, does not adequately analyze the effects on an industry of multiple regulations within a short period and suggested adding the combined costs of complying with multiple regulations into the product conversion costs in GRIM as one potential solution DOE could take. (*Id.*)

Regarding AHAM's suggestion about spacing out the timing of final rules for home appliance rulemakings to reduce regulatory burden, DOE has statutory requirements under EPCA on the timing of rulemakings. For consumer conventional cooking products; consumer clothes dryers; dishwashers; refrigerators, refrigerator-freezers and freezers; residential clothes washers; and room air conditioners, new and amended standards apply to covered 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)) For miscellaneous refrigeration products, amended standards apply 5 years after the date on which any new or amended standard is published. (42 U.S.C. 6295(l)(2)) However, the multi-product Joint Agreement recommends alternative compliance dates. As discussed in section II.B.4 of this document the Joint Agreement recommendations are in accordance with the statutory requirements of 42 U.S.C. 6295(p)(4) for the issuance of a direct final rule. Therefore, as compared to the EPCA-required lead time of 3-years, consumer conventional cooking product manufacturers have more lead time to meet new and amended standards at the Recommend TSL.

As shown in Table V.28, the ongoing rulemakings with the largest overlap of consumer conventional cooking product manufacturers include dishwashers; refrigerators, refrigerator-freezers, and freezers; residential clothes washers; clothes dryers; and miscellaneous

refrigeration products, which are all part of the multi-product Joint Agreement submitted by interested parties. As detailed in the Joint Agreement, the signatories indicated that their recommendations should be considered a ''complete package.'' The signatories further stated that ''each part of this agreement is contingent upon the other parts being implemented.'' (Joint Agreement, No. 505 at p. 3)

The multi-product Joint Agreement states the ''jointly recommended compliance dates will achieve the overall energy and economic benefits of this agreement while allowing necessary lead-times for manufacturers to redesign products and retool manufacturing plants to meet the recommended standards across product categories.'' (Joint Agreement, No. 505 at p. 2) The staggered compliance dates help mitigate manufacturers' concerns about their ability to allocate sufficient resources to comply with multiple concurrent new and amended standards. See Table V.29 for a comparison of the estimated compliance dates based on EPCA-specified timelines and the compliance dates detailed in the Joint Agreement.

Table V.29 Expected Compliance Dates for Multi-Product Joint Agreement

Rulemaking	Estimated Compliance Year based on EPCA Requirements	Compliance Year in the Joint Agreement
Dishwashers	2027	2027*
Consumer Conventional Cooking Products	2027	2028
Residential Clothes Washers	2027	2028
Consumer Clothes Dryers	2027	2028
Miscellaneous Refrigeration Products	2029	2029
Refrigerators, Refrigerator-Freezers, and Freezers	2027	2029 or 2030 depending on the product class

* Estimated compliance year. The Joint Agreement states, "3 years after the publication of a final rule in the *Federal Register*." (Joint Agreement, No. 505 at p. 2)

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 new or amended standards.

a. National Energy Savings

To estimate the energy savings attributable to potential new or 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 new and amended standards (2027–2056 for all TSLs other than TSL 1, the Recommended TSL; 2028–2057 for TSL 1). Table V.30 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 of this document.

Table V.30 Cumulative National Energy Savings for Consumer Conventional Cooking Products; 30 Years of Shipments*

	Trial Standard Level		
	1	2	3
	quads		
Primary energy	0.21	0.62	1.46
FFC energy	0.22	0.66	1.52

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

OMB Circular A–4 [137] 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.[138] The review

[137] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* Available at *www.whitehouse.gov/omb/information-for-agencies/circulars* (last accessed January 3, 2024). DOE used the prior version of Circular A–4 (September 17, 2003) in accordance with the effective date of the November 9, 2023, version.

[138] 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. (42 U.S.C. 6295(m)) 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

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.31. The impacts are counted over the lifetime of consumer conventional cooking products purchased during the period 2027–2035 for all TSLs except TSL 1 (the Recommended TSL); 2028–2035 for TSL 1.

Table V.31 Cumulative National Energy Savings for Consumer Conventional Cooking Products; 9 Years of Shipments

	Trial Standard Level		
	1	2	3
	quads		
Primary energy	0.06	0.17	0.37
FFC energy	0.06	0.18	0.39

*2027–2035 for all TSLs except TSL 1 (the Recommended TSL); 2028–2036 for TSL 1

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,[139] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table V.32 shows the consumer NPV results with impacts counted over the lifetime of products purchased during the period 2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1.

Table V.32 Cumulative Net Present Value of Consumer Benefits for Consumer Conventional Cooking Products; 30 Years of Shipments*

Discount Rate	Trial Standard Level		
	1	2	3
	billion 2022$		
3 percent	1.56	0.34	(43.89)
7 percent	0.65	(0.40)	(26.34)

Note: Negative values denoted in parentheses.
*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

The NPV results based on the aforementioned 9-year analytical period are presented in Table V.33. The impacts are counted over the lifetime of products purchased during the period 2027–2035 for all TSLs other than TSL 1 (the Recommended TSL); 2028–2036 for TSL 1. 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.33 Cumulative Net Present Value of Consumer Benefits for Consumer Conventional Cooking Products; 9 Years of Shipments*

Discount Rate	Trial Standard Level		
	1	2	3
	billion 2022$		
3 percent	0.55	(0.04)	(19.11)
7 percent	0.31	(0.29)	(14.25)

Note: Negative values denoted in parentheses.
*2027–2035 for all TSLs except TSL 1 (the Recommended TSL); 2028–2036 for TSL 1

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.H.3 of this document). DOE also conducted a

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.

[139] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* Available at *www.whitehouse.gov/omb/information-for-agencies/circulars* (last accessed January 3, 2024). DOE used the prior version of Circular A–4 (September 17, 2003) in accordance with the effective date of the November 9, 2023, version.

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 direct final rule TSD. In the high-price-decline case, the NPV of consumer benefits is higher than in the default case. In the low-price-decline case, the NPV of consumer benefits is lower than in the default case.

c. Indirect Impacts on Employment

DOE estimates that new and amended energy conservation standards for consumer conventional cooking products will 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 ((2027–2032) for all TSLs other than TSL 1 (the Recommended TSL) and 2028 for TSL 1), where these uncertainties are reduced.

The results suggest that the adopted standards are 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 direct final rule TSD presents detailed results regarding anticipated indirect employment impacts.

4. Impact on Utility or Performance of Products

As stated, EPCA, as codified, contains the provision that 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)) This provision is referred to by commenters as the ''unavailability provision'' or the ''features provision.''

The Joint Agreement signatories [140] stated that standards recommended in the Joint Agreement and adopted in this direct final rule are unlikely to result in the unavailability of covered products in the United States, in accordance with 42 U.S.C. 6295(o)(4). (Joint Agreement signatories, No. 12814 at p. 8)

This section summarizes the comments received in response to the gas cooking top standard proposed in the February 2023 SNOPR and the updated efficiency levels for gas cooking tops in the August 2023 NODA, regarding their impact on the utility of gas cooking tops.

a. General Comments

ASAP *et al.* commented that the standards DOE proposed in the February 2023 SNOPR for gas cooking tops ensure that consumers will have access to the features generally available on the market today. (ASAP *et al.,* No. 2273 at pp. 2–3) ASAP *et al.* commented that HIR burners allow consumers to perform high-heat cooking and that continuous cast-iron grates are useful for heavy pans or to easily shift cookware between burners. (*Id.*) ASAP *et al.* commented that DOE's decision to evaluate only models with at least one HIR burner and continuous cast-iron grates ensures that gas cooking top models with both features could comply with the proposed standard. (*Id.*) ASAP *et al.* commented that well-designed cooking tops can be both energy efficient and have multiple HIR burners. (*Id.*)

The CA IOUs commented that DOE has provided sufficient evidence of the standard's technological feasibility across a range of gas cooking top types and has ensured that gas cooking tops with varying utilities, including those with at least one HIR burner and continuous cast-iron grates, can be more efficient and will have continued market availability. (CA IOUs, No. 2278 at pp. 2–3) The CA IOUs commented that the rulemaking record shows that the proposed standard will not reduce gas cooking top utility, will not negatively affect consumer choice, and will provide consumers with more efficient gas cooking tops. (*Id.*)

b. Market Availability

Spire and AGA requested that, in any final rule, DOE include a provision stating that interested persons have established by a preponderance of evidence that the proposed standard is likely to result in the unavailability of products that are substantially the same as those currently generally available in the United States. (Spire, No. 2710 at p. 23; AGA, No. 2279 at p. 24)

EPCA specifies that the Secretary may not prescribe an amended or new standard under this section if the Secretary finds (and publishes such finding) that interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States in any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding. (42 U.S.C. 6295(o)(4)) DOE is publishing its analyses and findings in this direct final rule, including comments from interested parties, that demonstrate that the standards DOE is adopting fulfill this requirement.

DOE notes that it estimates that the adopted standards will affect only 3 percent of gas cooking top shipments, which can be redesigned through technology options that maintain the performance characteristics of currently available models, thus not resulting in the unavailability of products that are substantially the same as those currently available in the United States.

Spire commented that there is no basis to believe any of the gas cooking tops that DOE tested could be modified to meet the standard proposed in the February 2023 SNOPR without sacrificing their HIR burners and the more heavy-duty continuous cast-iron grates that provide the greatest utility for consumers, unless the product has only one HIR burner and relatively light cast-iron grates. (Spire, No. 2710 at pp. 11–14) Spire commented that based on its analysis of DOE's test sample, the presence or absence of HIR burners is the only material determinant of whether products do or do not meet the standard proposed in the February 2023 SNOPR for gas cooking tops. (*Id.*)

Whirlpool added that only a single model tested by DOE that meets the standard proposed in the February 2023 SNOPR offers the key features that consumers expect from their gas cooking tops and ranges (*i.e.,* HIR

[140] In Docket Item 12814, AHAM noted that it represents the following companies who manufacture residential cooking products are members of the AHAM Major Appliance Division: Arcelik A.S.; Beko US, Inc.; Brown Stove Works, Inc.; BSH Home Appliances Corporation; Danby Products, Ltd.; De'Longhi America, Inc.; Electrolux Home Products, Inc.; Elicamex S.A. de C.V.; Faber S.p.A.; FOTILE America, LLC; GE Appliances, a Haier Company; Gradient, Inc.; Hisense USA Corporation; LG Electronics USA, Inc.; Liebherr USA, Co.; Midea America Corp.; Miele, Inc.; Panasonic Corporation of America; Samsung Electronics America Inc.; Sharp Electronics Corporation; Smeg S.p.A; Sub-Zero Group, Inc.; Viking Range, LLC; and Whirlpool Corporation.

burners and continuous cast-iron grates), and that three additional models were screened out of DOE's dataset because they did not offer these key features. (Whirlpool, No. 2284 at pp. 9–10) Whirlpool commented that DOE has not identified a single model of gas cooking product with these common features that is currently on the market and can meet the standard proposed in the February 2023 SNOPR. (*Id.*)

