

Proposed Rules

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This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE-2017-BT-STD-0003]

RIN 1904-AF56

Energy Conservation Program: Energy Conservation Standards for Refrigerators, Refrigerator-Freezers, and Freezers

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

ACTION: Notice of proposed rulemaking.

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 refrigerators, refrigerator-freezers, and freezers. In this notice of proposed rulemaking (“NOPR”), DOE proposes new energy conservation standards for refrigerators, refrigerator-freezers, and freezers identical to those set forth in a direct final rule published elsewhere in this issue of the **Federal Register**. If DOE receives adverse comment and determines that such comment may provide a reasonable basis for withdrawal of the direct final rule, DOE will publish a notice of withdrawal and will proceed with this proposed rule.

DATES: DOE will accept comments, data, and information regarding this NOPR no later than May 6, 2024. Comments regarding the likely competitive impact of the proposed standard should be sent to the Department of Justice contact listed in the **ADDRESSES** section on or before February 16, 2024.

ADDRESSES: See section IV, “Public Participation,” for details. If DOE withdraws the direct final rule published elsewhere in this issue of the **Federal Register**, DOE will hold a public meeting to allow for additional comment on this proposed rule. DOE will publish notice of any meeting in the **Federal Register**.

Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at www.regulations.gov under docket number EERE-2017-BT-STD-0003. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2017-BT-STD-0003, by any of the following methods:

Email:

ApplianceStandardsQuestions@ee.doe.gov. Include the docket number EERE-2017-BT-STD-0003 in the subject line of the message.

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

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

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

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

The docket web page can be found at www.regulations.gov/docket/EERE-2017-BT-STD-0003. The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section IV of this document for information on how to submit comments through www.regulations.gov.

EPCA requires the Attorney General to provide DOE a written determination

of whether the proposed standard is likely to lessen competition. The U.S. Department of Justice Antitrust Division invites input from market participants and other interested persons with views on the likely competitive impact of the proposed standard. Interested persons may contact the Antitrust Division at energy_standards@usdoj.gov on or before the date specified in the **DATES** section. Please indicate in the “Subject” line of your email the title and Docket Number of this proposed rulemaking.

FOR FURTHER INFORMATION CONTACT:

Mr. Lucas Adin, 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) 287-5904 Email:

ApplianceStandardsQuestions@ee.doe.gov.

Mr. Matthew Schneider, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue SW, Washington, DC 20585-0121. Telephone: (240) 597-6265. Email: matthew.schneider@hq.doe.gov.

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

SUPPLEMENTARY INFORMATION:

Table of Contents

- I. Synopsis of the Proposed Rule
- II. Introduction
 - A. Authority
 - B. Background
 1. Current Standards
 2. Current Test Procedure
 3. History of Standards Rulemaking for Refrigerators, Refrigerator-Freezers, and Freezers
 4. The Joint Agreement
- III. Proposed Standards
 - A. Benefits and Burdens of TSLs Considered for Refrigerator, Refrigerator-Freezer, and Freezer Standards
 - B. Annualized Benefits and Costs of the Proposed Standards
- IV. Public Participation
 - A. Submission of Comments
 - B. Public Meeting
- V. Procedural Issues and Regulatory Review
 - A. Review Under the Regulatory Flexibility Act
 1. Description of Reasons Why Action Is Being Considered

- 2. Objectives of, and Legal Basis for, Rule
- 3. Description and Estimated Number of Small Entities Regulated
- 4. Description and Estimate of Compliance Requirements Including Differences in Cost, if Any, for Different Groups of Small Entities
- 5. Duplication, Overlap, and Conflict With Other Rules and Regulations
- 6. Significant Alternatives to the Rule
 - B. Materials Incorporated by Reference
- VI. Approval of the Office of the Secretary

I. Synopsis of the Proposed Rule

The Energy Policy and Conservation Act, Public Law 94–163, as amended (“EPCA”),¹ authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B of EPCA² established the Energy Conservation Program for Consumer Products Other Than Automobiles. (42 U.S.C. 6291–6309) These products include refrigerators, refrigerator-freezers, and freezers, the subject of this proposed rulemaking.

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 proposing this rule establishing and amending the energy conservation standards for refrigerators, refrigerator-freezers, and freezers and is concurrently issuing a direct final rule elsewhere in this issue of the **Federal Register**. DOE will proceed with this notice of proposed rulemaking only if it determines it must withdraw the direct final rule pursuant to the criteria provided in 42 U.S.C. 6295(p)(4). The amended standard levels in the proposed rule and the 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 residential refrigerators, refrigerator-freezers, and freezers 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 Massachusetts⁴ and utilities including San Diego Gas and Electric and Southern California Edison⁵ advocating for the adoption of the recommended standards. As discussed in more detail in the accompanying direct final rule and in accordance with the provisions

at 42 U.S.C. 6295(p)(4), DOE has determined that the recommendations contained in the Joint Agreement comply with the requirements of 42 U.S.C. 6295(o).

In accordance with these and other statutory provisions discussed in this document, DOE proposes new and amended energy conservation standards for refrigerators, refrigerator-freezers, and freezers. The standards for refrigerators, refrigerator-freezers, and freezers are expressed in terms of integrated annual energy use (“AEU”), measured in kilowatt-hours per year (“kWh/year”), as measured according to DOE’s current test procedure codified at title 10 of the Code of Federal Regulations (“CFR”) part 430, subpart B, appendices A (“appendix A”) and B (“appendix B”).

Table I.1 and Table I.2 present the proposed standards for refrigerators, refrigerator-freezers, and freezers. The proposed standards the same as those recommended by the Joint Agreement. These standards apply to all products listed in Table I.1 and manufactured in, or imported into the United States starting on January 31, 2029, and all products listed in Table I.2 and manufactured in, or imported into, the United States starting on January 31, 2030, as recommended in the Joint Agreement.

TABLE I.1—ENERGY CONSERVATION STANDARDS FOR CONSUMER REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS WITH CORRESPONDING DOOR COEFFICIENT TABLE
[Compliance starting January 31, 2029]

Product class (“PC”)	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
3–BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer	8.24AV + 238.4 + 28I	0.291av + 238.4 + 28I.
3A–BI. Built-in All-refrigerators—automatic defrost	(7.22AV + 205.7)*K3ABI	(0.255av + 205.7)*K3ABI.
4–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer.	(8.79AV + 307.4)*K4BI + 28I ..	(0.310av + 307.4)*K4BI + 28I.
5–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer.	(8.65AV + 309.9)*K5BI + 28I ..	(0.305av + 309.9)*K5BI + 28I.
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	(7.76AV + 351.9)*K5A	(0.274av + 351.9)*K5A.
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	(8.21AV + 370.7)*K5ABI	(0.290av + 370.7)*K5ABI.
7–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer.	(8.82AV + 384.1)*K7BI	(0.311av + 384.1)*K7BI.
8. Upright freezers with manual defrost	5.57AV + 193.7	0.197av + 193.7.
9–BI. Built-In Upright freezers with automatic defrost	(9.37AV + 247.9)*K9BI + 28I ..	(0.331av + 247.9)*K9BI + 28I.
9A–BI. Built-In Upright freezers with automatic defrost with through-the-door ice service.	9.86AV + 288.9	0.348av + 288.9.

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/document/EERE-2017-BT-STD-0003-0103.

⁴ This document is available in the docket at: www.regulations.gov/document/EERE-2017-BT-STD-0003-0104.

⁵ This document is available in the docket at: www.regulations.gov/document/EERE-2017-BT-STD-0003-0105.

TABLE I.1—ENERGY CONSERVATION STANDARDS FOR CONSUMER REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS WITH CORRESPONDING DOOR COEFFICIENT TABLE—Continued

[Compliance starting January 31, 2029]

Product class ("PC")	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
10. Chest freezers and all other freezers except compact freezers	7.29AV + 107.8	0.257av + 107.8.
10A. Chest freezers with automatic defrost	10.24AV + 148.1	0.362av + 148.1.
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	7.68AV + 214.5	0.271av + 214.5.
11A. Compact all-refrigerators—manual defrost	6.66AV + 186.2	0.235av + 186.2.
12. Compact refrigerator-freezers—partial automatic defrost	(5.32AV + 302.2)*K12	(0.188av + 302.2)*K12.
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer	10.62AV + 305.3 + 28I	0.375av + 305.3 + 28I.
13A. Compact all-refrigerators—automatic defrost	(8.25AV + 233.4)*K13A	(0.291av + 233.4)*K13A.
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer.	6.14AV + 411.2 + 28I	0.217av + 411.2 + 28I.
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer.	10.62AV + 305.3 + 28I	0.375av + 305.3 + 28I.
16. Compact upright freezers with manual defrost	7.35AV + 191.8	0.260av + 191.8.
17. Compact upright freezers with automatic defrost	9.15AV + 316.7	0.323av + 316.7.
18. Compact chest freezers	7.86AV + 107.8	0.278av + 107.8.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

av = Total adjusted volume, expressed in Liters.

I = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3ABI) are as defined in the following table.

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K3ABI	1.10	1.0	1.0.
K4BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K5BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K5A	1.10	1.06	1 + 0.02 * (N _d - 3).
K5ABI	1.10	1.06	1 + 0.02 * (N _d - 3).
K7BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K9BI	1.0	1.0	1 + 0.02 * (N _d - 1).
K12	1.0	1.0	1 + 0.02 * (N _d - 1).
K13A	1.10	1.0	1.0.

Notes:

¹ N_d is the number of external doors.

² The maximum N_d values are 2 for K12, 3 for K9BI, and 5 for all other K values.

TABLE I.2—ENERGY CONSERVATION STANDARDS FOR CONSUMER REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS WITH CORRESPONDING DOOR COEFFICIENT TABLE

[Compliance starting January 31, 2030]

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	6.79AV + 191.3	0.240av + 191.3.
1A. All-refrigerators—manual defrost	5.77AV + 164.6	0.204av + 164.6.
2. Refrigerator-freezers—partial automatic defrost	(6.79AV + 191.3)*K2	(0.240av + 191.3)*K2.
3. Refrigerator-freezers—automatic defrost with top-mounted freezer	6.86AV + 198.6 + 28I	0.242av + 198.6 + 28I.
3A. All-refrigerators—automatic defrost	(6.01AV + 171.4)*K3A	(0.212av + 171.4)*K3A.
4. Refrigerator-freezers—automatic defrost with side-mounted freezer	(7.28AV + 254.9)*K4 + 28I	(0.257av + 254.9)*K4 + 28I.
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer	(7.61AV + 272.6)*K5 + 28I	(0.269av + 272.6)*K5 + 28I.
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	7.14AV + 280.0	0.252av + 280.0.
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	(7.31AV + 322.5)*K7	(0.258av + 322.5)*K7.
9. Upright freezers with automatic defrost	(7.33AV + 194.1)*K9 + 28I	(0.259av + 194.1)*K9 + 28I.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

Av = Total adjusted volume, expressed in Liters.