Sub-Zero commented that the Wolf SRT366 model, which is a very typical gas cooking top for the Wolf company, cannot meet the standard proposed in the February 2023 SNOPR. (Sub-Zero, No. 2140 at pp. 8–9) Sub-Zero noted that this product has one burner with a 20,000 Btu/h input rate, two with 18,000 Btu/h, two with 15,000 Btu/h, and one with 9,200 Btu/h. (*Id.*)

IER asserted that DOE has not tested, nor has it disclosed to the public, a single gas cooking top that has HIR burners and continuous cast-iron grates, is available for purchase, and meets the standard proposed in the February 2023 SNOPR. (IER, No. 2274 at pp. 4–5)

IER commented that it disagrees with DOE's assertion that nearly half of the total gas cooking top market currently achieves the proposed EL 2 in the February 2023 SNOPR and August 2023 NODA, based on IER's analysis of the expanded test sample. (IER, No. 10111 at p. 5) IER asserted that only four out of 21 gas cooking tops in DOE's test sample meet updated EL 2, that three out of 30 gas cooking tops in AHAM's test sample meet updated EL 2, and that one out of 6 gas cooking tops in the PG&E test sample meet updated EL 2. (*Id.*) IER commented that DOE's review of websites of major U.S. retailers without test data does not provide sufficient information for DOE's determination of the percentage of cooking tops that would not be impacted by the proposed standard. (*Id.*) IER repeated its comments on the February 2023 SNOPR that there are no gas cooking tops in DOE's test sample currently available on the market that meet the proposed standards. (*Id.*)

ONE Gas commented that DOE's test data are insufficient to justify the standards proposed in the February 2023 SNOPR and updated efficiency levels analyzed in the August 2023 NODA. (ONE Gas, No. 10109 at pp. 2–3) ONE Gas commented that only one of the gas cooking top models tested meets the proposed standard and only two of the gas cooking top models tested meet the updated EL 2. (*Id.*) ONE Gas commented that DOE should use expanded testing prior to issuing an updated proposed standard for gas cooking tops. (*Id.*)

DOE notes that 53 out of 55 non-entry-level gas cooking top units (*i.e.,* with at least one HIR burner and continuous cast-iron grates) in its expanded test sample, including units with all HIR burners, as well as all eight entry-level gas cooking tops (*i.e.,* cooking tops that do not have at least one HIR burner and continuous cast-iron grates) in its expanded test sample meet the adopted standard for gas cooking tops. Additionally, there are gas cooking tops in DOE's expanded test sample that meet the adopted standard level with all features identified by manufacturers and individual commenters as important to consumers.

AGA asserted that the standards proposed in the February 2023 SNOPR would violate the unavailability provision of EPCA through its drastic market elimination of 50 percent of the total gas cooking top market and 96 percent of the market for ''commercial'' or ''professional'' gas cooking tops—particularly those with features most desirable to consumers, such as HIR burners and continuous cast-iron grates. (AGA, No. 2279 at pp. 21–24, 29–30) AGA commented that Congress ensured that: (1) energy conservation standards would not eliminate traits, qualities, or characteristics of products that make them work for consumers or are otherwise attractive to them; (2) energy conservation standards would be neutral as to which fuels that covered products use, protecting the standards from being used to favor one fuel source over another; (3) energy conservation standards would not eliminate a class of covered products or render them unworkable through infeasible or overly costly standards; and (4) DOE may not promulgate standards that are ''likely to result in the unavailability in the United States of 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.'' (*Id.*) AGA asserted that the courts will pay particular scrutiny to DOE's interpretation in this case because DOE asserts the authority to eliminate the availability of a class of natural gas appliances with features desired by millions of Americans, which is a major policy decision that the courts will presume rests with Congress. (*Id.*) AGA asserted that performance-related features warrant separate standards, and DOE must not set standards that would be ''likely to result in the unavailability'' of currently available ''performance characteristics,'' which represents a desired policy outcome that fails to adhere to the structure Congress enacted into law. (*Id.*)

AGA also asserted that the February 2023 SNOPR assumptions that the standard presents no problem because it would allow cooking tops to offer at least one HIR burner and continuous cast-iron grates are false. (AGA, No. 2279 at pp. 25–26)

Spire commented that DOE's data do not support the proposition that the standard proposed in the February 2023 SNOPR is achievable for gas cooking tops with the features and performance characteristics that many consumers demand, and that as such, there is no basis for the economic and energy conservation benefits that DOE claims justify the proposed standard. (Spire, No. 2710 at pp. 4–5) Spire asserted that the standard proposed in the February 2023 SNOPR violates DOE's requirement under EPCA to ensure that any proposed standards will not preclude consumers from purchasing the equivalent of products currently available to them on the market. (*Id.* at pp. 19–23)

GAAS asserted that the standard proposed in the February 2023 SNOPR comes with restrictions to consumer choice and that restricted features include, but are not limited to, HIR burners and heavy-duty grates. (GAAS, No. 2271 at p. 2)

NAHB asserted that the standard proposed in the February 2023 SNOPR could eliminate or severely limit several product features in gas cooking tops that are widely available currently and highly valued by consumers, including HIR burners (particularly cooking tops with multiple HIR burners), simmer burners for low-temperature cooking, and heavy cast-iron grates that add safety and durability over the lifespan of the appliance. (NAHB, No. 2288 at p. 2)

Representatives McMorris-Rodgers *et al.* asserted that the design changes DOE expects manufacturers to make—such as smaller burners, longer cooking times, and smaller grates that could be less stable—are not likely to be accepted by consumers. (Representatives McMorris-Rodgers *et al.,* No. 765 at p. 2)

CEI *et al.* asserted that the proposed rule violates the ''features provision'' of EPCA by jeopardizing several features of gas cooking tops that lead many cooks to prefer gas over electric cooking tops. (CEI *et al.,* No. 2287 at pp. 3–4) CEI *et al.* commented that the features provision requires that characteristics presently available in gas cooking tops be preserved in substantially the same form and DOE lacks the discretion to decide whether a particular feature is important enough to warrant protection. (*Id.*) CEI *et al.* commented that HIR

burners (especially those with input rates greater than 20,000 Btu/h) are of particular concern, as this feature is critical for stir-frying, searing, or heating up a large pot of water in a short time, but CEI *et al.* asserted that the proposed rule would limit gas cooking tops to only one such burner (some currently available models have more than one) and require that the maximum heat for the one HIR burner be reduced to considerably less than those now available. (*Id.*) CEI *et al.* commented that the rule would also threaten smaller, low-heat burners ideal for cooking tasks like simmering. (*Id.*) CEI *et al.* commented that heavy and/or continuous (often cast-iron) grates needed to safely handle large pots and to shift them from one gas burner to another—a feature on several currently offered gas cooking top models—may also be in jeopardy. (*Id.*)

Wilfong and Dayaratna commented that the standard proposed in the February 2023 SNOPR could eliminate many gas cooking tops from the market or at least significantly affect competition and degrade consumer choice, which is not permitted under EPCA. (Wilfong and Dayaratna, No. 2281 at pp. 5–6) Wilfong and Dayaratna asserted that consumers value energy safety, convenience, and durability along with energy efficiency when choosing appliances, and if DOE regulates based on one or two characteristics and prioritizes energy efficiency over other factors, the government stifles the free market, hinders innovation, and discourages products that consumers want to buy. (*Id.*)

Strauch commented that manufacturers offer a range of grate and burner design choices to consumers for aesthetic purposes, in addition to utility purposes. (Strauch, No. 2263 at p. 2)

Zycher commented that DOE accounts for neither the reasons why consumers prefer a mix of cooking products nor the benefits that consumers see in various cooking products' cooking quality or convenience. (Zycher, No. 2266 at pp. 3–4) Zycher commented that the proposed rule would reduce or eliminate many products preferred by consumers, and that this is an essential consideration when developing a cost/benefit analysis. (*Id.*) Zycher asserted that consumers would be forced to choose the product characteristics favored by DOE, which suggests that the benefits of consumer choices exceed the costs estimated by DOE. (*Id.*)

AHAM asserted that finalizing standards at the proposed levels for gas products will force a ''race to the middle'' where all products are essentially the same and, contrary to EPCA's requirements and the Process Rule, lack features and functionality currently available in the U.S. market (HIR burners and continuous cast-iron grates). (AHAM, No. 2285 at pp. 15–16) AHAM also asserted that DOE's proposed levels will likely result in homogenized cooking top designs that eliminate more than one HIR burner and the consumer utility associated with multiple HIR burners, eliminate burners with input rates at or above 14,000 Btu/h without adding costs that DOE has not accounted for in its analysis (lengthening boil times), eliminate LIR burners, and offer burner input rates ranging from 9,500–10,000 Btu/h in order to meet the stringent standard. (*Id.* at p. 43) AHAM commented that the products potentially capable of meeting the standard proposed in the February 2023 SNOPR are those that do not include the very features and utility that DOE deemed must be maintained. (*Id.* at pp. 15–16) Thus, asserted AHAM, the February 2023 NODA shows that DOE's proposed standard for gas cooking tops do not meet EPCA's requirements. (*Id.*)

AHAM commented that, contrary to EPCA's requirements, DOE's proposed standard for gas cooking tops will eliminate gas products with performance characteristics, features, and sizes that are substantially the same as those generally available in the United States today. (*Id.* at pp. 16–17) AHAM commented that its consumer research shows that consumers of cooking products rated safety (88 percent), performance (87 percent), and cost (85 percent) as extremely or very important purchase drivers more than energy efficiency (79 percent) and cost to use over time (76 percent). (*Id.*) AHAM commented this analysis demonstrates that, consistent with EPCA's requirements, DOE must ensure that safety, performance, and product price are not negatively impacted by its proposed energy conservation standards. (*Id.*)

AHAM commented that while DOE has acknowledged consumer-valued features for gas cooking tops, it has not produced an exhaustive list of those features. (AHAM, No. 10116 at pp. 15–16) AHAM commented that ranking these features by monetary value could help DOE preserve these features under EPCA. (*Id.*)

AHAM asserted that commenters have provided evidence that the proposed standard is likely to result in the unavailability of features generally available at the time of this rulemaking, including but not limited to safety, performance, and product price; cooking tops with more than one HIR burner; LIR burners; a spectrum of heat input rates; conventional ranges; continuous cast-iron grates; and specialty cooking zones. (*Id.* at pp. 19–21) AHAM commented that much of this information is publicly available from online product reviews. (*Id.*) AHAM commented that HIR burners, LIR burners, and continuous cast-iron grates are likely to be removed under the proposed standards. (*Id.*)

Whirlpool asserted that the proposed rulemaking threatens to diminish the availability, utility, and performance of consumer conventional cooking products, particularly gas cooking tops and gas ranges, which will negatively affect how consumers cook. (Whirlpool, No. 2284 at p. 6) Whirlpool asserted that the proposed and updated EL 2 for gas cooking tops do not preserve key features of products available on the market today, and that DOE is not permitted under EPCA to prescribe energy conservation standards for gas cooking tops as proposed. (Whirlpool, No. 10117 at p. 2)

Whirlpool commented that the standard proposed in the February 2023 SNOPR would effectively require manufacturers of gas cooking tops and gas ranges to replace large (input rates greater than 15,000 Btu/h) and small (input rates of 5,000–6,000 Btu/h) burners with mid-sized (input rates of 9,500–10,000 Btu/h) burners that offer higher optimized tested efficiency under appendix I1. (Whirlpool, No. 2284 at p. 7) Whirlpool asserted that cooking with mid-sized burners will disrupt the cooking process for many types of meals and consumers will likely lose the ability to use their cooking tops for low-temperature cooking. (*Id.*)

ONE Gas commented that with the updated efficiency levels in the August 2023 NODA, at least 59 percent of current gas cooking top models would be eliminated from the market. (ONE Gas, No. 10109 at p. 4) ONE Gas asserted that elimination of gas cooking top models will disproportionately impact certain manufacturers and will reduce product availability and consumer choice. (*Id.*)

DOE notes that its definition of EL 1 for gas cooking tops, as updated in this direct final rule, and consistent with the Recommended TSL, represents the most energy efficient AEC among units with multiple HIR burners and continuous cast-iron grates that would not preclude any combination of other features mentioned by manufacturers (*e.g.,* different nominal unit widths, sealed burners, at least one LIR burner, multiple dual-stacked and/or multi-ring HIR burners, and at least one extra-high input rate burner), as demonstrated by

products from multiple manufacturers in the expanded test sample. As such, DOE notes that any utility associated with these features is preserved under the adopted standards. DOE also determines that the adopted standards would not result in homogenized cooking top designs, because the adopted standards do not preclude any combination of the features mentioned by manufacturers, and a wide range of both entry-level and non-entry-level gas cooking tops meeting the adopted standards from multiple manufacturers already exist on the market.