1 = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3A) are as defined in the following table.

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K2	1.0	1.0	1 + 0.02 * (N _d - 1).
K4	1.10	1.06	1 + 0.02 * (N _d - 2).
K3A	1.10	1.0	1.0.
K5	1.10	1.06	1 + 0.02 * (N _d - 2).
K7	1.10	1.06	1 + 0.02 * (N _d - 2).
K9	1.0	1.0	1 + 0.02 * (N _d - 1).

Notes:

¹ N_d is the number of external doors.

² The maximum N_d values are 2 for K2, and 5 for all other K values.

II. Introduction

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

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 refrigerators, refrigerator-freezers, and freezers, the subject of this document. (42 U.S.C. 6292(a)(1)) EPCA prescribed energy conservation standards for these products (42 U.S.C. 6295(b)(1)), and directs DOE to conduct future rulemakings to determine whether to amend these standards. (42 U.S.C. 6295(b)(3)) 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 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 (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 refrigerators, refrigerator-freezers, and freezers appear at title 10 of the Code of Federal Regulations (“CFR”) part 430, subpart B, appendices A (“appendix A”) and B (“appendix B”).

DOE must follow specific statutory criteria for prescribing new or amended standards for covered products, including refrigerators, refrigerator-freezers, and freezer. Any new or amended standard for a covered product must be designed to achieve the maximum improvement in energy efficiency that the Secretary of Energy determines is technologically feasible and economically justified. (42 U.S.C.

6295(o)(2)(A) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6295(o)(3))

Moreover, DOE may not prescribe a standard: (1) for certain products, including refrigerators, refrigerator-freezers, and freezers, if no test procedure has been established for the product, or (2) if DOE determines by rule that the standard is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)(A)–(B)) In deciding whether a proposed standard is economically justified, DOE must determine whether the benefits of the standard exceed its burdens. (42 U.S.C. 6295(o)(2)(B)(i)) DOE must make this determination after receiving comments on the proposed standard, and by considering, to the greatest extent practicable, the following seven statutory factors:

(1) The economic impact of the standard on manufacturers and consumers of the products subject to the standard;

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

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

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

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

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

(7) Other factors the Secretary of Energy (“Secretary”) considers relevant. (42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII))

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

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

Additionally, pursuant to the amendments contained in the Energy

Independence and Security Act of 2007 (“EISA 2007”), Public Law 110–140, any final rule for new or amended energy conservation standards promulgated after July 1, 2010, is required to address standby mode and off mode energy use. (42 U.S.C. 6295(gg)(3)) Specifically, when DOE adopts a standard for a covered product after that date, it must, if justified by the criteria for adoption of standards under EPCA (42 U.S.C. 6295(o)), incorporate standby mode and off mode energy use into a single standard, or, if that is not feasible, adopt a separate standard for such energy use for that product. (42 U.S.C. 6295(gg)(3)(A)–(B)) DOE’s current test procedures for refrigerators, refrigerator-freezers, and freezers address standby mode and off mode energy use.

Finally, EISA 2007 amended EPCA, in relevant part, to grant DOE authority to directly issue a final rule (*i.e.*, a “direct final rule”) establishing an energy conservation standard on 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).

A NOPR that proposes an identical energy efficiency standard must be published simultaneously with 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)) 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.* After withdrawing a direct final rule, DOE must proceed with the notice of proposed rulemaking published simultaneously with the direct final rule and publish in the **Federal Register** the reasons why the direct final rule was withdrawn. *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, 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 6313(a)(6)(B), as applicable. 86 FR 70892, 70912 (Dec. 13, 2021). But the direct final rule provision in EPCA, under which this proposed rule is issued, does not impose additional requirements applicable to other standards rulemakings, which is consistent with the unique circumstances of rules issued as 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 September 15, 2011, DOE prescribed the current energy conservation standards for refrigerators, refrigerator-freezers, and freezers. 76 FR 57516 (“September 2011 Final Rule”). These standards are set forth in DOE’s regulations at 10 CFR 430.32(a) and are shown in Table I.2. These standards are expressed in terms of kilo-watt hours per year (“kWh/yr”).

TABLE II.2—CURRENT FEDERAL ENERGY CONSERVATION STANDARDS FOR CONSUMER REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	7.99AV + 225.0	0.282av + 225.0.
1A. All-refrigerators—manual defrost	6.79AV + 193.6	0.240av + 193.6.
2. Refrigerator-freezers—partial automatic defrost	7.99AV + 225.0	0.282av + 225.0.
3. Refrigerator-freezers—automatic defrost with top-mounted freezer without an automatic icemaker.	8.07AV + 233.7	0.285av + 233.7.
3-BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer without an automatic icemaker.	9.15AV + 264.9	0.323av + 264.9.
3I. Refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service.	8.07AV + 317.7	0.285av + 317.7.
3I-BI. Built-in refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service.	9.15AV + 348.9	0.323av + 348.9.
3A. All-refrigerators—automatic defrost	7.07AV + 201.6	0.250av + 201.6.
3A-BI. Built-in All-refrigerators—automatic defrost	8.02AV + 228.5	0.283av + 228.5.
4. Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker.	8.51AV + 297.8	0.301av + 297.8.
4-BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker.	10.22AV + 357.4	0.361av + 357.4.
4I. Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service.	8.51AV + 381.8	0.301av + 381.8.
4I-BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service.	10.22AV + 441.4	0.361av + 441.4.
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker.	8.85AV + 317.0	0.312av + 317.0.
5-BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker.	9.40AV + 336.9	0.332av + 336.9.
5I. Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service.	8.85AV + 401.0	0.312av + 401.0.
5I-BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service.	9.40AV + 420.9	0.332av + 420.9.
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	9.25AV + 475.4	0.327av + 475.4.
5A-BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	9.83AV + 499.9	0.347av + 499.9.
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	8.40AV + 385.4	0.297av + 385.4.
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	8.54AV + 432.8	0.302av + 432.8.
7-BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	10.25AV + 502.6	0.362av + 502.6.
8. Upright freezers with manual defrost	5.57AV + 193.7	0.197av + 193.7.
9. Upright freezers with automatic defrost without an automatic icemaker	8.62AV + 228.3	0.305av + 228.3.
9I. Upright freezers with automatic defrost with an automatic icemaker	8.62AV + 312.3	0.305av + 312.3.
9-BI. Built-In Upright freezers with automatic defrost without an automatic icemaker.	9.86AV + 260.9	0.348av + 260.9.
9I-BI. Built-in upright freezers with automatic defrost with an automatic icemaker.	9.86AV + 344.9	0.348av + 344.9.
10. Chest freezers and all other freezers except compact freezers	7.29AV + 107.8	0.257av + 107.8.
10A. Chest freezers with automatic defrost	10.24AV + 148.1	0.362av + 148.1.
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	9.03AV + 252.3	0.319av + 252.3.
11A. Compact all-refrigerators—manual defrost	7.84AV + 219.1	0.277av + 219.1.
12. Compact refrigerator-freezers—partial automatic defrost	5.91AV + 335.8	0.209av + 335.8.
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer	11.80AV + 339.2	0.417av + 339.2.
13I. Compact refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker.	11.80AV + 423.2	0.417av + 423.2.
13A. Compact all-refrigerators—automatic defrost	9.17AV + 259.3	0.324av + 259.3.
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer.	6.82AV + 456.9	0.241av + 456.9.
14I. Compact refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker.	6.82AV + 540.9	0.241av + 540.9.
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer.	11.80AV + 339.2	0.417av + 339.2.
15I. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker.	11.80AV + 423.2	0.417av + 423.2.
16. Compact upright freezers with manual defrost	8.65AV + 225.7	0.306av + 225.7.
17. Compact upright freezers with automatic defrost	10.17AV + 351.9	0.359av + 351.9.

TABLE II.2—CURRENT FEDERAL ENERGY CONSERVATION STANDARDS FOR CONSUMER REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS—Continued

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
18. Compact chest freezers	9.25AV + 136.8	0.327av + 136.8.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of this part.
 av = Total adjusted volume, expressed in Liters.

2. Current Test Procedure

On October 12, 2021, DOE published a test procedure final rule (“October 2021 TP Final Rule”) establishing test procedures for refrigerators, refrigerator-freezers, and freezers, at 10 CFR part 430, subpart B, appendices A (“appendix A”) and B (“appendix B”). 86 FR 56790. The test procedure adopted the latest version of the relevant industry standard published by the Association of Home Appliance Manufacturers (“AHAM”), updated in 2019, AHAM Standard HRF–1, “Energy and Internal Volume of Refrigerating Appliances” (“HRF–1–2019”). 10 CFR 430.3(i)(4). The standard levels proposed in this NOPR are based on the AEU metrics as measured according to appendix A and appendix B.

3. History of Standards Rulemaking for Refrigerators, Refrigerator-Freezers, and Freezers, and Freezers

The National Appliance Energy Conservation Act of 1987 (“NAECA”), Public Law 100–12, amended EPCA to establish prescriptive standards for refrigeration products, with requirements that DOE conduct two cycles of rulemakings to determine whether to amend these standards (42 U.S.C. 6295 (b)(1), (2), (3)(A)(i), and (3)(B)–(C)). DOE completed the first of these rulemaking cycles in 1989 and 1990 by adopting amended performance

standards for all refrigeration products manufactured on or after January 1, 1993. 54 FR 47916 (November 17, 1989); 55 FR 42845 (October 24, 1990). DOE Completed a second rulemaking cycle to amend the standards for refrigeration products by issuing a final rule in 1997, which adopted the current standards for these products. 62 FR 23102 (April 28, 1997).