AGA asserted that the proposed rule would eliminate features from gas cooking tops that permit home cooks and home-based businesses to make certain foods, with impacts on the ability to cook a family meal, a holiday dinner, or food that is part of a home-based business, such as catering. (AGA, No. 2279 at pp. 50–51) AGA also asserted that DOE's proposal would limit cooks to one stir-fry dish or one large pot of boiling water, but not both, and that cooks would no longer be able to shift a heavy pot of hot water or a large pan without lifting it because a continuous cast-iron grate would no longer be an option. (*Id.*) AGA commented that DOE should conduct a full analysis of the impact of the proposed rule on the various communities in the United States whose cooking methods and food preferences would be negatively impacted, and also analyze the impact on home-based businesses. (*Id.*)

APGA commented that despite DOE acknowledging the consumer utility of HIR burners and continuous cast-iron grates, DOE did nothing to protect these features, as required by EPCA. (APGA, No. 2283 at pp. 4–5) APGA commented that DOE proposed to set the standards for gas cooking products at max-tech, which does not allow for more than one HIR burner, if any at all, or the use of heavy cast-iron grates, and no ''professional-style cooking products'' passed DOE's testing. (*Id.*) APGA asserted that because DOE is in violation of EPCA's unavailability provisions, DOE must reissue proposed standards that adequately protect these features in all situations, not just some, whether that be done with the creation of separate product classes or in some other manner. (*Id.*)

Western Energy Alliance commented that home cooks benefit from access to the same features of gas cooking tops enjoyed by professional chefs, which include (1) the ability to control temperature precisely; (2) better distribution of heat for even cooking, which is especially important for complex recipes; (3) efficiency, as it takes about three times as much energy to produce and deliver the electricity to the cooking top compared to gas at the burner tip; (4) instant heat and higher temperatures, resulting in shorter cook times; and (5) the ability to cook during an electricity outage. (Western Energy Alliance, No. 2272 at pp. 2–3) Western Energy Alliance asserted that DOE's proposed rule would risk the future availability of HIR burners on gas cooking tops (and therefore common cooking styles like stir-frying and searing). (*Id.*)

Wilfong and Dayaratna commented that DOE proposed to alter features that the TSD for the February 2023 SNOPR acknowledges that manufacturers and consumers have indicated as enhancing performance and utility, such as HIR burners with large diameters; HIR burners with high levels of flame controllability; spacing between the gas flame, grate, and cookware; and heavy, cast-iron grates. (Wilfong and Dayaratna, No. 2281 at pp. 3–4) Wilfong and Dayaratna that EPCA statutorily requires DOE to consider any lessening of utility or performance, and they asserted that by requiring design alterations such as flame angle, distance from burner to cookware, and grate weight, DOE proposes a standard that runs in direct opposition to this requirement. (*Id.*)

Whirlpool commented that the standard proposed in the February 2023 SNOPR would effectively ban an entire class of high output gas cooking products that have many features and utilities that consumers consider to be important, including the ability to perform low-temperature cooking, as well as having the necessary burner input rates across a number of burners to perform large cooking events. (Whirlpool, No. 2284 at pp. 6–7) Whirlpool asserted that the proposed standard may harm consumers who rely on gas stoves to cook certain cuisines, and that the proposed standard would effectively eliminate aspects of cooking tops that consumers prefer, such as 18,000 Btu/h rapid burners and thick continuous cast-iron grates, both because of flame size efficiency and aesthetic appeal. (*Id.*) Whirlpool commented that this would be inconsistent with EPCA's unavailability provision. (*Id.*)

Sub-Zero asserted that to meet the standard proposed in the February 2023 SNOPR for gas cooking tops, manufacturers would be forced to reduce the burner input rate and the mass of the grates, both of which would diametrically oppose the needs of Sub-Zero's niche market. (Sub-Zero, No. 2140 at p. 4) Sub-Zero requested that DOE reanalyze the market for the entirety of gas cooking tops and most specifically, the ''commercial''- or ''professional''-style market. (*Id.*) Sub-Zero commented that while all of its Wolf-brand electric products (using both radiant and induction technology) meet the proposed standard for electric smooth element cooking tops, no Wolf-brand gas model is close to meeting the proposed standard for gas cooking tops, which Sub-Zero commented is inappropriate from a rulemaking process perspective and a threat to its niche market. (*Id.*)

Sub-Zero shared several confidential data sets with DOE representing what it characterized as its niche consumer needs in high-performance surface cooking, including specifics on HIR burners, which have been reflected in its Wolf-brand products. (Sub-Zero, No. 2140 at p. 6)

Sub-Zero commented it could find no evidence that DOE took into consideration important attributes of high-performance gas cooking tops in its February 2023 SNOPR analysis, such as: mass of grates, diameter of gas burner, distance from burner to utensil surface, and open area for primary and secondary air for combustion and exhaust of combustion by-products. (Sub-Zero, No. 2140 at p. 9)

Sub-Zero asserted that cooking top performance includes much more than speed-to-boil time, and that the high-performance cooking equipment user expects controllability of the flame, specifically in the area of simmer/low heat for foods such as melting of chocolate and simmering of sauces. (Sub-Zero, No. 2140 at pp. 10–11) Sub-Zero commented that dual-stacked burner systems can provide excellent simmer performance while also achieving fast speed-to-boil times, by adding two distinct burner port rings and combustion systems within one unique burner position for high burner input rate along with precise simmer performance from a single burner position. (*Id.*) Sub-Zero commented that this design affects spacing from the flame to the cooking vessel to enhance performance at low input rates and allow precise burner control, both of which are impacted greatly when balancing safety and efficiency standards. (*Id.*)

Sub-Zero asserted that consumers who purchase high-performance cooking tops require special performance enhancements for which they are willing to spend up to ten times more than for a non-high performance cooking top. (Sub-Zero, No. 2140 at p. 11) Sub-Zero acknowledged that a precise definition of ''high-

performance'' may be hard to develop, but stated DOE's obligation under law to acknowledge performance-related features that provide utility to the consumer. (*Id.*)

As discussed, the adopted standards will not preclude designs with multiple HIR burners, continuous cast-iron grates, and any combination of other features mentioned by manufacturers. As such, DOE preserved the utility, including the cooking processes and styles, of existing gas cooking tops. The results for units in DOE's expanded test sample satisfying AHAM's suggested definition of a high-performance gas cooking top demonstrate that such units can meet the adopted standard.

c. High Input Rate Burners

AGA commented that HIR burners are sought by consumers because of their versatility to boil very large amounts of water without long wait times or to allow cookware to reach ideal surface temperatures for cooking normal portions of food while maintaining that temperature despite the initial shock from adding room temperature ingredients into a pan. (AGA, No. 2279 at p. 30)

APGA commented that DOE should screen out products without both multiple HIR burners and cast-iron grates because such products would have adverse impacts on product utility or availability to consumers. (APGA, No. 2283 at p. 5)

ONE Gas asserted that the proposed rule for gas cooking tops would have unrealistic and discriminatory effects on consumer utility. (ONE Gas, No. 2289 at pp. 4–5; ONE Gas, No. 10109 at p. 4) ONE Gas asserted that the proposed total cooking top IAEC maximum would limit cooking performance for searing and stir-frying to just one HIR burner, and asserted that the burner would be limited in providing heat rates that might not meet consumer needs for these cooking functions. (*Id.*) ONE Gas also asserted that DOE's presumption of consumer ''needs'' limited to one such burner is unjustified. (*Id.*)

Spire asserted that multiple HIR burners are a typical feature of the highest-performing and most highly rated gas cooking tops and that no such products in DOE's test sample can meet the standard proposed in the February 2023 SNOPR. (Spire, No. 2710 at pp. 19–23) Spire commented that multiple HIR burners are desired by many consumers for the ability to quickly reach a boil in multiple pots at the same time. (*Id.*)

AHAM stated agreement with DOE that HIR burners must be retained as a key consumer feature. (AHAM, No. 2285 at pp. 3–4) AHAM asserted, however, that DOE's proposed stringent energy conversation standards would allow only a single HIR burner, even though DOE recognizes in the February 2023 SNOPR the ''unique consumer utility'' of this feature that allows high-heat cooking activities such as searing and stir-frying. (*Id.* at pp. 17–19) AHAM commented that research supplied by members show consumers desire the ability to boil water faster using an HIR burner and to have another HIR burner available because they have more than one large pan in use, particularly for serving larger groups of people and special occasion meals. (*Id.*) However, commented AHAM, no cooking top in DOE's or AHAM's sample with more than one HIR burner meets the standard proposed in the February 2023 SNOPR. (*Id.*) DOE's own anticipated design pathways to reach EL 2 for gas cooking tops involves reducing the number of HIR burners. (*Id.*) AHAM commented that, with the possible exception of DOE Test Unit #2 with its single HIR burner, no product in AHAM's or DOE's test sample with even a single HIR burner meets the standard proposed in the February 2023 SNOPR—and asserted that DOE Test Unit #2 likely would not be certified to meet the proposed standard in the future. AHAM commented that DOE must ensure that a final standard does not remove this important performance feature. (*Id.*)

AHAM commented that DOE should consider the utility associated with more than one HIR burner because consumers find utility in being able to mix and match various pan sizes and cooking methods all at the same time. (*Id.* at pp. 19–20) AHAM commented that in order to avoid negatively impacting consumer utility and removing products on the market like those that are available today—which is contrary to EPCA—DOE must ensure that its standards do not require limitations on the number of HIR burners. (*Id.*) AHAM asserted that boiling two pots of water on a unit with only one HIR burner would take 37 percent longer than on a unit with two burners having input rates of 19,000 Btu/h. (*Id.*)

AHAM commented that research shows consumers typically use two or more burners to make dinner and four or more for special occasions and want the ability to cook with a spectrum of heat inputs. (*Id.* at pp. 22–23)

In response to the August 2023 NODA, AHAM asserted that the updated EL 2 for gas cooking tops cannot be achieved by models with all HIR burners, noting that none of the seven units with all HIR burners in the expanded data set meet the proposed or updated EL 2. (AHAM, No. 10116 at pp. 8–9) AHAM commented that it is unclear how DOE identified the updated EL 2 and what gas cooking top with all HIR burners can meet updated EL 2. (*Id.*) AHAM commented that if DOE is basing this claim on a theoretical unit that has the most efficient HIR burners from different units, the methodology fails to take into account system dynamics and interactions between various components. (*Id.*) AHAM commented that DOE should explain and provide data to show that the proposed standard or updated EL 2 can be met by a unit with all HIR burners. (*Id.*) AHAM asserted that applicable units in the expanded test sample that meet EL 2 only have one HIR burner. (*Id.*)

AGA *et al.* commented that they disagree that the updated EL 2 is achievable with multiple HIR burners and continuous cast-iron grates. (AGA *et al.,* No. 10112 at pp. 8–9) AGA *et al.* commented that DOE's data shows that of the 55 tested gas cooking tops with HIR burners and continuous cast-iron grates, only one gas cooking top with multiple HIR burners was able to achieve EL 2 (DOE Test Unit #10). (*Id.*) AGA *et al.* commented that this unit met EL 2 by a margin of 1.25 percent, which they asserted is within the test procedure's margin for error and would preclude any reasonable certification of compliance with a standard based on EL 2. (*Id.*) AGA *et al.* commented that among the other 54 gas cooking tops tested, only eight gas cooking tops can achieve EL 2, and that none of those products have more than one HIR burner. (*Id.*)

AGA *et al.* commented that DOE has not provided evidence that manufacturers will be able to redesign their products to achieve significant improvements in measured efficiency without compromising the features or performance of their products. (*Id.* at pp. 9–10) AGA *et al.* commented that the presence of HIR burners and continuous cast-iron grates appears to be the only material determinant of whether products could satisfy the standard proposed in the February 2023 SNOPR, and that they find the same to be true of the updated EL 2. (*Id.*) AGA *et al.* commented that changes to flame angle and distance from burner ports to cooking surfaces are design options that have the potential to degrade product features or performance without providing real energy savings. (*Id.*) AGA *et al.* commented that DOE has not explained how anticipated efficiency improvements can be achieved through redesigned products. (*Id.*) AGA *et al.*

commented that DOE does not include a description of what constitutes EL 2 as presented in the August 2023 NODA. (*Id.*)

After evaluation of comments and data received in response to the February 2023 SNOPR, DOE evaluated the utility associated with multiple HIR burners and updated its screening analysis and efficiency levels in order to define efficiency levels achievable by gas cooking tops with multiple HIR burners. The adopted standard for gas cooking tops preserves the utility associated with multiple HIR burners.

d. Low Input Rate Burners

AHAM commented that DOE should consider LIR burners in its screening criteria and ensure that its final standards do not eliminate LIR burners, which are ranked amongst the most important cooking top features for consumers. (AHAM, No. 2285 at pp. 20–22) In this context, AHAM defined LIR burners as having an input rate of 6,500 Btu/h or less, based on Consumer Reports, and noted that they are typically designed to gently heat small quantities of liquid and are used by consumers for melting chocolate, cooking sauces, gravies, simmering soups/stews, cooking scrambled eggs, *etc.* and also used to keep food warm. (*Id.*) AHAM commented that LIR burners are smaller in diameter, with 30–40 percent lower minimum input rates than traditional (non-multi-ring) burners, and because the test procedure measures the efficiency of boiling a pot of water, these burners appear less efficient when tested using the appendix I1 test procedure and, therefore, do not meet DOE's proposed level. (*Id.*) AHAM asserted that to comply with the standard proposed in the February 2023 SNOPR, manufacturers may not be able to offer LIR burners, and their removal will have negative performance impacts on consumers and consumer utility. (*Id.*)

AHAM commented that DOE's definition of a LIR burner is inconsistent in the August 2023 NODA. (AHAM, No. 10116 at pp. 7–8) AHAM commented that DOE should clarify the definition of a LIR burner used in its analysis and provide opportunity for comment. (*Id.*) AHAM further commented that DOE has not preserved LIR burners as a product feature. (*Id.*) AHAM asserted that what DOE calls non-optimized burners are actually LIR burners. (*Id.*) AHAM commented that according to its dataset, 73 percent of all burners that meet the definition of non-optimized have input rates less than 6,500 Btu/hr. (*Id.*) AHAM commented that the proposed standard for gas cooking tops would require the removal of LIR burners in order to increase efficiency. (*Id.*) AHAM commented that DOE should not eliminate product features but instead exclude non-optimized burners from the test procedure. (*Id.*) AHAM asserted that optimizing a LIR burner could result in a loss of utility because, while an LIR burner can be optimized to boil water more efficiently by reducing grate weight, bringing the flame closer to the cookware, and pointing the flame more directly at the cookware, these design changes reduce utility of the LIR burner. (*Id.*) AHAM commented that multi-ring burners can preserve the utility of a LIR burner, but that multi-ring technology is significantly more expensive, and that DOE should consider the cost of replacing LIR burners with multi-ring burners for manufacturers. (*Id.*)

DOE considers a LIR burner to have a burner input rate less than 6,500 Btu/h. DOE notes that its adopted standard for gas cooking tops does not preclude the use of LIR burners, as demonstrated by units in its expanded test sample. As discussed in section IV.C.3.b of this document, DOE notes that it considers burners with ''non-optimized'' turndown capability to be burners for which the lowest available simmer setting is more energy consumptive than necessary to hold the test load in a constant simmer close to 90 °C, resulting in significantly higher energy consumption than for a burner with a simmer setting that holds the test load close to that temperature. 88 FR 50810, 50813. DOE empirically defines a non-optimized burner as having a specific energy use of more than 1.45 Btu per gram of water in the test load, as measured by appendix I1. *Id.* As such, DOE clarifies that its definition of a non-optimized burner is separate from the definition of a LIR burner and that its test sample includes LIR burners that are ''optimized,'' as well as ''non-optimized'' burners with input rates above 6,500 Btu/h. DOE additionally notes that the IAEC of a gas cooking top is calculated as the average of the performance of each of the individual burners on the cooking top. DOE notes that the adopted standard for gas cooking tops would not preclude a non-optimized burner if the average performance of all burners on the cooking top achieves the standard, but also notes that optimized turndown capability is a design option available to manufacturers in order to improve the efficiency of a cooking top. DOE further determines that excluding non-optimized burners from the test procedure is not warranted. However, as discussed in section IV.C.3.b of this document, DOE has previously stated that a burner that is not able to heat water to 90 °C would likely be excluded from testing because it would be a specialty cooking zone (*e.g.,* a warming plate or zone). 87 FR 51492, 51505.

e. Cooking Time

Consumers' Research asserted that the standard proposed in the February 2023 SNOPR may require manufacturers to redesign gas cooking tops with reduced burner sizes or heat outputs leading to longer cooking times, which would pose time constraints on consumers' cooking abilities and perhaps incentivize consumers to choose unhealthy pre-packaged food options over home-cooked meals. (Consumers' Research, No. 2267 at pp. 2–3)

AHAM asserted that part of the consumer utility of HIR burners is quicker times to boil and that the standard proposed in the February 2023 SNOPR would eliminate that performance feature and lengthen times to boil. (AHAM, No. 2285 at p. 18) AHAM further noted that its data show that time to boil is directly related to burner input rate, with higher burner input rates generally resulting in shorter times to boil. (*Id.*)

DOE notes that its adopted standard for gas cooking tops does not preclude the use of extra-high input rate burners or multiple HIR burners on a cooking top. DOE therefore determines that cooking time is not impacted by its adopted standards.

f. Continuous Cast-Iron Grates

AHAM asserted that in order to achieve the ''burner and grate optimization'' required by the standard proposed in the February 2023 SNOPR, manufacturers are likely to turn to thinner, wire grates, meaning that consumers will lose the option of sturdier grates that allow pots and pans to be safely moved from one place to another without lifting the pot/pan—a commonly reported activity. (AHAM, No. 2285 at p. 24) AHAM commented that consumer research provided by its members indicates that large, heavy, or specialty pots must be able to be slid from burner to burner without getting caught or causing a spill that must be cleaned up or cause a burn, which is a purchase driver for consumers and translates to consumer satisfaction. (*Id.*)

As discussed, DOE evaluated only efficiency levels in this direct final rule analysis that can be achieved by gas cooking tops with multiple HIR burners and continuous cast-iron grates. Therefore, the adopted standards do not require the use of wire grates.

g. Conventional Ranges

NAHB commented that gas ranges are crucial for affordable housing as they represent the more affordable end of the product spectrum and are often used in starter homes and dwellings with limited kitchen sizes. (NAHB, No. 2288 at p. 2) NAHB asserted that many consumer-preferred ranges will likely be unable to comply with the standard proposed in the February 2023 SNOPR despite being a popular consumer choice and recommended that DOE define separate product classes for gas cooking tops and gas ranges. (*Id.*)

Senators Marshall *et al.* commented that only one cooking top in DOE's test sample, and no freestanding ranges meet the standard for gas cooking tops proposed in the February 2023 SNOPR. (Senators Marshall *et al.,* No. 2277 at p. 1) Senators Marshall *et al.* stated that none of the products that manufacturers tested were able to meet the proposed standard and that the rule poses serious consumer concerns with no consumer benefits. (*Id.*)

AHAM commented that ranges offer the consumer a cooking top and an oven in a single product, taking up less space than a separate cooking top and oven, and ranges are less expensive to install because they do not require customization in the kitchen. (AHAM, No. 2285 at p. 23) However, AHAM noted, no ranges in DOE's or AHAM's sample meet DOE's proposed energy conservation standard for gas cooking tops. (*Id.*) AHAM commented that millions of ranges are sold each year and yet the standard proposed in the February 2023 SNOPR threatens to eliminate them from the market for gas products, as no gas ranges meet the proposed standard. (*Id.*)

AHAM commented that no gas ranges in DOE's or AHAM's test sample meet the standard proposed in the February 2023 SNOPR, asserting that products representing 91 percent of U.S. shipments in 2022 would not meet the proposed standard. (AHAM, No. 2285 at p. 27)

DOE notes that electric and gas ranges can meet the adopted standards, as demonstrated by the units in its expanded test sample.