In 2005, DOE granted a petition, submitted by a coalition of state governments, utility companies, consumer and low-income advocacy groups, and environmental and energy efficiency organizations, requesting a rulemaking to amend the standards for residential refrigerator-freezers. DOE then conducted limited analyses to examine the technological and economic feasibility of amended standards at the ENERGY STAR levels that were in effect for 2005 for the two most popular product classes of refrigerator-freezers. These analyses not only identified potential energy savings, benefits, and burdens from such standards, but also assessed other issues related to them.

DOE initiated a rulemaking and also published a notice announcing the availability of the framework document and a public meeting to discuss the document in September 2008. It also requested public comment on the published document. 73 FR 54089

(September 18, 2008). The framework document described the procedural and analytical approaches that DOE anticipated using to evaluate energy conservation standards for refrigeration products and identified various issues to resolve during the rulemaking. DOE published a final rule on September 15, 2011, to satisfy the statutory requirement that DOE publish a final rule to determine whether to amend the standards for refrigeration products manufactured in 2014. (42 U.S.C. 6295(b)(4)) The limited 2005 analyses served as background for the more extensive analysis conducted for final rule published on September 15, 2011. 76 FR 57516.

4. The Joint Agreement

On September 25, 2023, DOE received the Joint Agreement for various consumer products, including refrigerators, refrigerator-freezers, and freezers, submitted jointly by groups representing manufacturers, energy and environmental advocates, consumer groups, and a utility.⁶ The Joint Agreement recommends amended standard levels for refrigerators, refrigerator-freezers, and freezers as presented in Table II.3. (Joint Agreement, No. 103 at p. 4) Details of the Joint Agreement recommendations for other products are provided in the Joint Agreement posted in the docket.⁷

TABLE II.3—RECOMMENDED AMENDED ENERGY CONSERVATION STANDARDS FOR RESIDENTIAL REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS

Product class	Efficiency level	Level (based on AV (ft ³))	Compliance date
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost. 1A. All-refrigerators—manual defrost. 2. Refrigerator-freezers—partial automatic defrost.	EL 3 (DOE Proposed Level)	6.79AV + 191.3 5.77AV + 164.6. (6.79AV + 191.3)*K2.	January 31, 2030.

⁶ The signatories to the Joint Agreement include 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

manufacture the affected products include: Alliance Laundry Systems, LLC; Asko Appliances AB; Beko US Inc.; Brown Stove Works, Inc.; BSH; Danby Products, Ltd.; Electrolux Home Products, Inc.; Elicamex S.A. de C.V.; Faber; Fotile America; GEA, a Haier Company; L’Atelier Paris Haute Design LLC; LGEUSA; Liebherr USA, Co.; Midea America Corp.; Miele, Inc.; Panasonic Appliances Refrigeration Systems (PAPRSA) Corporation of America; Perlick

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

⁷ The Joint Agreement is available in the docket at: www.regulations.gov/document/EERE-2017-BT-STD-0003-0103.

TABLE II.3—RECOMMENDED AMENDED ENERGY CONSERVATION STANDARDS FOR RESIDENTIAL REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS—Continued

Product class	Efficiency level	Level (based on AV (ft ³))	Compliance date
3. Refrigerator-freezers—automatic defrost with top-mounted freezer.		6.86AV + 198.6 +28l.	
3A. All-refrigerators—automatic defrost.		(6.01AV + 171.4)*K3A.	
4. Refrigerator-freezers—automatic defrost with side-mounted freezer.	EL 3	7.28AV + 254.9	January 31, 2030.
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer.	EL 2 (DOE Proposed Level)	(7.61AV + 272.6)*K5 + 28l	January 31, 2030.
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	EL 2	(7.76AV + 351.9)*K5A	January 31, 2029.
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	EL 3 (DOE Proposed Level)	7.14AV + 280.0	January 31, 2030.
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	EL 3	(7.31AV + 322.5)*K7	January 31, 2030.
8. Upright freezers with manual defrost	No Change (DOE Proposed Level).	5.57AV + 193.7	January 31, 2029.
9. Upright freezers with automatic defrost	EL 2	7.33AV + 194.1 + 28l	January 31, 2030.
10. Chest freezers and all other freezers except compact freezers.	No Change (DOE Proposed Level).	7.29AV + 107.8	January 31, 2029.
10A. Chest freezers with automatic defrost	No Change (DOE Proposed Level).	10.24AV + 148.1	January 31, 2029.
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	EL 2 (DOE Proposed Level)	7.68AV + 214.5	January 31, 2029.
11A. Compact all-refrigerators—manual defrost.		6.66AV + 186.2.	
12. Compact refrigerator-freezers—partial automatic defrost.	10% Savings	(5.32AV + 302.2)*K12	January 31, 2029.
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer.	EL 1 (DOE Proposed Level)	10.62AV + 305.3 + 28l	January 31, 2029.
13A. Compact all-refrigerators—automatic defrost		(8.25AV + 233.4)*K13A.	
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer.		6.14AV + 411.2 + 28l.	
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer.		10.62AV + 305.3 + 28l.	
16. Compact upright freezers with manual defrost	EL 2 (DOE Proposed Level)	7.35AV + 191.8	January 31, 2029.
17. Compact upright freezers with automatic defrost	EL 1 (DOE Proposed Level)	9.15AV + 316.7	January 31, 2029.
18. Compact chest freezers	EL 2 (DOE Proposed Level)	7.86AV + 107.8	January 31, 2029.
3–BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer.	EL 3 (DOE Proposed Level)	8.24AV + 238.4 + 28l	January 31, 2029.
3A–BI. Built-in All-refrigerators—automatic defrost.		(7.22AV + 205.7)*K3ABI.	
4–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer.	EL 4 (DOE Proposed Level)	8.79AV + 307.4 + 28l	January 31, 2029.
5–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer.	EL 1 (DOE Proposed Level)	(8.65AV + 309.9)*K5BI + 28l.	January 31, 2029.
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	EL 3 (DOE Proposed Level)	(8.21AV + 370.7)*K5ABI	January 31, 2029.
7–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer.	EL 4 (DOE Proposed Level)	(8.82AV + 384.1)*K7BI	January 31, 2029.
9–BI. Built-In Upright freezers with automatic defrost	EL 1 (DOE Proposed Level)	9.37AV + 247.9 + 28l	January 31, 2029.
9A–BI. NEW PRODUCT CLASS: Upright built-in freezer w/auto defrost and through-door-ice.	N/A	9.86AV + 288.9	January 31, 2029.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

Av = Total adjusted volume, expressed in Liters.

I = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3A) are as defined below.

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K2	N/A	N/A	1 + 0.02 * (N _d - 1).
K3A	1.10	N/A	N/A.
K3ABI	1.10	N/A	N/A.
K13A	1.10	N/A	N/A.
K4	1.10	1.06	1 + 0.02 * (N _d - 2).
K4BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K5	1.10	1.06	1 + 0.02 * (N _d - 2).
K5BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K5A	1.10	1.06	1 + 0.02 * (N _d - 3).

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K5ABI	1.10	1.06	$1 + 0.02 * (N_d - 3)$.
K7	1.10	1.06	$1 + 0.02 * (N_d - 2)$.
K7BI	1.10	1.06	$1 + 0.02 * (N_d - 2)$.
K9	N/A	N/A	$1 + 0.02 * (N_d - 1)$.
K9BI	N/A	N/A	$1 + 0.02 * (N_d - 1)$.
K12	N/A	N/A	$1 + 0.02 * (N_d - 1)$.

Note: N_d is the number of external doors.

DOE has evaluated the Joint Agreement and believes that it meets the EPCA requirements for issuance of a direct final rule. As a result, DOE published a direct final rule establishing energy conservation standards for refrigerators, refrigerator-freezers, and freezers elsewhere in this issue of the **Federal Register**. If DOE receives adverse comments that may provide a reasonable basis for withdrawal and withdraws the direct final rule, DOE will consider those comments and any other comments received in determining how to proceed with this proposed rule.

For further background information on these proposed standards and the supporting analyses, please see the direct final rule published elsewhere in this issue of the **Federal Register**. That document and the accompanying technical support document (“TSD”) contain an in-depth discussion of the analyses conducted in evaluating the Joint Agreement, the methodologies DOE used in conducting those analyses, and the analytical results.

DOE also notes that it was conducting a rulemaking to consider amending the standards for refrigerators, refrigerator-freezers, and freezers when the Joint Agreement was submitted. As part of that process, DOE published a NOPR and announced a public webinar to respond to initial comments on February 27, 2023 (“February 2023 NOPR”). 88 FR 12452. DOE also held a public webinar on April 11, 2023, to discuss and receive comments on the February 2023 NOPR and NOPR TSD. The NOPR TSD is available at: www.regulations.gov/document/EERE-2017-BT-STD-0003-0045.

III. Proposed Standards

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))

DOE considered the impacts of amended standards for refrigerators, refrigerator-freezers, and freezers at each trial standard level (“TSL”), beginning with the maximum technologically feasible (“max-tech”) level, to determine whether that level was economically justified. Where the max-tech level was not justified, DOE then considered the next most efficient level and undertook the same evaluation until it reached the highest efficiency level that is both technologically feasible and economically justified and saves a significant amount of energy. DOE refers to this process as the “walk-down” analysis.

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

DOE also notes that the economics literature provides a wide-ranging discussion of how consumers trade off upfront costs and energy savings in the absence of government intervention. Much of this literature attempts to explain why consumers appear to undervalue energy efficiency improvements. There is evidence that consumers undervalue future energy savings as a result of (1) a lack of information; (2) a lack of sufficient salience of the long-term or aggregate benefits; (3) a lack of sufficient savings to warrant delaying or altering

purchases; (4) excessive focus on the short term, in the form of inconsistent weighting of future energy cost savings relative to available returns on other investments; (5) computational or other difficulties associated with the evaluation of relevant tradeoffs; and (6) a divergence in incentives (for example, between renters and owners, or builders and purchasers). Having less than perfect foresight and a high degree of uncertainty about the future, consumers may trade off these types of investments at a higher than expected rate between current consumption and uncertain future energy cost savings.

In DOE’s current regulatory analysis, potential changes in the benefits and costs of a regulation due to changes in consumer purchase decisions are included in two ways. First, if consumers forego the purchase of a product in the standards case, this decreases sales for product manufacturers, and the impact on manufacturers attributed to lost revenue is included in the manufacturer impact analysis (“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 TSD⁸ available in the docket for this rulemaking. 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.