AHAM commented DOE should understand the safety requirements for gas ranges that impact the ability of ranges to achieve higher levels of efficiency, which include: combustion requirements (also applicable to cooking tops) that require higher grates and make burners less efficient; component temperature thermal and emissions testing for gas and electric ranges that are run with both the cooking top and oven components on; surface temperatures for both electric and gas ranges that affect the proximity of elements/burners to touchpad and knobs, which must be designed to ensure touchable surfaces remain cool for the user; enclosure temperatures that impact grate design, input rates, and burner spacing to ensure fire hazards are avoided; and venting location and impact on secondary air for cooking top burners, because the oven is on during safety testing of freestanding ranges. (AHAM, No. 2285 at pp. 26–27)

The cooking top efficiency levels that DOE analyzed for this direct final rule were based on the measured performance of gas and electric cooking tops available on the market in the United States, and therefore which meet all applicable safety standards. The adopted standards can be achieved by both standalone cooking tops and the cooking top portion of combined cooking products, such as ranges, as demonstrated by units in DOE's expanded test sample.

h. Unit Width

AHAM commented that the size of the unit plays an important role in the design of the cooking top due to its impact on the availability of secondary air. (AHAM, No. 2285 at p. 26) AHAM commented that it believes the only gas cooking top to meet the standard proposed in the February 2023 SNOPR is 36 inches wide, making it easier to pass this test, and that DOE must consider all widths in order to ensure it does not eliminate consumer utility. (*Id.*)

Representatives McMorris-Rodgers *et al.* stated that DOE has not demonstrated that its proposed design changes are possible for products outside the niche market of 36-inch-wide countertop-mounted cooking tops and noted that EPCA prohibits DOE from using standards to eliminate products with features that are substantially the same as those available on the market today. (Representatives McMorris-Rodgers *et al.,* No. 765 at p. 2, citing 42 U.S.C. 6295(o)(4))

BSH Home Appliances Corporation (''BSH'') commented that it supports the inclusion of additional consumer-valued features in the August 2023 NODA efficiency levels. (BSH, No. 10110 at p. 2) BSH commented that while DOE finds that units with two to six HIR burners can achieve the updated EL 1 and that a gas cooking top with all HIR burners can achieve the updated EL 2, the data set does not account for any range greater than 36 inches in width. (*Id.*)

DOE notes that the adopted standards for gas and electric cooking tops do not preclude units of varying width and installation configuration from meeting the standard, as demonstrated by units in its expanded test sample. Specifically, since the IAEC metric is an average measurement across all cooking zones on a cooking top, the number of cooking zones (and by proxy, the unit width) has no bearing on a unit's ability to meet the adopted standard levels.

i. Conclusion

DOE has concluded that the standards adopted in this direct final rule will 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 adopted standards.

5. Impact of Any Lessening of Competition

DOE considered any lessening of competition that would be likely to result from new or amended standards. As discussed in section III.E.1.e of this document, EPCA directs the Attorney General of the United States (''Attorney General'') to determine the impact, if any, of any lessening of competition likely to result from a proposed standard and to transmit such determination in writing 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. To assist the Attorney General in making this determination, DOE is providing the Department of Justice (''DOJ'') with copies of this direct final rule and the TSD for review.

Overall, DOE does not anticipate that energy conservation standards set at the Recommended TSL, *i.e.,* TSL 1, would significantly alter the current market structure that consumer conventional cooking products are currently sold.

DOE does not expect this direct final rule to increase the concentration in an already concentrated market. 88 FR 6818, 6887. 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.

6. Need of the Nation To Conserve Energy

Enhanced energy efficiency, where economically justified, improves the Nation's energy security, strengthens the economy, and reduces the environmental impacts (costs) of energy production. Reduced electricity demand due to energy conservation standards is also likely to reduce the cost of maintaining the reliability of the electricity system, particularly during peak-load periods. Chapter 15 in the direct final rule TSD presents the estimated impacts on electricity generating capacity, relative to the no-new-standards case, for the TSLs that DOE considered in this rulemaking.

In response to the February 2023 SNOPR, Fall commented that the impact of performance standards on energy security should be considered, particularly with respect to the need for diversification of energy sources to provide increased energy security. (Fall, No. 376 at pp. 1–2) Fall commented that performance standards should be technologically feasible while allowing a range of products utilizing an array of possible energy source. (*Id.* at p. 2)

As discussed in section V.C of this document, the Secretary has concluded that the standards adopted in this direct final rule represent the maximum improvement in energy efficiency that is technologically feasible and economically justified, and would result in significant conservation of energy. As discussed in section V.B.4 of this document, consumers will continue to have access to cooking products with the same performance features across both electric and gas fuel types at the adopted TSL (the Recommended TSL detailed in the Joint Agreement).

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.34 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 direct final rule TSD.

Table V.34 Cumulative Emissions Reduction for Consumer Conventional Cooking Products; 30 Years of Shipments*

	Trial Standard Level		
	1	2	3
Electric Power Sector and Site Emissions			
CO_2 (*million metric tons*)	3.61	18.80	32.90
CH_4 (*thousand tons*)	0.25	0.73	1.77
N_2O (*thousand tons*)	0.04	0.09	0.24
SO_2 (*thousand tons*)	1.13	2.21	6.83
NO_X (*thousand tons*)	1.75	13.82	20.46
Hg (*tons*)	0.01	0.01	0.05
Upstream Emissions			
CO_2 (*million metric tons*)	0.38	2.37	3.79
CH_4 (*thousand tons*)	34.45	234.68	364.45
N_2O (*thousand tons*)	0.00	0.01	0.01
SO_2 (*thousand tons*)	0.02	0.05	0.13
NO_X (*thousand tons*)	5.87	37.32	59.57
Hg (*tons*)	0.00	0.00	0.00
Total FFC Emissions			
CO_2 (*million metric tons*)	3.99	21.16	36.69
CH_4 (*thousand tons*)	34.70	235.42	366.22
N_2O (*thousand tons*)	0.04	0.10	0.25
SO_2 (*thousand tons*)	1.15	2.26	6.96
NO_X (*thousand tons*)	7.61	51.14	80.03
Hg (*tons*)	0.01	0.01	0.05

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

As part of the analysis for this rule, 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 estimated SC–CO_2 values that DOE used. Table V.35 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 selected TSL in chapter 14 of the direct final rule TSD.

Table V.35 Present Value of CO_2 Emissions Reduction for Consumer Conventional Cooking Products; 30 Years of Shipments*

TSL	SC-CO_2 Case			
	Discount Rate and Statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	billion 2022$			
1	0.04	0.17	0.27	0.52
2	0.22	0.94	1.47	2.85
3	0.39	1.64	2.55	4.96

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

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.36 presents the value of the CH_4 emissions reduction at each TSL, and Table V.37 presents the value of the N_2O emissions reduction at each TSL. The time-series of annual values is presented for the selected TSL in chapter 14 of the direct final rule TSD.

Table V.36 Present Value of Methane Emissions Reduction for Consumer Conventional Cooking Products; 30 Years of Shipments*

TSL	SC-CH_4 Case			
	Discount Rate and Statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	billion 2022$			
1	0.02	0.05	0.07	0.13
2	0.11	0.34	0.47	0.89
3	0.18	0.52	0.73	1.39

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

Table V.37 Present Value of Nitrous Oxide Emissions Reduction for Consumer Conventional Cooking Products; 30 Years of Shipments*

TSL	SC-N_2O Case			
	Discount Rate and Statistics			
	5%	3%	2.5%	3%
	Average	Average	Average	95th percentile
	billion 2022$			
1	0.000	0.001	0.001	0.002
2	0.000	0.002	0.002	0.004
3	0.001	0.004	0.006	0.011

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

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, however, that the adopted standards would be economically justified even without inclusion of monetized benefits of reduced GHG emissions.

DOE also estimated the monetary value of the economic 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.38 presents the present value for NO_X emissions reduction for each TSL calculated using 7-percent and 3-percent discount rates, and Table V.39 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 selected TSL in chapter 14 of the direct final rule TSD.

Table V.38 Present Value of NO_X Emissions Reduction for Consumer Conventional Cooking Products; 30 Years of Shipments*

TSL	7% Discount Rate	3% Discount Rate
	million 2022$	
1	134.2	347.0
2	805.2	1,999.2
3	1,367.8	3,387.9

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

Table V.39 Present Value of SO_2 Emissions Reduction for Consumer Conventional Cooking Products; 30 Years of Shipments*

TSL	7% Discount Rate	3% Discount Rate
	million 2022$	
1	29.2	74.6
2	60.6	148.6
3	191.2	465.6

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1

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 direct PM and other co-pollutants may be significant. DOE has not included monetary benefits of the reduction of Hg emissions because the amount of reduction is very small.

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.40 presents the NPV values that result from adding the estimates of the economic benefits resulting from reduced GHG and NO_X and SO_2 emissions to the NPV of consumer benefits calculated for each TSL considered in this rulemaking. The consumer benefits are domestic U.S. monetary savings that occur as a result of purchasing the covered products and are measured for the lifetime of products shipped during the period 2027–2056 for all TSLs except TSL 1 (the Recommended TSL) and 2028–2057 for TSL 1. 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 during the period 2027–2056 for all TSLs except TSL 1 (the Recommended TSL) and 2028–2057 for TSL 1.

Table V.40 Consumer NPV Combined with Present Value of Climate Benefits and Health Benefits; 30 Years of Shipments*

Category	TSL 1	TSL 2	TSL 3**
Using 3% discount rate for Consumer NPV and Health Benefits (billion 2022$)			
5% Average SC-GHG case	2.0	2.8	(39.5)
3% Average SC-GHG case	2.2	3.8	(37.9)
2.5% Average SC-GHG case	2.3	4.4	(36.7)
3% 95th percentile SC-GHG case	2.6	6.2	(33.7)
Using 7% discount rate for Consumer NPV and Health Benefits (billion 2022$)			
5% Average SC-GHG case	0.9	0.8	(24.2)
3% Average SC-GHG case	1.0	1.7	(22.6)
2.5% Average SC-GHG case	1.2	2.4	(21.5)
3% 95th percentile SC-GHG case	1.5	4.2	(18.4)

*2027–2056 for all TSLs except TSL 1 (the Recommended TSL); 2028–2057 for TSL 1
**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 direct final rule, 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.

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

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

In DOE's current regulatory analysis, potential changes in the benefits and costs of a regulation due to changes in consumer purchase decisions are included in two ways. First, if consumers forgo 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 direct final rule TSD. However, DOE's current analysis does not explicitly control for heterogeneity in consumer preferences, preferences across subcategories of products or specific features, or consumer price sensitivity variation according to household income.[141]

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.[142] DOE welcomes comments on how to

[141] 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.*

[142] 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 November 2, 2023).

more fully assess the potential impact of energy conservation standards on consumer choice and how to quantify this impact in its regulatory analysis in future rulemakings.