While DOE is not prepared at present to provide a fuller quantifiable framework for estimating the benefits

⁸ The TSD is available in the docket for this rulemaking at <https://www.regulations.gov/document/EERE-2017-BT-STD-0003-0046/document>.

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. DOE welcomes comments on how to

more fully assess the potential impact of energy conservation standards on consumer choice and how to quantify this impact in its regulatory analysis in future rulemakings.

A. Benefits and Burdens of TSLs Considered for Refrigerator, Refrigerator-freezer, and Freezer Standards

Table III.1 and Table III.2 summarize the quantitative impacts estimated for each TSL for refrigerators, refrigerator-freezers, and freezers. The national impacts are measured over the lifetime of refrigerators, refrigerator-freezers, and

freezers purchased in the 30-year period that begins in the anticipated year of compliance with amended standards (2027–2056 for all TSLs except TSL 4; for TSL 4, 2029–2058 for the product classes listed in Table III.3 and 2030–2059 for the product classes listed in Table III.4). The energy savings, emissions reductions, and value of emissions reductions refer to full-fuel-cycle (“FFC”) results. The efficiency levels contained in each TSL are described in section V.A of the direct final rule published elsewhere in this issue of the **Federal Register**.

TABLE III.1—SUMMARY OF ANALYTICAL RESULTS FOR REFRIGERATOR, REFRIGERATOR-FREEZER, AND FREEZER TSLs: NATIONAL IMPACTS

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Cumulative FFC National Energy Savings						
Quads	2.76	3.38	4.72	5.61	6.01	9.57
Cumulative FFC Emissions Reduction						
CO ₂ (million metric tons)	50.79	62.34	86.98	100.76	110.76	176.19
CH ₄ (thousand tons)	419.63	514.70	717.90	846.48	914.15	1455.24
N ₂ O (thousand tons)	0.50	0.62	0.87	0.99	1.10	1.75
SO ₂ (thousand tons)	16.00	19.64	27.40	31.57	34.89	55.49
NO _x (thousand tons)	93.17	114.33	159.50	186.11	203.10	323.18
Hg (tons)	0.11	0.13	0.19	0.22	0.24	0.38
Present Value of Benefits and Costs (3% discount rate, billion 2022\$)						
Consumer Operating Cost Savings	19.68	24.06	33.21	36.36	41.23	63.08
Climate Benefits *	2.67	3.29	4.60	5.02	5.87	9.29
Health Benefits **	5.24	6.46	9.03	9.80	11.50	18.24
Total Benefits †	27.60	33.81	46.85	51.18	58.60	90.61
Consumer Incremental Product Costs ‡ ..	3.23	4.64	8.56	9.38	15.43	37.66
Consumer Net Benefits	16.45	19.42	24.65	26.98	25.80	25.42
Total Net Benefits	24.37	29.17	38.29	41.80	43.17	52.96
Present Value of Benefits and Costs (7% discount rate, billion 2022\$)						
Consumer Operating Cost Savings	8.36	10.25	14.17	14.00	17.60	26.88
Climate Benefits *	2.67	3.29	4.60	5.02	5.87	9.29
Health Benefits **	2.04	2.52	3.53	3.45	4.50	7.12
Total Benefits †	13.07	16.06	22.31	22.47	27.97	43.29
Consumer Incremental Product Costs	1.92	2.75	5.00	4.96	8.96	21.65
Consumer Net Benefits	6.44	7.50	9.17	9.04	8.64	5.23
Total Net Benefits	11.15	13.32	17.31	17.51	19.01	21.64

Note: This table presents the costs and benefits associated with refrigerators, refrigerator-freezers, and freezers shipped during the period 2027–2056 for all TSLs except TSL 4; for TSL 4, 2029–2058 for the product classes listed in Table III.3 and 2030–2059 for the product classes listed in Table III.4. These results include consumer, climate, and health benefits that accrue after 2056 from the products shipped during the period 2027–2056 for all TSLs except TSL 4; for TSL 4, 2029–2058 for the product classes listed in Table III.3 and 2030–2059 for the product classes listed in Table III.4.

* Climate benefits are calculated using four different estimates of the four different estimates of the social cost of carbon (SC–CO₂), methane (SC–CH₄), and nitrous oxide (SC–N₂O) (model average at 2.5 percent, 3 percent, and 5 percent discount rates; 95th percentile at 3 percent discount rate). 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; 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 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 Interagency Working Group (“IWG”) on the Social Cost of Greenhouse Gases. See www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

** Health benefits are calculated using benefit-per-ton values for NO_x and SO₂. DOE is currently only monetizing (for NO_x and SO₂) 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. For more details, see section IV.L of the direct final rule published elsewhere in this issue of the **Federal Register**.

† 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.

TABLE III.2—SUMMARY OF ANALYTICAL RESULTS FOR REFRIGERATOR, REFRIGERATOR-FREEZER, AND FREEZER TSLs: MANUFACTURER AND CONSUMER IMPACTS

Category	TSL 1	TSL 2	TSL 3	TSL 4	TSL 5	TSL 6
Manufacturer Impacts						
Industry NPV (<i>million 2022\$</i>) (No-new-standards case INPV = 4,905.8)	4,841.5 to 4,891.4	4,798.5 to 4,870.1	4,387.6 to 4,514.7	4,401.3 to 4,522.3	3,839.9 to 4,061.6	3,080.1 to 3,604.0
Industry NPV (% change)	(1.3) to (0.3)	(2.2) to (0.7)	(10.6) to (8.0)	(10.3) to (7.8)	(21.7) to (17.2)	(37.2) to (26.5)
Consumer Average LCC Savings (2022\$)						
PC 3	30.50	40.14	40.14	50.91	43.46	0.03
PC 5	46.90	46.90	45.47	55.23	45.47	20.22
PC 5Bl	86.19	86.19	86.19	91.13	86.19	(30.73)
PC 5A	127.59	127.59	124.76	133.27	122.18	122.18
PC 7	52.10	70.96	134.10	142.56	73.96	69.71
PC 9	62.02	62.02	62.02	56.17	62.02	26.33
PC 10	5.94	N/A	N/A	N/A	N/A	(8.65)
PC 11A (residential)	0.00	0.00	8.11	8.35	8.11	(4.66)
PC 11A (commercial)	0.00	0.00	3.06	3.16	3.06	(29.11)
PC 17	32.29	32.29	32.29	36.86	32.29	0.26
PC 18	23.82	23.82	22.49	23.55	22.49	(5.34)
Shipment-Weighted Average*	47.08	55.22	63.46	70.88	55.93	27.51
Consumer Simple PBP (years)						
PC 3	1.4	4.2	4.2	4.8	5.3	9.3
PC 5	4.3	4.3	6.1	5.6	6.1	8.6
PC 5Bl	2.4	2.4	2.4	2.1	2.4	8.2
PC 5A	1.9	1.9	4.4	4.1	6.0	6.0
PC 7	0.7	2.9	1.9	1.6	6.2	6.8
PC 9	4.1	4.1	4.1	6.6	4.1	10.7
PC 10	11.2	N/A	N/A	N/A	N/A	13.4
PC 11A (residential)	2.1	2.1	2.1	2.1	2.1	6.0
PC 11A (commercial)	3.3	3.3	3.3	3.2	3.3	9.3
PC 17	4.6	4.6	4.6	4.1	4.6	7.2
PC 18	1.4	1.4	4.2	4.1	4.2	9.4
Shipment-Weighted Average*	3.0	3.6	4.3	4.5	5.4	8.7
Percent of Consumers that Experience a Net Cost						
PC 3	3.9	17.3	17.3	28.3	34.2	67.1
PC 5	18.2	18.2	39.4	33.6	39.4	60.3
PC 5Bl	1.0	1.0	1.0	0.5	1.0	61.0
PC 5A	1.2	1.2	23.0	19.8	39.4	39.4
PC 7	0.0	9.6	1.2	0.5	42.6	48.3
PC 9	12.2	12.2	12.2	39.1	12.2	61.0
PC 10	57.5	N/A	N/A	N/A	N/A	70.0
PC 11A (residential)	0.0	0.0	8.4	8.0	8.4	61.7
PC 11A (commercial)	0.0	0.0	16.1	15.7	16.1	92.7
PC 17	5.6	5.6	5.6	4.5	5.6	61.5
PC 18	0.8	0.8	18.9	17.6	18.9	68.5
Shipment-Weighted Average*	10.2	12.7	20.5	24.4	33.2	60.0

Parenteses indicate negative (–) values. The entry “N/A” means not applicable because there is no change in the standard at certain TSLs.
 * Weighted by shares of each product class in total projected shipments in 2027 for all TSLs except TSL 4; for TSL 4, 2029 for PCs 5Bl, 5A, 10, 11A, 17, and 18, and 2030 for PCs 3, 5, 7, and 9.

DOE first considered TSL 6, which represents the max-tech efficiency levels. At this level, DOE expects that all product classes would require vacuum-insulated panels (“VIPs”) and most would require variable-speed compressor (“VSCs”). For most product classes, this represents the use of VIPs for roughly half the cabinet surface (typically side walls and doors for an upright cabinet), the best-available-efficiency variable-speed compressor, forced-convection heat exchangers with multi-speed brush-less direct current (“BLDC”) fans, variable defrost, and increase in cabinet wall thickness for some classes (e.g., compact refrigerators

and both standard-size and compact chest freezers). DOE estimates that less than 1 percent of annual shipments across all refrigerator, refrigerator-freezer, and freezer product classes currently meet the max-tech efficiencies required. TSL 6 would save an estimated 9.57 quads of energy, an amount DOE considers significant. Under TSL 6, the net present value (“NPV”) of consumer benefit would be \$5.23 billion using a discount rate of 7 percent, and \$25.42 billion using a discount rate of 3 percent. The cumulative emissions reductions at TSL 6 are 176 Mt of CO₂, 55.5 thousand tons of SO₂, 323 thousand

tons of NO_x, 0.38 tons of Hg, 1,455 thousand tons of CH₄, and 1.75 thousand tons of N₂O. The estimated monetary value of the climate benefits from reduced GHG emissions (associated with the average SC–GHG at a 3-percent discount rate) at TSL 6 is \$9.29 billion. The estimated monetary value of the health benefits from reduced SO₂ and NO_x emissions at TSL 6 is \$7.12 billion using a 7-percent discount rate and \$18.24 billion using a 3-percent discount rate. Using a 7-percent discount rate for consumer benefits and costs, health benefits from reduced SO₂ and NO_x emissions, and the 3-percent discount

rate case for climate benefits from reduced GHG emissions, the estimated total NPV at TSL 6 is \$21.64 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 6 is \$52.96 billion. The estimated total NPV is provided for additional information, however DOE primarily relies upon the NPV of consumer benefits when determining whether a standard level is economically justified.

At TSL 6, for the largest product classes, which are 3, 5, 5A, and 7 and together account for approximately 76 percent of annual shipments, there is a life-cycle cost (“LCC”) savings of \$0.03, \$20.22, \$122.18, and \$69.71 and a payback period of 9.3 years, 8.6 years, 6.0 years and 6.8 years, respectively. However, for these product classes, the fraction of customers experiencing a net LCC cost is 67.1 percent, 60.3 percent, 39.4 percent and 48.3 percent with increases in first cost of \$169.37, \$151.75, \$161.65, and \$153.01, respectively. Overall, a majority of refrigerators, refrigerator-freezers, and freezers consumers (60 percent) would experience a net cost and the average LCC savings would be negative for PC 5BI, PC 10, PC 11A, and PC 18. Additionally, 35 percent of low-income households with a side-by-side refrigerator-freezer (represented by PC 7 and used by 19 percent of low-income households) would experience a net cost.

At TSL 6, the projected change in industry net present value (“INPV”) ranges from a decrease of \$1.83 billion to a decrease of \$1.30 billion, which corresponds to decreases of 37.2 percent and 26.5 percent, respectively. Industry conversion costs could reach \$2.39 billion as manufacturers work to redesign their portfolio of model offerings and re-tool entire factories to comply with amended standards at TSL 6.

DOE estimates that less than 1 percent of refrigerator, refrigerator-freezer, and freezer current annual shipments meet the max-tech levels. At TSL 6, only a few manufacturers offer any standard-size products that meet the efficiencies required. For PC 3, which accounts for approximately 25 percent of annual shipments, no original equipment manufacturers (“OEMs”) currently offer products that meet the efficiency level required. For PC 5, which accounts for approximately 21 percent of annual shipments, DOE estimates that seven out of 22 OEMs currently offer products that meet the efficiency level required. For PC 7, which accounts for approximately 11 percent of annual shipments, only one out of 11 OEMs

currently offers products that meet the efficiency level required.

At max-tech, manufacturers would likely need to implement all the most efficient design options in the engineering analysis. In interviews, manufacturer indicated they would redesign all product platforms and dramatically update manufacturing facilities to meet max-tech for all approximately 17.0 million annual shipments of refrigerators, refrigerator-freezers, and freezers.⁹

In particular, increased incorporation of VIPs could increase the expense of adapting manufacturing plants. As discussed in section IV.J.2.c of the direct final rule published elsewhere in this issue of the **Federal Register**, DOE expects manufacturers would likely adopt VIP technology to improve thermal insulation while minimizing loss to the interior volume for their products. Extensive incorporation of VIPs requires significant capital expenditures due to the need for more careful product handling and conveyor, increased warehousing requirements, investments in tooling necessary for the VIP installation process, and adding production line capacity to compensate for more time-intensive manufacturing associated with VIPs. Manufacturers with facilities that have limited space and few options to expand may consider greenfield projects. In interviews, several manufacturers expressed concerns about their ability to produce sufficient quantities of refrigerators, refrigerator-freezers, and freezers at max-tech given the required scale of investment, redesign effort, and 3-year compliance timeline.

The Secretary tentatively concludes that at TSL 6 for refrigerators, refrigerator-freezers, and freezers, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the emissions reductions would be outweighed by the economic burden on many consumers, and the impacts on manufacturers, including the large potential reduction in INPV and the lack of manufacturers currently offering products meeting the efficiency levels required at this TSL. At TSL 6, a majority of refrigerator, refrigerator-freezer, and freezers consumers (60 percent) would experience a net cost and the average LCC savings would be negative for PC 5BI, PC 10, PC 11A, and PC 18. Additionally, manufacturers would need to make significant upfront investments to update product lines and manufacturing facilities. Manufacturers

⁹ Current shipments calculations relied on shipments in the year 2023.

expressed concern that they would not be able to complete product and production line updates within the 3-year conversion period. Consequently, the Secretary has tentatively concluded that TSL 6 is not economically justified.

DOE then considered TSL 5 for refrigerators, refrigerator-freezers, and freezers. For classes other than refrigerator-freezers with bottom-mounted freezers and through-the-door ice service (PC 5A), this TSL represents efficiency levels less than max-tech. TSL 5 represents similar design options as max-tech, but generally incorporates the use of high-efficiency compressors (single speed compressors or VSCs) rather than maximum efficiency VSCs, incorporates VIPs in fewer product classes, and incorporates less VIP surface area for the product classes requiring the use of VIPs as compared to TSL 6. TSL 5 would save an estimated 6.01 quads of energy, an amount DOE considers significant. Under TSL 5, the NPV of consumer benefit would be \$8.64 billion using a discount rate of 7 percent, and \$25.80 billion using a discount rate of 3 percent.

The cumulative emissions reductions at TSL 5 are 111 Mt of CO₂, 34.9 thousand tons of SO₂, 203 thousand tons of NO_x, 0.24 tons of Hg, 914 thousand tons of CH₄, and 1.10 thousand tons of N₂O. The estimated monetary value of the climate benefits from reduced GHG emissions (associated with the average SC-GHG at a 3-percent discount rate) at TSL 5 is \$5.87 billion. The estimated monetary value of the health benefits from reduced SO₂ and NO_x emissions at TSL 5 is \$4.50 billion using a 7-percent discount rate and \$11.50 billion using a 3-percent discount rate.

Using a 7-percent discount rate for consumer benefits and costs, health benefits from reduced SO₂ and NO_x emissions, and the 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated total NPV at TSL 5 is \$19.01 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at TSL 5 is \$43.17 billion. The estimated total NPV is provided for additional information, however DOE primarily relies upon the NPV of consumer benefits when determining whether a standard level is economically justified.

At TSL 5, for the largest product classes, which are 3, 5, 5A, and 7, there is a life-cycle cost savings of \$43.46, \$45.47, \$122.18, and \$73.96 and a payback period of 5.3 years, 6.1 years, 6.0 years and 6.2 years, respectively. For these product classes, the fraction of

customers experiencing a net LCC cost is 34.2 percent, 39.4 percent, 39.4 percent and 42.6 percent with increases in first cost of \$52.69, \$69.25, \$161.65, and \$121.58, respectively. Overall, 33 percent of refrigerators, refrigerator-freezers, and freezers consumers would experience a net cost and the average LCC savings are positive for all product classes.

At TSL 5, an estimated 16 percent of all low-income households experience a net cost, including 11 percent of low-income households with a top-mount or single-door refrigerator-freezer (represented by PC 3 and used by 72 percent of low-income households) and 32 percent of low-income households with a side-by-side refrigerator-freezer (represented by PC 7 and used by 19 percent of low-income households). More than half of low-income PC 7 consumers with a net cost experience a net cost of at least \$40 and while low-income PC 7 consumers experience an average LCC savings of \$132.77 at TSL 5, there are larger average LCC savings at TSL 4 (\$161.87) and substantially fewer low-income PC 7 consumers would experience a net cost (0.6 percent) at that TSL. Further, the incremental increase in purchase price at TSL 5 for PC 7 is \$121.58, which may be difficult for low-income homeowners to afford.

At TSL 5, the projected change in INPV ranges from a decrease of \$1.07 billion to a decrease of \$844.2 million, which corresponds to decreases of 21.7 percent and 17.2 percent, respectively. DOE estimates that industry must invest \$1.40 billion to comply with standards set at TSL 5.

DOE estimates that approximately 14 percent of refrigerator, refrigerator-freezer, and freezer annual shipments meet the TSL 5 efficiencies. For standard-size refrigerator-freezers, which account for approximately 70 percent of total annual shipments, approximately 1 percent of shipments meet the efficiencies required at TSL 5. Compared to max-tech, more manufacturers offer standard-size refrigerator-freezer products that meet the required efficiencies, however, many manufacturers do not offer products that meet this level. Of the 22 OEMs offering PC 3 products, three OEMs offer models that meet the efficiency level required. Of the 22 OEMs offering PC 5 products, 14 OEMs offer models that meet the efficiency level required. Of the 11 OEMs offering PC 7 products, only one OEM offers models that meet the efficiency level required.

The manufacturers that do not currently offer models that meet TSL 5

efficiencies would need to develop new product platforms. Updates could include incorporating variable defrost, BLDC evaporator fan motors, and high-efficiency VSCs. Additionally, some product classes could require the use of VIPs. DOE expects manufacturers would likely need to incorporate some VIPs into PC 5 and PC 7 designs, but not to the extent required at max-tech. However, DOE expects manufacturers would need to incorporate the max-tech design options for PC 5A, which includes the use of VIPs for roughly half the cabinet surface (side walls and doors) to meet TSL 5 efficiencies. As discussed in section IV.J.2.c of the direct final rule published elsewhere in this issue of the **Federal Register**, the inclusion of VIPs in product design necessitates large investments in tooling and significant changes to production plants. Furthermore, given that only 1 percent of current standard-size refrigerator-freezer shipments meet TSL 5 efficiency levels, the manufacturers that are currently able to meet TSL 5 would need to scale up manufacturing capacity of compliant models. DOE anticipates conversion costs as high as \$1.40 billion because the majority of product platforms in the industry would require redesign and investment.

The Secretary tentatively concludes that at TSL 5 for refrigerators, refrigerator-freezers, and freezers, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the emissions reductions would be outweighed by the economic burden on consumers, particularly low-income consumers of side-by-side refrigerator-freezers, and the impacts on manufacturers, including the large potential reduction in INPV and the lack of manufacturers currently offering standard-size refrigerator-freezer products meeting the efficiency levels required at this TSL. Specifically, only one OEM currently offers any PC 7 models that meet the TSL 5 efficiencies. At TSL 5, 32 percent of low-income PC 7 consumers would experience a net cost and the incremental increase in purchase price of \$121.58 may be difficult for low-income homeowners to afford. Consequently, the Secretary has tentatively concluded that TSL 5 is not economically justified.