1. Benefits and Burdens of TSLs Considered for Consumer Conventional Cooking Product Standards

Table V.41 and Table V.42 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 the new and amended standards (2027–2056 for all TSLs except TSL 1, the Recommended TSL; 2028–2057 for TSL 1). The energy savings, emissions reductions, and value of emissions reductions refer to full-fuel-cycle results. DOE is presenting monetized benefits of GHG emissions reductions in accordance with the applicable Executive Orders and 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.41 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	0.22	0.66	1.52
Cumulative FFC Emissions Reduction			
CO_2 (*million metric tons*)	3.99	21.16	36.69
CH_4 (*thousand tons*)	34.70	235.42	366.22
N_2O (*thousand tons*)	0.04	0.10	0.25
SO_2 (*thousand tons*)	1.15	2.26	6.96
NO_X (*thousand tons*)	7.61	51.14	80.03
Hg (*tons*)	0.01	0.01	0.05
Present Value of Benefits and Costs (*3% discount rate, billion 2022$*)			
Consumer Operating Cost Savings	1.63	4.30	3.97
Climate Benefits*	0.22	1.28	2.16
Health Benefits**	0.42	2.15	3.85
Total Benefits†	2.27	7.73	9.99
Consumer Incremental Product Costs‡	0.07	3.96	47.86
Consumer Net Benefits	1.56	0.34	(43.89)
Total Net Benefits	2.20	3.77	(37.87)
Present Value of Benefits and Costs (*7% discount rate, billion 2022$*)			
Consumer Operating Cost Savings	0.69	1.90	0.86
Climate Benefits*	0.22	1.28	2.16
Health Benefits**	0.16	0.87	1.56
Total Benefits†	1.07	4.04	4.58
Consumer Incremental Product Costs‡	0.04	2.30	27.21
Consumer Net Benefits	0.65	(0.40)	(26.34)
Total Net Benefits	1.03	1.74	(22.62)

Note: This table presents the costs and benefits associated with consumer conventional cooking products shipped during the period 2027−2056 for all TSLs except for TSL 1 (the Recommended TSL) and 2028–2057 for TSL 1. These results include benefits to consumers which accrue after 2056 from the products shipped during the period 2027−2056 for all TSLs except TSL 1 and 2057 from the products shipped during the period 2028–2057 for TSL 1.

* 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 DOE does not have a single central SC-GHG point estimate. To monetize the benefits of reducing GHG emissions this analysis uses the interim 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.

** 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.

† 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 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 sets of SC-GHG estimates.

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

Table V.42 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 2022$) (No-new-standards case INPV = 1,601)	1,457–1,458	1,042–1,078	(302)–(25)
Industry NPV (% change)	(9.0)–(9.0)	(34.9)–(32.6)	(118.9)–(101.6)
Consumer Average LCC Savings (2022$)			
Electric Smooth Element Standalone Cooking Tops	62.80	8.54	(638.87)
Electric Smooth Element Cooking Top as a Component of a Combined Cooking Product	62.80	8.54	(638.87)
Gas Standalone Cooking Tops	3.09	(1.03)	(1.03)
Gas Cooking Top as a Component of a Combined Cooking Product	3.09	(1.03)	(1.03)
Electric Ovens	16.23	(39.55)	(24.87)
Gas Ovens	15.17	(24.16)	(24.16)
Shipment-Weighted Average**	23.34	(17.72)	(153.51)
Consumer Simple PBP (years)			
Electric Smooth Element Standalone Cooking Tops	0.6	4.0	170.4
Electric Smooth Element Cooking Top as a Component of a Combined Cooking Product	0.6	4.0	170.4
Gas Standalone Cooking Tops	6.6	10.5	10.5
Gas Cooking Top as a Component of a Combined Cooking Product	6.6	10.5	10.5
Electric Ovens	2.1	25.4	20.8
Gas Ovens	1.9	18.0	18.0
Shipment-Weighted Average**	2.7	16.1	50.7
Percent of Consumers that Experience a Net Cost			
Electric Smooth Element Standalone Cooking Tops	0%	52%	100%
Electric Smooth Element Cooking Top as a Component of a Combined Cooking Product	0%	52%	100%
Gas Standalone Cooking Tops	1%	38%	38%
Gas Cooking Top as a Component of a Combined Cooking Product	1%	38%	38%
Electric Ovens	0%	27%	81%
Gas Ovens	0%	21%	21%
Shipment-Weighted Average**	0%	34%	64%

Parentheses indicate negative (-) values.

* All TSLs except TSL 1 (the Recommended TSL) have a compliance year of 2027; TSL 1 has a compliance year of 2028.

** Weighted by shares of each product class in total projected shipments in 2022.

DOE first considered TSL 3, which represents the max-tech efficiency levels. TSL 3 would save an estimated 1.52 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 $26.34 billion using a discount rate of 7 percent, and $43.89 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 3 are 36.69 Mt of CO_2, 6.96 thousand tons of SO_2, 80.03 thousand tons of NO_X, 0.05 tons of Hg, 366.22 thousand tons of CH_4, and 0.25 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 $2.2 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 3 is $1.6 billion using a 7-percent discount rate and $3.9 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 $22.6 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 $37.9 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 loss of $638.87 for electric smooth element cooking top product classes, a loss $1.03 for gas cooking top product classes, a shipments-weighted average loss of $24.87 for electric ovens, and a shipment-weighted average loss of $24.16 for gas ovens. The simple payback period is 170.5 years for electric smooth element cooking top product classes, 10.5 years for gas cooking top product classes, 20.8 years for electric ovens, and 18.0 years for gas ovens. The fraction of consumers experiencing a net LCC cost is 100 percent for electric smooth element cooking top product classes, 38 percent for gas cooking top product classes, 81 percent for electric ovens, and 21 percent for gas ovens.

At TSL 3, the projected change in INPV ranges from a decrease of $1,903 million to a decrease of $1,626 million, which corresponds to decreases of 118.9 percent and 101.6 percent, respectively. DOE estimates that industry must invest $2,069.2 million to comply with standards set at TSL 3. DOE estimates that less than 1 percent of electric smooth element cooking top (standalone and component of a combined cooking product) shipments, 41 percent of gas cooking top (standalone and component of a combined cooking product) shipments, zero percent of electric standard oven (freestanding and built-in) shipments, zero percent of electric self-clean oven (freestanding) shipments, 2 percent of electric self-clean oven (built-in) shipments, 62 percent of gas standard oven (freestanding) shipments, 38 percent of gas standard oven (built-in) shipments, 93 percent of gas self-clean oven (freestanding) shipments, and 77 percent of gas self-clean oven (built-in) shipments would already meet the efficiency levels required at TSL 3 in 2027.

The Secretary 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), and the significant impacts on manufacturers, including the large conversion costs and the significant reduction in INPV. A significant fraction of consumers across all product classes 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 118.9 percent. Consequently, the Secretary has concluded that TSL 3 is not economically justified.

DOE next considered TSL 2, which represents EL 2 for all product classes. TSL 2 would save an estimated 0.66 quads of energy, an amount DOE considers significant. Under TSL 2, the NPV of consumer benefit would decrease compared to the no-new-standards case by $0.40 billion using a discount rate of 7 percent, and increase compared to the no-new-standards case by $0.34 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 2 are 21.16 Mt of CO_2, 2.26 thousand tons of SO_2, 51.14 thousand tons of NO_X, 0.01 tons of Hg, 235.42 thousand tons of CH_4, and 0.10 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 $1.3 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at TSL 2 is $0.9 billion using a 7-percent discount rate and $2.1 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 $1.7 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 2 is $3.8 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 $8.54 for electric smooth element cooking top product classes, a loss of $1.03 for gas cooking top product classes, a shipments-weighted average loss of $39.55 for electric ovens, and a shipment-weighted average loss of $24.16 for gas ovens. The simple payback period is 4.0 years for electric smooth element cooking top product classes, 10.5 years for gas cooking top product classes, 25.4 years for electric ovens, and 18.0 years for gas ovens. The fraction of consumers experiencing a net LCC cost is 52 percent for electric smooth element cooking top product classes, 38 percent for gas cooking top product classes, 27 percent for electric ovens, and 21 percent for gas ovens.

At TSL 2, the projected change in INPV ranges from a decrease of $559 million to a decrease of $522 million, which corresponds to decreases of 34.9 percent and 32.6 percent, respectively. DOE estimates that industry must invest $576.5 million to comply with standards set at TSL 2. DOE estimates that approximately 15 percent of electric smooth element cooking top (standalone and component of a combined cooking product) shipments, 41 percent of gas cooking top (standalone and component of a combined cooking product) shipments, 38 percent of electric standard oven (freestanding) shipments, 30 percent of electric standard oven (built-in) shipments, 77 percent of electric self-clean oven (freestanding) shipments, 88 percent of electric self-clean ovens (built-in) shipments, 62 percent of gas standard oven (freestanding) shipments, 38 percent of gas standard oven (built-in), 93 percent of gas self-clean oven (freestanding) shipments, and 77 percent of gas self-clean oven (built-in) shipments would already meet or exceed the efficiency levels required at TSL 2 in 2027.

The Secretary concludes that at TSL 2 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, and the significant impacts on manufacturers, including the large conversion costs and the significant reduction in INPV. At TSL 2, consumers, on average, would experience a negative LCC savings for gas cooking tops, electric ovens, and gas ovens. For electric cooking tops, 52 percent of consumers would experience a net cost. At TSL 2, the simple payback period for electric and gas ovens would exceed the average product lifetime. Additionally, the consumer NPV is negative at 7 percent. The potential reduction in INPV could be as high as 34.9 percent. Consequently, the Secretary has concluded that TSL 2 is not economically justified.

DOE next considered the Recommended TSL, which represents EL 1 for all product classes. The Recommended TSL would save an estimated 0.22 quads of energy, an amount DOE considers significant. Under the Recommended TSL, the NPV of consumer benefit would be $0.65 billion using a discount rate of 7 percent, and $1.56 billion using a discount rate of 3 percent.

The cumulative emissions reductions at the Recommended TSL are 3.99 Mt of CO_2, 1.15 thousand tons of SO_2, 7.61 thousand tons of NO_X, 0.01 tons of Hg, 34.70 thousand tons of CH_4, and 0.04 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 the Recommended TSL is $0.22 billion. The estimated monetary value of the health benefits from reduced SO_2 and NO_X emissions at the Recommended TSL is $0.16 billion using a 7-percent discount rate and $0.42 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 the Recommended TSL is $1.03 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at the Recommended TSL is $2.20 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 the Recommended TSL, the average LCC impact is a savings of $62.80 for electric smooth element cooking top product classes, a savings of $3.09 for gas cooking top product classes, a shipments-weighted average savings of $16.23 for electric ovens, and a shipment-weighted average savings of $15.17 for gas ovens. The simple payback period is 0.6 years for electric smooth element cooking top product classes, 6.6 years for gas cooking top product classes, 2.1 years for electric ovens, and 1.9 years for gas ovens. The fraction of consumers experiencing a net LCC cost is 0 percent for electric smooth element cooking top product classes, 1 percent for gas cooking top product classes, 0 percent for electric ovens, and 0 percent for gas ovens.

At the Recommended TSL, the projected change in INPV ranges from a decrease of $144 million to a decrease of $143 million, which corresponds to decreases of 9.0 percent and 9.0 percent, respectively. DOE estimates that industry must invest $66.7 million to comply with standards set at the Recommended TSL. DOE estimates that approximately 77 percent of electric smooth element cooking top (standalone and component of a combined cooking product) shipments, 97 percent of gas cooking top (standalone and component of a combined cooking product) shipments, 95 percent of electric standard oven (freestanding and built-in) shipments, 95 percent of electric self-clean oven (freestanding and built-in) shipments, 96 percent of gas standard oven (freestanding and built-in) shipments, and 96 percent of gas self-clean oven (freestanding and built-in) shipments would already meet or exceed the efficiency levels required at the Recommended TSL in 2028.