DOE then considered the TSL 4 which corresponds to the TSL recommended in the Joint Agreement (the "Recommended TSL"). For representative product classes other than PC 5A, PC 7, and PC 9, this TSL represents the same efficiency levels as

TSL 5.¹⁰ Thus, the Recommended TSL represents similar design options as TSL 5, except for PC 5A, PC 7, and PC 9. For PC 7, DOE expects manufacturers would not require the use of VIPs to meet the required efficiency level. For PC 5A, DOE expects manufacturers would require less VIP surface area to meet the required efficiency level. For PC 9, DOE expects manufacturers to implement variable speed compressor systems to meet required standards. DOE estimates that approximately 14 percent of annual shipments across all refrigerator, refrigerator-freezer, and freezer product classes currently meet the efficiencies required. For the Recommended TSL, DOE's analysis utilized the January 31, 2029 (or January 31, 2030, for some product classes) compliance dates specified in the Joint Agreement. The Recommended TSL would save an estimated 5.61 quads of energy, an amount DOE considers significant. Under the Recommended TSL, the NPV of consumer benefit would be \$9.04 billion using a discount rate of 7 percent, and \$26.98 billion using a discount rate of 3 percent.

The cumulative emissions reductions at the Recommended TSL are 101 Mt of CO₂, 31.6 thousand tons of SO₂, 186 thousand tons of NO_x, 0.22 tons of Hg, 846.5 thousand tons of CH₄, and 0.99 thousand tons of N₂O. 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 \$5.02 billion. The estimated monetary value of the health benefits from reduced SO₂ and NO_x emissions at the Recommended TSL is \$3.45 billion using a 7-percent discount rate and \$9.80 billion using a 3-percent discount rate.

Using a 7-percent discount rate for consumer benefits and costs, health benefits from reduced SO₂ 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 \$17.51 billion. Using a 3-percent discount rate for all benefits and costs, the estimated total NPV at the

¹⁰ For all TSLs except the Recommended TSL, the efficiency levels required for non-representative product classes are the same as the efficiency levels required for the associated directly analyzed product classes. However, as noted in section V.A of this document, the Recommended TSL from the Joint Agreement includes standard levels for some non-representative product classes that differ from their associated representative product class. Thus, in addition to the representative PC 5A, PC 7, and PC 9, the efficiency levels required for non-representative PC 9A-BI and PC 12 at the Recommended TSL also differ from the efficiency levels required at TSL 5.

Recommended TSL is \$41.80 billion. The estimated total NPV is provided for additional information, however DOE primarily relies upon the NPV of consumer benefits when determining whether a standard level is economically justified.

At the Recommended TSL, for the largest product classes, which are 3, 5, 5A, and 7, there is a life-cycle cost savings of \$50.91, \$55.23, \$133.27, and \$142.56 and a payback period of 4.8 years, 5.6 years, 4.1 years and 1.6 years, respectively. For these product classes, the fraction of customers experiencing a net LCC cost is 28.3 percent, 33.6 percent, 19.8 percent and 0.5 percent with increases in first cost of \$47.67, \$62.72, \$81.32, and \$24.39, respectively. Overall, 24.4 percent of refrigerators, refrigerator-freezers, and freezers consumers would experience a net cost and the average LCC savings are positive for all product classes.

At the Recommended TSL, 9 percent of low-income households with a top-mount or single-door refrigerator-freezer (represented by PC 3 and used by 72 percent of low-income households) and 0.6 percent of low-income households with a side-by-side refrigerator-freezer (represented by PC 7 and used by 19 percent of low-income households) experience a net cost. Additionally, the incremental increase in purchase price is \$24.39 for low-income PC 7 homeowners at the Recommended TSL, substantially lower than the incremental increase in purchase price of \$121.58 at TSL 5.

At the Recommended TSL, the projected change in INPV ranges from a decrease of \$504.4 million to a decrease of \$383.5 million, which correspond to decreases of 10.3 percent and 7.8 percent, respectively. DOE estimates that industry must invest \$830.3 million comply with standards set at the Recommended TSL. DOE estimates that approximately 14 percent of refrigerator, refrigerator-freezer, and freezer annual shipments meet the Recommended TSL efficiencies.

Compared to TSL 5, more manufacturers offer standard-size refrigerator freezer products that meet the required efficiencies since PC 7 has a lower required efficiency level at the Recommended TSL. For PC 7, which accounts for 11 percent of shipments, three OEMs offer products that meet the efficiency level required. Furthermore, DOE does not expect manufacturers would need to incorporate VIPs into PC 7 designs to meet the efficiencies required at the Recommended TSL. For PC 5 and PC 5A, DOE understands the two product classes often share the same production lines, with shared

cabinet architecture and tooling. DOE expects manufacturers would likely need to incorporate some VIPs into PC 5A designs, but not to the extent required at TSL 5 and TSL 6. Thus, for the 10 OEMs that manufacture both PC 5 and PC 5A, DOE expects manufacturers could implement similar cabinet upgrades (*i.e.*, partial VIP) for PC 5 and PC 5A designs to achieve the efficiencies required at this level.

For all TSLs considered in this proposed 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 amended standards required in 2027). For the Recommended TSL, DOE's analysis utilized the January 31, 2029 (or January 31, 2030, for some product classes) compliance dates specified in the Joint Agreement as they were an integral part of the multi-product joint recommendation. These compliance dates provide manufacturers the flexibility to spread capital requirements, engineering resources, and other 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 suppliers of components that improve efficiency. DOE believes the Recommended TSL mitigates risks raised by AHAM and multiple manufacturers in response to the February 2023 NOPR regarding the ability for VSC and VIP component suppliers to increase supply of these key components in the 3-year lead time required by EPCA.

After considering the analysis and weighing the benefits and burdens, the Secretary has tentatively concluded that a standard set at the Recommended TSL for refrigerators, refrigerator-freezers, and freezers is economically justified. At this TSL, the average LCC savings are positive for all product classes for which an amended standard is considered. An estimated 24.4 percent of all refrigerator, refrigerator-freezer, and freezer consumers experience a net cost. An estimated 9 percent of low-income households with a top-mount or single-door refrigerator-freezer (represented by PC 3 and used by 72 percent of low-income households) and 0.6 percent of low-income households with a side-by-side refrigerator-freezer (represented by PC 7 and used by 19 percent of low-income households), experience a net cost, which is a significantly lower percentage than under TSL 5. DOE notes that for low-income PC 7 consumers, as well as across all PC 7 consumers, the

Recommended TSL represents the largest average LCC savings of any TSL. The FFC national energy savings are significant and the NPV of consumer benefits is positive at the Recommended TSL 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 17 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 \$5.02 billion in climate benefits (associated with the average SC-GHG at a 3-percent discount rate), and \$9.80 billion (using a 3-percent discount rate) or \$3.45 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. DOE notes 72 percent of low-income households have a top-mount refrigerator-freezer (represented by PC 3) and that an estimated 9 percent of low-income PC 3 households experience a net cost at the Recommended TSL, whereas an estimated 6 percent of low-income households with a top-mount refrigerator-freezer experience a net cost at TSL 3. However, the average LCC savings for low-income PC 3 consumers are \$22.05 higher at the Recommended TSL than at TSL 3. Further, compared to TSL 3, it is estimated that the Recommended TSL would result in additional FFC national energy savings of 0.9 quads. These additional savings and benefits at the Recommended TSL are significant. DOE considers the impacts to be, as a whole, economically justified at the Recommended TSL.

Although DOE considered amended standard levels for refrigerators, refrigerator-freezers, and freezers by grouping the efficiency levels for each product class into TSLs, DOE evaluates all analyzed efficiency levels in its analysis. In general, the standard level represents the maximum energy savings that does not result in a large percentage of consumers experiencing a net LCC cost. For example, for PC 5, more than half of consumers experience a net cost at EL 3. In the case of PC 7, for which DOE found that a relatively higher percentage of low-income consumers

may experience net costs at higher efficiency levels, at the standard level chosen, 0.6 percent of low-income households with side-by-side refrigerator-freezers will experience a potential burden. The ELs at the standard level result in positive LCC savings for all product classes, significantly reduce the number of consumers experiencing a net cost, and reduce the decrease in INPV and conversion costs to the point where DOE has tentatively concluded they are economically justified, as discussed for the Recommended TSL in the preceding paragraphs.

Therefore, based on the previous considerations, DOE proposes to adopt the energy conservation standards for refrigerators, refrigerator-freezers, and freezers at the Recommended TSL.

The Recommended TSL for refrigerators, refrigerator-freezers, and freezers proposed in this NOPR is part of a multi-product Joint Agreement covering six rulemakings (refrigerators, refrigerator-freezers, and freezers; miscellaneous refrigeration products; conventional cooking products; residential clothes washers; consumer clothes dryers; and dishwashers). 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 the direct final rule published elsewhere in this issue of the **Federal Register**, many refrigerator, refrigerator-freezer, and freezer OEMs also manufacture miscellaneous refrigeration products, conventional cooking products, residential clothes washers, consumer clothes dryers, and dishwashers. Rather than requiring compliance with five amended standards in a single year (2027),¹¹ 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 NOPR, AHAM and individual manufacturers expressed concerns about the timing of ongoing home appliance rulemakings. Specifically, AHAM commented that the combination of the stringency of DOE’s proposals, the short lead-in time required under EPCA to comply with standards, and the overlapping timeframe of multiple standards affecting the same manufacturers represents significant cumulative regulatory burden for the home

appliance industry. (AHAM, No. 69 at pp. 20–21) AHAM has submitted similar comments to other ongoing consumer product rulemakings.¹² 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 amended standards, about the need to align compliance dates for products that are typically designed or sold as matched pairs, and about the ability of their suppliers to ramp up production of key components. The Joint Agreement also provides additional years of regulatory certainty for manufacturers and their suppliers while still achieving the maximum improvement in energy efficiency that is technologically feasible and economically justified.

The proposed energy conservation standards for refrigerators, refrigerator-freezers, and freezers, which are expressed in kWh/yr, are shown in Table III.3 and Table III.4.

TABLE III.3—PROPOSED AMENDED ENERGY CONSERVATION STANDARDS FOR REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS
[Compliance starting January 31, 2029]

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
3–BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer	8.24AV + 238.4 + 28I	0.291av + 238.4 + 28I.
3A–BI. Built-in All-refrigerators—automatic defrost	(7.22AV + 205.7)*K3ABI	(0.255av + 205.7)*K3ABI.
4–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer	(8.79AV + 307.4)*K4BI + 28I	(0.310av + 307.4)*K4BI + 28I.
5–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer.	(8.65AV + 309.9)*K5BI + 28I	(0.305av + 309.9)*K5BI + 28I.
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	(7.76AV + 351.9)*K5A	(0.274av + 351.9)*K5A.
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	(8.21AV + 370.7)*K5ABI	(0.290av + 370.7)*K5ABI.
7–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer	(8.82AV + 384.1)*K7BI	(0.311av + 384.1)*K7BI.
8. Upright freezers with manual defrost	5.57AV + 193.7	0.197av + 193.7.
9–BI. Built-In Upright freezers with automatic defrost	(9.37AV + 247.9)*K9BI + 28I	(0.331av + 247.9)*K9BI + 28I.
9A–BI. Built-In Upright freezers with automatic defrost with through-the-door ice service.	9.86AV + 288.9	0.348av + 288.9.
10. Chest freezers and all other freezers except compact freezers	7.29AV + 107.8	0.257av + 107.8.
10A. Chest freezers with automatic defrost	10.24AV + 148.1	0.362av + 148.1.
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	7.68AV + 214.5	0.271av + 214.5.
11A. Compact all-refrigerators—manual defrost	6.66AV + 186.2	0.235av + 186.2.
12. Compact refrigerator-freezers—partial automatic defrost	(5.32AV + 302.2)*K12	(0.188av + 302.2)*K12.

¹¹ The refrigerators, refrigerator-freezers, and freezers (88 FR 12452); consumer conventional cooking products (88 FR 6818); residential clothes washers (88 FR 13520); consumer clothes dryers (87 FR 51734); and dishwashers (88 FR 32514) 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.

¹² AHAM has submitted written comments regarding cumulative regulatory burden for the other five rulemakings included in the multi-product Joint Agreement. AHAM’s written comments on cumulative regulatory burden are available at: www.regulations.gov/comment/EERE-2020-BT-STD-0039-0031 (pp. 12–15) for miscellaneous refrigeration products; www.regulations.gov/comment/EERE-2014-BT-STD-0005-2285 (pp. 44–27) for consumer conventional cooking products; www.regulations.gov/comment/EERE-2017-BT-STD-0014-0464 (pp. 40–44) for residential clothes washers; www.regulations.gov/comment/EERE-2014-BT-STD-0058-0046 (pp. 12–13) for consumer clothes dryers; and www.regulations.gov/comment/EERE-2019-BT-STD-0039-0051 (pp. 21–24) for dishwashers.

¹³ AHAM has submitted written comments regarding cumulative regulatory burden for the other five rulemakings included in the multi-product Joint Agreement. AHAM’s written comments on cumulative regulatory burden are available at: www.regulations.gov/comment/EERE-2020-BT-STD-0039-0031 (pp. 12–15) for miscellaneous refrigeration products; www.regulations.gov/comment/EERE-2014-BT-STD-0005-2285 (pp. 44–27) for consumer conventional cooking products; www.regulations.gov/comment/EERE-2017-BT-STD-0014-0464 (pp. 40–44) for residential clothes washers; www.regulations.gov/comment/EERE-2014-BT-STD-0058-0046 (pp. 12–13) for consumer clothes dryers; and www.regulations.gov/comment/EERE-2019-BT-STD-0039-0051 (pp. 21–24) for dishwashers.

TABLE III.3—PROPOSED AMENDED ENERGY CONSERVATION STANDARDS FOR REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS—Continued
[Compliance starting January 31, 2029]

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer ..	10.62AV + 305.3 + 28l	0.375av + 305.3 + 28l.
13A. Compact all-refrigerators—automatic defrost	(8.25AV + 233.4)*K13A	(0.291av + 233.4)*K13A.
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer	6.14AV + 411.2 + 28l	0.217av + 411.2 + 28l.
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer.	10.62AV + 305.3 + 28l	0.375av + 305.3 + 28l.
16. Compact upright freezers with manual defrost	7.35AV + 191.8	0.260av + 191.8.
17. Compact upright freezers with automatic defrost	9.15AV + 316.7	0.323av + 316.7.
18. Compact chest freezers	7.86AV + 107.8	0.278av + 107.8.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

av = Total adjusted volume, expressed in Liters.

l = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3ABI) are as defined in the following table.

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K3ABI	1.10	1.0	1.0.
K4BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K5BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K5A	1.10	1.06	1 + 0.02 * (N _d - 3).
K5ABI	1.10	1.06	1 + 0.02 * (N _d - 3).
K7BI	1.10	1.06	1 + 0.02 * (N _d - 2).
K9BI	1.0	1.0	1 + 0.02 * (N _d - 1).
K12	1.0	1.0	1 + 0.02 * (N _d - 1).
K13A	1.10	1.0	1.0.

Notes:

¹ N_d is the number of external doors.

² The maximum N_d values are 3 for K9BI, and 5 for all other K values.

TABLE III.4—PROPOSED AMENDED ENERGY CONSERVATION STANDARDS FOR REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS
[Compliance starting January 31, 2030]

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	6.79AV + 191.3	0.240av + 191.3.
1A. All-refrigerators—manual defrost	5.77AV + 164.6	0.204av + 164.6.
2. Refrigerator-freezers—partial automatic defrost	(6.79AV + 191.3)*K2	(0.240av + 191.3)*K2.
3. Refrigerator-freezers—automatic defrost with top-mounted freezer	6.86AV + 198.6 + 28l	0.242av + 198.6 + 28l.
3A. All-refrigerators—automatic defrost	(6.01AV + 171.4)*K3A	(0.212av + 171.4)*K3A.
4. Refrigerator-freezers—automatic defrost with side-mounted freezer	(7.28AV + 254.9)*K4 + 28l ...	(0.257av + 254.9)*K4 + 28l.
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer	(7.61AV + 272.6)*K5 + 28l ...	(0.269av + 272.6)*K5 + 28l.
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	7.14AV + 280.0	0.252av + 280.0.
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	(7.31AV + 322.5)*K7	(0.258av + 322.5)*K7.
9. Upright freezers with automatic defrost	(7.33AV + 194.1)*K9 + 28l ...	(0.259av + 194.1)*K9 + 28l.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

av = Total adjusted volume, expressed in Liters.

l = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3A) are as defined in the following table.

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K2	1.0	1.0	1 + 0.02 * (N _d - 1).
K3A	1.10	1.0	1.0.
K4	1.10	1.06	1 + 0.02 * (N _d - 2).
K5	1.10	1.06	1 + 0.02 * (N _d - 2).
K7	1.10	1.06	1 + 0.02 * (N _d - 2).
K9	1.0	1.0	1 + 0.02 * (N _d - 1).

Notes:

¹ N_d is the number of external doors.

² The maximum N_d values are 2 for K2, and 5 for all other K values.

B. Annualized Benefits and Costs of the Proposed Standards

The benefits and costs of the proposed standards can also be expressed in terms of annualized values. The annualized net benefit is (1) the annualized national economic value (expressed in 2022\$) of the benefits from operating products that meet the proposed standards (consisting primarily of operating cost savings from using less energy), minus increases in product purchase costs, and (2) the annualized monetary value of the climate and health benefits from emission reductions.

Table III.5 shows the annualized values for refrigerators, refrigerator-freezers, and freezers 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 health benefits from reduced NO_x and SO₂ emissions, and the 3-percent discount rate case for climate benefits from reduced GHG emissions, the estimated cost of the proposed standards is \$590.5 million per year in increased equipment costs, while the estimated annual monetized benefits are \$1.7 billion in

reduced equipment operating costs, \$303.8 million in climate benefits, and \$410.6 million in health benefits. In this case, the net benefit would amount to \$1.8 billion per year.

Using a 3-percent discount rate for all benefits and costs, the estimated cost of the proposed standards is \$567.5 million per year in increased equipment costs, while the estimated annual monetized benefits are \$2.2 billion in reduced operating costs, \$303.8 million in climate benefits, and \$592.9 million in health benefits. In this case, the net benefit would amount to \$2.5 billion per year.

TABLE III.5—ANNUALIZED BENEFITS AND COSTS OF PROPOSED STANDARDS FOR REFRIGERATORS, REFRIGERATOR-FREEZERS, AND FREEZERS

	Million 2022\$/year		
	Primary estimate	Low-net-benefits estimate	High-net-benefits estimate
3% discount rate			
Consumer Operating Cost Savings	2,200.5	2,023.9	2,326.6
Climate Benefits *	303.8	291.8	307.9
Health Benefits **	592.9	569.7	600.7
Total Benefits †	3,097.2	2,885.4	3,235.2
Consumer Incremental Product Costs ‡	567.5	666.6	547.8
Net Benefits	2,529.6	2,218.8	2,687.4
Change in Producer Cashflow (INPV ‡‡)	(49) to (37)	(49) to (37)	(49) to (37)
7% discount rate			
Consumer Operating Cost Savings	1,667.0	1,541.9	1,758.5
Climate Benefits * (3% discount rate)	303.8	291.8	307.9
Health Benefits **	410.6	395.8	415.7
Total Benefits †	2,381.4	2,229.5	2,482.0
Consumer Incremental Product Costs	590.5	677.9	569.6
Net Benefits	1,790.9	1,551.6	1,912.5
Change in Producer Cashflow (INPV ‡‡)	(49) to (37)	(49) to (37)	(49) to (37)

Note: This table presents the costs and benefits associated with refrigerators, refrigerator-freezers, and freezers shipped during the period 2029–2058 for the product classes listed in Table III.3 and shipped in 2030–2059 for the product classes listed in Table III.4. These results include benefits which accrue after 2058/9 from the products shipped in 2029–2058 for the product classes listed in Table III.3 and shipped in 2030–2059 for the product classes listed in Table III.4. 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 V.H.3 of the direct final rule published elsewhere in this issue of the **Federal Register**. Note that the Benefits and Costs may not sum to the Net Benefits due to rounding.

* Climate benefits are calculated using four different estimates of the SC-CO₂, SC-CH₄ and SC-N₂O. 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 SO₂. DOE is currently only monetizing (for SO₂ 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 the direct final rule published elsewhere in this issue of the **Federal Register** 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.