For all TSLs considered in this direct final rule—except for the Recommended TSL—DOE is bound by the 3-year lead time requirements in EPCA when determining compliance dates (*i.e.,* compliance with new and amended standards required in 2027). For the Recommended TSL, DOE's analysis utilized the January 31, 2028, compliance date specified in the Joint Agreement as it was an integral part of the multi-product joint recommendation. A 2028 compliance year provides manufacturers additional flexibility to spread capital requirements, engineering resources, and conversion activities over a longer period of time depending on the individual needs of each manufacturer. Furthermore, these delayed compliance dates provide additional lead time and certainty for supplier of components that improve efficiency.

After considering the analysis and weighing the benefits and burdens, the Secretary has concluded that at a standard set at the Recommended TSL for consumer conventional cooking products would be economically justified. At this TSL, the average LCC savings for all consumer conventional cooking product consumers is positive. A shipment-weighted 0 percent of conventional cooking product consumers experience a net cost, with the largest impact being 1 percent net cost for gas cooking top product classes. 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 the Recommended TSL, 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 the Recommended TSL are economically justified even without weighing the estimated monetary value of emissions reductions. When those emissions reductions are included—representing $0.22 billion in climate benefits (associated with the average SC–GHG at a 3-percent discount rate), and $0.42 billion (using a 3-percent discount rate) or $0.16 billion (using a 7-percent discount rate) in health benefits—the rationale becomes stronger still.

As stated, DOE conducts the walk-down analysis to determine the TSL that represents the maximum improvement in energy efficiency that is technologically feasible and economically justified as required under EPCA. The walk-down is not a comparative analysis, as a comparative analysis would result in the maximization of net benefits instead of 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 new and amended energy conservation standards, DOE notes that the Recommended TSL has higher average LCC savings, a shorter average payback period, a lower fraction of consumers experiencing a net LCC cost, and higher consumer net present values compared to TSL 2 and 3.

Although DOE considered new and amended standard levels for consumer 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 smooth element cooking top product classes, the Recommended TSL corresponds to EL 1, which incorporates low-standby-loss electronic controls. Setting a standard at EL 2 or EL 3 would result in a majority of consumers experiencing a net LCC cost and longer payback periods relative to EL 1. For gas cooking top product classes, the Recommended TSL corresponds to EL 1, which represents the efficiency level defined in the Joint Agreement and which would not preclude any combination of other features mentioned by manufacturers (*e.g.,* multiple HIR burners, continuous cast-iron grates, different nominal unit widths, sealed burners, at least one LIR burner, multiple dual-stacked and/or multi-ring HIR burners, and at least one extra-high input rate burner), as demonstrated by products from multiple manufacturers in the expanded test sample. Setting a standard at EL 2 would result in an average net LCC cost and a higher payback period relative to EL 1. For electric and gas ovens, the Recommended TSL 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 adopted levels at the Recommended TSL result in positive LCC savings for all product classes and a lower percentage of consumers experiencing a net cost to the point where DOE has concluded that they are economically justified, as discussed for the Recommended TSL in the preceding paragraphs.

Accordingly, the Secretary concludes that the Recommended TSL would offer the maximum improvement in efficiency that is technologically feasible and economically justified, and would result in the significant conservation of energy.

Therefore, based on the previous considerations, DOE adopts the energy conservation standards for consumer conventional cooking products at the Recommended TSL.

While DOE considered each potential TSL under the criteria laid out in 42 U.S.C. 6295(o) as previously discussed, DOE notes that the Recommended TSL for consumer conventional cooking products adopted in this direct final rule is part of a multi-product Joint Agreement covering six rulemakings (consumer conventional cooking products; residential clothes washers; consumer clothes dryers; dishwashers; refrigerators, refrigerator-freezers, and freezers; and miscellaneous refrigeration products). The signatories indicate that the Joint Agreement for the six rulemakings should be considered as a joint statement of recommended standards, to be adopted in its entirety. As discussed in section V.B.2.e of this document, many consumer conventional cooking product manufacturers also manufacture dishwashers; refrigerators, refrigerator-freezers, and freezers; residential clothes washers; consumer clothes dryers; and miscellaneous refrigeration products. Therefore, there are potential integrated benefits to the Joint Agreement. Rather than requiring compliance with five new and amended standards in a single year (2027),[143] the negotiated multi-product Joint Agreement staggers the compliance dates for the five amended standards over a 4-year period (2027–2030). In response to the February 2023 SNOPR, AHAM expressed concerns about the timing of ongoing home appliance rulemakings. Specifically, AHAM commented that DOE to abide by Process Rule requirements and take action to fully review the cumulative impacts its rules will have on manufacturers and consumers, with this review including examination of the potential impact on the economy and inflation as a result of the unprecedented stringency and close compliance dates of DOE's recently proposed standards. (AHAM, No. 2285 at pp. 44–47) AHAM commented that DOE's proposed levels for consumer clothes dryers, residential clothes washers, consumer conventional cooking products, refrigerators, refrigerator-freezers, freezers, and its final rule for room air conditioners will require significant redesign of products—and in the case of gas cooking tops and top-load residential clothes washers, the complete redesign of entire product lines. (*Id.*) AHAM repeated its request that DOE acknowledge this cumulative regulatory burden and take action, such as spacing out its final rules, allowing more lead-time by issuing final rules well before publishing them in the **Federal Register**, and reducing the stringency of standards such that fewer percentages of products would require complete re-design. (*Id.*) AHAM has submitted similar comments to other ongoing home appliance rulemakings. As AHAM is a key signatory of the Joint Agreement, DOE understands that the compliance dates recommended in the Joint Agreement would help reduce cumulative regulatory burden. These compliance dates help relieve concern on the part of some manufacturers about their ability to allocate sufficient resources to comply with multiple concurrent new and amended standards. The Joint Agreement also provides additional years of regulatory certainty for manufacturers and their suppliers.

The new and amended energy conservation standards for consumer conventional cooking products are shown in Table V.43 and Table V.44.

Table V.43 New and Amended Energy Conservation Standards for Conventional Cooking Tops

Product Class	Maximum integrated annual energy consumption (IAEC)
Electric Open (Coil) Element Cooking Tops	No standard
Electric Smooth Element Standalone Cooking Tops	207 *kWh/year*
Electric Smooth Element Cooking Top Component of a Combined Cooking Product	207 *kWh/year*
Gas Standalone Cooking Tops	1,770 *kBtu/year*
Gas Cooking Top Component of a Combined Cooking Product	1,770 *kBtu/year*

[143] The analyses for residential clothes washers (88 FR 13520); consumer clothes dryers (87 FR 51734); consumer conventional cooking products (88 FR 6818); dishwashers (88 FR 32514); and refrigerators, refrigerator-freezers, and freezers (88 FR 12452) utilized a 2027 compliance year for analysis at the proposed rule stage. Miscellaneous refrigeration products (88 FR 12452) utilized a 2029 compliance year for the NOPR analysis.

Table V.44 New and Amended Prescriptive Energy Conservation Standards for Conventional Ovens

Product Class	New and Amended Standards
Electric Ovens	Shall not be equipped with a control system that uses linear power supply.*
Gas Ovens	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.

The Secretary also concludes that an amended standard is not technologically feasible and economically justified for electric open (coil) element cooking tops. Therefore, DOE is not adopting any energy conservation standards for electric open (coil) element cooking tops.

2. Annualized Benefits and Costs of the Adopted Standards

The benefits and costs of the adopted standards can also be expressed in terms of annualized values. The annualized net benefit is (1) the annualized national economic value (expressed in 2022$) of the benefits from operating products that meet the adopted 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.

Table V.45 shows the annualized values for consumer conventional cooking products under the Recommended TSL, expressed in 2022$. 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 reductions, and the 3-percent discount rate case for GHG social costs, the estimated cost of the adopted standards for consumer conventional cooking products is $3.9 million per year in increased equipment installed costs, while the estimated annual benefits are $68.1 million from reduced equipment operating costs, $12.4 million in GHG reductions, and $16.1 million from reduced NO_X and SO_2 emissions. In this case, the net benefit amounts to $92.6 million per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the adopted standards for consumer conventional cooking products is $4.0 million per year in increased equipment costs, while the estimated annual benefits are $90.8 million in reduced operating costs, $12.4 million from GHG reductions, and $23.5 million from reduced NO_X and SO_2 emissions. In this case, the net benefit amounts to $122.7 million per year.

Table V.45 Annualized Benefits and Costs of Adopted Standards (Recommended TSL) for Consumer Conventional Cooking Products

	Million 2022$/year		
	Primary Estimate	Low-Net-Benefits Estimate	High-Net-Benefits Estimate
3% discount rate			
Consumer Operating Cost Savings	90.8	84.0	95.6
Climate Benefits*	12.4	11.9	12.5
Health Benefits**	23.5	22.6	23.8
Total Benefits†	126.7	118.4	131.9
Consumer Incremental Product Costs‡	4.0	4.1	3.8
Net Benefits	122.7	114.3	128.1
Change in Producer Cash Flow (INPV‡‡)	(13.8)	(13.8)	(13.8)
7% discount rate			
Consumer Operating Cost Savings	68.1	63.3	71.5
Climate Benefits* (3% discount rate)	12.4	11.9	12.5
Health Benefits**	16.1	15.5	16.3
Total Benefits†	96.6	90.7	100.3
Consumer Incremental Product Costs‡	3.9	4.0	3.8
Net Benefits	92.6	86.7	96.5
Change in Producer Cash Flow (INPV‡‡)	(13.8)	(13.8)	(13.8)

Note: This table presents the costs and benefits associated with consumer conventional cooking products shipped in 2028–2057. These results include consumer, climate, and health benefits that accrue after 2057 from the products shipped in 2028−2057. The Primary, Low Net Benefits, and High Net Benefits Estimates utilize projections of energy prices from the *AEO2023* 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.2 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 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 sets of SC-GHG estimates. To monetize the benefits of reducing GHG emissions, this analysis uses the interim 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.

** 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 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.

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

‡‡ Operating Cost Savings are calculated based on the life cycle costs analysis and national impact analysis as discussed in detail below. *See* sections IV.F and IV.H of this document. DOE's national impacts analysis includes all impacts (both costs and benefits) along the distribution chain beginning with the increased costs to the manufacturer to manufacture the product and ending with the increase in price experienced by the consumer. DOE also separately conducts a detailed analysis on the impacts on manufacturers (the MIA). *See* section IV.J of this document. In the detailed MIA, DOE models manufacturers' pricing decisions based on assumptions regarding investments, conversion costs, cash flow, and margins. The MIA produces a range of impacts, which is the rule's expected impact on the INPV. The change in INPV is the present value of all changes in industry cash flow, including changes in production costs, capital expenditures, and manufacturer profit margins. The annualized change in INPV is calculated using the industry weighted average cost of capital value of 9.1 percent that is estimated in the manufacturer impact analysis (*see* chapter 12 of the direct final rule TSD for a complete description of the industry weighted average cost of capital). For consumer conventional cooking products, the annualized change in INPV is -$13.8 million. DOE accounts for that range of likely impacts in analyzing whether a trial standard level is economically justified. *See* section V.C of this document. DOE is presenting the range of impacts to the INPV under two markup scenarios: the Preservation of Gross Margin scenario, which is the manufacturer markup scenario used in the calculation of Consumer Operating Cost Savings in this table, and the Preservation of Operating Profit scenario, where DOE assumed manufacturers would not be able to increase per-unit operating profit in proportion to increases in manufacturer production costs. DOE includes the range of estimated annualized change in INPV in the above table, drawing on the MIA explained further in section IV.J of this document to provide additional context for assessing the estimated impacts of this direct final rule to society, including potential changes in production and consumption, which is consistent with OMB's Circular A-4 and E.O. 12866. If DOE were to include the INPV into the annualized net benefit calculation for this direct final rule, the annualized net benefits would be $108.9 million at 3-percent discount rate and would be $78.8 million at 7-percent discount rate. Parentheses () indicate negative values.

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.

1. Sampling and Test Procedure Repeatability

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 conventional cooking tops. DOE notes that as part of the August 2022 TP Final Rule, a sampling plan for conventional 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 did not propose to amend the product-specific certification requirements for these products in the February 2023 SNOPR because it did not have information regarding whether the confidence limit should be adjusted. 88 FR 6818, 6895.

DOE sought comment and data to potentially re-evaluate the sampling plan for cooking tops in the context of any potential performance standards for these products. *Id.*

Consumers' Research noted that the DOE test method for conventional cooking tops was adopted in September 2022 and commented that DOE does not have any significant real-world data on how current gas cooking tops would perform under this testing and sampling method. (Consumers' Research, No. 2267 at pp. 3–4)

AHAM asserted that DOE regulations require manufacturers to test more than one unit in an effort to account for variation. (AHAM, No. 2285 at p. 11) AHAM commented that the data it presented in its comments coupled with DOE's findings related to test procedure variation should be considered in the context of certification and enforcement. (*Id.*) AHAM commented that DOE should ensure that its rules recognize the variation in this particular case, which exceeds that of other test procedures, and should account for that fact—which its own data and analysis demonstrate—rather than ignore it. (*Id.*)

DOE notes that it neither received nor is it aware of any new data in response to the February 2023 SNOPR upon which to re-evaluate the sampling plan for conventional cooking tops established at 10 CFR 429.23.

2. 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 stated in the February 2023 SNOPR that it 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 proposed 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. 88 FR 6818, 6837.

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 proposed in the February 2023 SNOPR 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. *Id.* Based on its expectation that consumers will select, to the extent possible, matching products for this combination, DOE proposed 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). *Id.* DOE stated that it expects that these products comprising the test configuration typically would be marketed as being within the same ''product line'' by manufacturers. *Id.* In instances where the manufacturer's product line contains more than one dual-zone non-portable cooking top unit, DOE proposed 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. *Id.*

In the approach DOE proposed in the February 2023 SNOPR, 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. *Id.* 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 proposed 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 1/3 and the dual-zone IAEC would have a weighting of 2/3. *Id.* 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 proposed 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 would not require the dual-zone cooking top to be tested again for the purpose of determining the represented IAEC value of the single-zone cooking top). *Id.* DOE stated that it expected that this approach would produce results that are most representative for the tested configuration. *Id.* Further, DOE proposed 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. *Id.*

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

In the February 2023 SNOPR, DOE additionally proposed 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. *Id.* Accordingly, as part of DOE's proposal, each individual cooking top model that may be installed in combination would be rated as a separate basic model, and any combination of such cooking top models that are typically installed in combination would not itself need to have a separate representation as its own basic model. *Id.* at 88 FR 6837–6838. In other words, DOE stated that it did not expect combinations to be separately represented or certified to the Department as their own basic models. *Id.* at 88 FR 6838. DOE stated that this proposal is consistent with the current definition of a basic model at 10 CFR 430.2, which specifies that the 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. *Id.* Therefore, DOE stated that it believed this clarification would be helpful to provide specific context for cooking tops, but that DOE was not proposing specific amendments to the basic model definition in this rule. *Id.*

DOE requested 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. *Id.*

The Joint Agreement signatories suggested that the IAEC calculation of a single-zone cooking top be based on the testing of the single-zone unit by itself, stating that this methodology would reduce burden, simplify the certification process for single-zone cooking tops, and remove any ambiguity associated with determining which dual-zone models are ''comparable.'' (Joint Agreement signatories, No. 12814 at p. 7)

In accordance with the Joint Agreement signatories' recommendation, for this direct final rule, DOE is not implementing any specific methodology for non-portable single-zone conventional cooking tops.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866, 13563, and 14094

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) and E.O. 14094, ''Modernizing Regulatory Review,'' 88 FR 21879 (April 11, 2023), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in the Office of Management and Budget (''OMB'') has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit ''significant regulatory actions'' to OIRA for review. OIRA has determined that this final regulatory action constitutes a ''significant regulatory action'' within the scope of section 3(f) of E.O. 12866. DOE has provided to OIRA an assessment, including the underlying analysis, of benefits and costs anticipated from the final 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'') and a final regulatory flexibility analysis (''FRFA'') 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 (*www.energy.gov/gc/office-general-counsel*).

DOE is not obligated to prepare a regulatory flexibility analysis for this rulemaking because there is not a requirement to publish a general notice of proposed rulemaking under the Administrative Procedure Act. See 5 U.S.C. 601(2), 603(a). As discussed previously, DOE has determined that the Joint Agreement meets the necessary requirements under EPCA to issue this direct final rule for energy conservation standards for consumer conventional cooking products under the procedures in 42 U.S.C. 6295(p)(4). DOE notes that the NOPR for energy conservation standards for consumer conventional cooking products published elsewhere in this **Federal Register** contains an IRFA.

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 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 will be required for gas cooking tops and gas ovens at the time of compliance with this direct final rule. New certification data will be required for electric cooking tops and electric ovens at the time of compliance with this direct final rule. However, DOE is not amending or creating new certification or reporting requirements for consumer conventional cooking products in this direct final rule. 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

Pursuant to the National Environmental Policy Act of 1969 (''NEPA''), DOE has analyzed this rule

in accordance with NEPA and DOE's NEPA implementing regulations (10 CFR part 1021). DOE has determined that this rule qualifies for categorical exclusion under 10 CFR part 1021, subpart D, appendix B5.1 because it is a rulemaking that establishes energy conservation standards for consumer products or industrial equipment, none of the exceptions identified in B5.1(b) apply, no extraordinary circumstances exist that require further environmental analysis, and it meets the requirements for application of a categorical exclusion. See 10 CFR 1021.410. Therefore, DOE has determined that promulgation of this rule is not a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA, and does not require an environmental assessment or an environmental impact statement.

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 rule and has 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 direct final rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) 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 E.O. 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 direct final rule meets the relevant standards of E.O. 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

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

This rule does not contain a Federal intergovernmental mandate, nor is it expected to require expenditures of $100 million or more in any one year by the private sector. As a result, the analytical requirements of UMRA do not apply.

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. Although this direct final rule would not have any impact on the autonomy or integrity of the family as an institution as defined, this rule could impact a family's well-being. When developing a Family Policymaking Assessment, agencies must assess whether: (1) the action strengthens or erodes the stability or safety of the family and, particularly, the marital commitment; (2) the action strengthens or erodes the authority and rights of parents in the education, nurture, and supervision of their children; (3) the action helps the family perform its functions, or substitutes governmental activity for the function; (4) the action increases or decreases disposable income or poverty of families and children; (5) the proposed benefits of the action justify the financial impact on the family; (6) the action may be carried out by State or local government or by the family; and whether (7) the action establishes an implicit or explicit policy concerning the relationship between the behavior and personal responsibility of youth, and the norms of society.

DOE has considered how the proposed benefits of this rule compare to the possible financial impact on a family (the only factor listed that is relevant to this final rule). As part of its rulemaking process, DOE must determine whether the energy conservation standards contained in this direct final rule are economically justified. As discussed in section V.C.1 of this document, DOE has determined that the standards are economically justified because the benefits to consumers far outweigh the costs to manufacturers. Families will also see LCC savings as a result of this final rule.

Moreover, as discussed further in section V.B.1 of this document, DOE has determined that for low-income households, average LCC savings and PBP at the considered efficiency levels are improved (*i.e.,* higher LCC savings and lower payback period) as compared to the average for all households. Further, the standards will also result in climate and health benefits for families.

I. Review Under Executive Order 12630

Pursuant to E.O. 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights,'' 53 FR 8859 (March 18, 1988), DOE has determined that this 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 direct final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

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 significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgates or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy, or (3) is designated by the Administrator of OIRA as a significant energy action. For any significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

DOE has concluded that this regulatory action, which sets forth new and amended energy conservation standards for consumer conventional cooking products, is not a significant energy action because the standards are not likely to have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as such by the Administrator at OIRA. Accordingly, DOE has not prepared a Statement of Energy Effects on this direct final 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 prepared a report describing that peer review.[144] 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 DOE's analyses. DOE is in the process of evaluating the resulting report.[145]

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule prior to its effective date. The report will state that the Office of Information and Regulatory Affairs has determined that this rule meets the criteria set forth in 5 U.S.C. 804(2).

VII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this direct final rule.

List of Subjects in 10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

Signing Authority

This document of the Department of Energy was signed on January 26, 2024, by Jeffrey Marootian, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE **Federal Register** Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on January 29, 2024.

Treena V. Garrett,

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

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

[144] The 2007 ''Energy Conservation Standards Rulemaking Peer Review Report'' is available at the following website: *www.energy.gov/eere/buildings/downloads/energy-conservation-standards-rulemaking-peer-review-report-0* (last accessed July 10, 2023).

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

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

■ 2. Amend § 430.2 by adding in alphabetical order a definition for ''Portable indoor conventional cooking top'' to read as follows:

§ 430.2 Definitions.

* * * * *

Portable indoor conventional cooking top means a conventional cooking top designed—

(1) For indoor use; and

(2) To be moved from place to place.

* * * * *

■ 3. Amend § 430.32 by revising paragraphs (j)(1) and (2) and the heading to paragraph (j)(3) introductory text to read as follows:

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

* * * * *

(j) * * *

(1) *Conventional cooking tops.* (i) Gas cooking tops, other than gas portable indoor conventional cooking tops, manufactured on or after April 9, 2012, and before January 31, 2028, shall not be equipped with a constant burning pilot light.

(ii) Gas portable indoor conventional cooking tops, manufactured on or after April 9, 2012, shall not be equipped with a constant burning pilot light.

(iii) Conventional cooking tops, other than portable indoor conventional cooking tops, manufactured on or after January 31, 2028, shall have an integrated annual energy consumption (IAEC), excluding any downdraft venting system energy consumption, no greater than:

Product class	Maximum integrated annual energy consumption (IAEC)
(A) Electric Smooth Element Standalone Cooking Tops	207 kWh/year.
(B) Electric Smooth Element Cooking Top Component of Combined Cooking Products	207 kWh/year.
(C) Gas Standalone Cooking Tops	1,770 kBtu/year.
(D) Gas Cooking Top Component of Combined Cooking Products	1,770 kBtu/year.

(2) *Conventional ovens.* 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 January 31, 2028.

(3) *Microwave ovens.* * * *

* * * * *

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