‡ 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 the direct final rule published elsewhere in this issue of the **Federal Register**. 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 the direct final rule published elsewhere in this issue of the **Federal Register**. In the detailed MIA, DOE models manufacturers' pricing decisions based on assumptions regarding investments, conversion costs, cashflow, 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 refrigerators, refrigerator-freezers, and freezers, the annualized change in INPV ranges from -\$48.7 million to -\$37.0 million. DOE accounts for that range of likely impacts in analyzing whether a trial standard level is economically justified. See section V.C of the direct final rule published elsewhere in this issue of the **Federal Register**. DOE is presenting the range of impacts to the INPV under two manufacturer 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 annual change in INPV in the above table, drawing on the MIA explained further in section IV.J of the direct final rule published elsewhere in this issue of the **Federal Register** to provide additional context for assessing the estimated impacts of this proposal 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 proposed rule, the annualized net benefits would range from \$2,480.9 million to \$2,492.6 million at 3-percent discount rate and would range from \$1,742.2 million to \$1,753.9 million at 7-percent discount rate.

IV. Public Participation

A. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule until the date provided in the **DATES** section at the beginning of this proposed rule. Interested parties may submit comments, data, and other information using any of the methods described in the **ADDRESSES** section at the beginning of this document. Comments relating to the direct final rule published elsewhere in this issue of the **Federal Register**, should be submitted as instructed therein.

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

However, your contact information will be publicly viewable if you include it in the comment itself or in any documents attached to your comment. Any information that you do not want

to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Otherwise, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

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

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

Submitting comments via email, hand delivery/courier, or postal mail. Comments and documents submitted via email, hand delivery/courier, or postal mail also will be posted to

www.regulations.gov. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information in a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

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

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

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

reduces comment processing and posting time.

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

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

B. Public Meeting

As stated previously, if DOE withdraws the direct final rule published elsewhere in this issue of the **Federal Register** pursuant to 42 U.S.C. 6295(p)(4)(C), DOE will hold a public meeting to allow for additional comment on this proposed rule. DOE will publish notice of any meeting in the **Federal Register**.

V. Procedural Issues and Regulatory Review

The regulatory reviews conducted for this proposed rule are identical to those conducted for the direct final rule published elsewhere in this issue of the **Federal Register**. Please see the direct final rule for further details.

A. 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 has prepared the following IRFA for the products that are the subject of this proposed rulemaking.

For manufacturers of refrigerators, refrigerator-freezers, and freezers, the Small Business Administration (“SBA”) has set a size threshold, which defines those entities classified as “small businesses” for the purposes of the statute. DOE used the SBA’s small business size standards to determine whether any small entities would be subject to the requirements of the rule. (See 13 CFR part 121.) The size standards are listed by North American Industry Classification System (“NAICS”) code and industry description and are available at www.sba.gov/document/support-table-size-standards. Manufacturing of refrigerators, refrigerator-freezers, and freezers is classified under NAICS 335220, “Major Household Appliance Manufacturing.” The SBA sets a threshold of 1,500 employees or fewer for an entity to be considered as a small business for this category.

1. Description of Reasons Why Action Is Being Considered

DOE is proposing amended energy conservation standards for refrigerators, refrigerator-freezers, and freezers. EPCA prescribed energy conservation standards for these products (42 U.S.C. 6295(b)(1)–(2)), and directed DOE to conduct three cycles of future rulemakings to whether to amend these standards. (42 U.S.C. 6295(b)(3)(A)(i), (b)(3)(B), and (b)(4)). DOE has completed these rulemakings. 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))

Pursuant to EPCA, any new or amended energy conservation standard must be designed to achieve the maximum improvement in energy efficiency that DOE determines is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) Furthermore, the new or amended standard must result in significant conservation of energy. (42 U.S.C. 6295(o)(3)(B))

In light of the above and the requirements under 42 U.S.C. 6295(p)(4)(A)–(B), DOE is issuing this NOPR proposing energy conservation standards for refrigerators, refrigerator-

freezers, and freezers. These standard levels were submitted jointly to DOE on September 25, 2023, by groups representing manufacturers, energy and environmental advocates, consumer groups, and a utility.¹³ This letter, titled “Energy Efficiency Agreement of 2023” (hereafter, the “Joint Agreement”¹⁴), recommends specific energy conservation standards for refrigerators, refrigerator-freezers, and freezers that, in the commenters’ view, would satisfy the EPCA requirements in 42 U.S.C. 6295(o).

2. Objectives of, and Legal Basis for, Rule

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 refrigerators, refrigerator-freezers, and freezers, the subject of this document. (42 U.S.C. 6292(a)(1)) EPCA prescribed energy conservation standards for these products (42 U.S.C. 6295(b)(1)–(2)), and directed DOE to conduct three cycles of future rulemakings to whether to amend these standards. (42 U.S.C. 6295(b)(3)(A)(i), (b)(3)(B), and (b)(4)). DOE has completed these rulemakings. 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))

¹³ The signatories to the Joint Agreement include 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 manufacture the affected products include: Alliance Laundry Systems, LLC; Asko Appliances AB; Beko US Inc.; Brown Stove Works, Inc.; BSH; Danby Products, Ltd.; Electrolux Home Products, Inc.; Elicamex S.A. de C.V.; Faber; Fotile America; GEA, a Haier Company; L’Atelier Paris Haute Design LLC; LGEUSA; Liebherr USA, Co.; Midea America Corp.; Miele, Inc.; Panasonic Appliances Refrigeration Systems (PAPRSA) Corporation of America; Perlick Corporation; Samsung; Sharp Electronics Corporation; Smeg S.p.A.; Sub-Zero Group, Inc.; The Middleby Corporation; U-Line Corporation; Viking Range, LLC; and Whirlpool.

¹⁴ This document is available in the docket at: www.regulations.gov/document/EERE-2017-BT-STD-0003-0103.

3. Description and Estimated Number of Small Entities Regulated

DOE reviewed this proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. 68 FR 7990. DOE conducted a market survey to identify potential small manufacturers of refrigerators, refrigerator-freezers, and freezers. DOE conducted a market survey to identify potential small manufacturers of refrigerators, refrigerator-freezers, and freezers. DOE began its assessment by reviewing DOE's Compliance Certification Database,¹⁵ California Energy Commission's Modernized Appliance Efficiency Database System,¹⁶ individual company websites, and prior refrigerator, refrigerator-freezer, and freezer rulemakings to identify manufacturers of the covered product. DOE then consulted publicly available data, such as manufacturer websites, manufacturer specifications and product literature, import/export logs (e.g., bills of lading from Panjiva¹⁷), and basic model numbers, to identify OEMs of covered refrigerators, refrigerator-freezers, and freezers. DOE further relied on public data and subscription-based market research tools (e.g., Dun & Bradstreet reports¹⁸) to determine company, location, headcount, and annual revenue. DOE also asked industry representatives if they were aware of any small manufacturers during manufacturer interviews in support of the February 2023 NOPR. 88 FR 12452. DOE screened out companies that do not offer products covered by this rulemaking, do not meet the SBA's definition of a "small business," or are foreign-owned and operated.

DOE identified 63 OEMs that sell refrigerators, refrigerator-freezers, or freezers in the United States. Of the 63 OEMs identified, DOE tentatively determined that one company qualifies as a small business and is not foreign-owned and operated.

In support of the February 2023 NOPR, DOE reached out to the small business and invited them to participate

in a voluntary interview. The small business did not consent to participate in a formal MIA interview. DOE also requested information about small businesses and potential impacts on small businesses while interviewing larger manufacturers.

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

The one small business identified has 45 refrigerator, refrigerator-freezer, and freezer models certified in DOE's Compliance Certification Database ("CCD"). Of those 45 models, 43 models are compact-size refrigerators, refrigerator-freezers, or freezers (34 PC 13A models, three PC 15 models, and six PC 17 models). The remaining two models are standard-size built-in refrigerator-freezer models (PC 3A–BI). Of the 34 PC 13A models, 22 models meet the efficiency required (EL 1) at TSL. For PC 15, PC 17, and PC 3A–BI, this small manufacturer only offers models at the current DOE baseline efficiency and, therefore, does not offer any products that meet the proposed TSL efficiencies (i.e., 10-percent reduction in energy use from the current DOE baseline). To meet the required efficiencies, DOE expects this small manufacturer would likely need to implement variable defrost and higher efficiency compressors across their product platforms. For some PC 3A–BI, PC 13A, PC 15, and PC 17 models, variable-speed compressors may be necessary to meet the required efficiencies. Some capital conversion costs may be necessary for additional tooling and new stations to test more variable-speed compressors. Product conversion costs may be necessary for developing, qualifying, sourcing, and testing new components. DOE estimated conversion costs for this small manufacturer by using model counts to scale down the industry conversion costs. DOE estimates that the small manufacturer may incur \$367,000 in capital conversion costs and \$530,000 in product conversion costs related to redesigning their products to meet amended standards. Based on subscription-based market research reports, the small business has an annual revenue of approximately \$85.3 million. The total conversion costs of \$897,000 are approximately 0.2 percent of company revenue over the 5-year conversion period.

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

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

6. Significant Alternatives to the Rule

The discussion in the previous section analyzes impacts on small businesses that would result from DOE's proposed rule, represented by TSL 4 (i.e., the Recommended TSL). In reviewing alternatives to the proposed rule, DOE examined energy conservation standards set at lower efficiency levels. While TSLs 3, 2, and 1 would reduce the impacts on small business manufacturers, it would come at the expense of a reduction in energy savings. TSL 1 achieves 51 percent lower energy savings compared to the energy savings at TSL 4. TSL 2 achieves 40 percent lower energy savings compared to the energy savings at TSL 4. TSL 3 achieves 16 percent lower energy savings compared to the energy savings at TSL 4.

Based on the presented discussion, establishing standards at TSL 4 balances the benefits of the energy savings at TSL 4 with the potential burdens placed on refrigerators, refrigerator-freezers, and freezers manufacturers, including small business manufacturers. Accordingly, DOE does not propose one of the other TSLs considered in the analysis, or the other policy alternatives examined as part of the regulatory impact analysis and included in chapter 17 of the direct final rule TSD.

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

B. Materials Incorporated by Reference

The following standards appear in the amendatory text of this document and were previously approved for the locations in which they appear: AS/NZS 4474.1:2007; HRF–1–2019. No changes are proposed to the IBR material.

¹⁵ U.S. Department of Energy's Compliance Certification Database. (last accessed May 5, 2023.) www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A*.

¹⁶ California Energy Commission's Modernized Appliance Efficiency Database System. (last accessed May 5, 2023.) cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx.

¹⁷ S&P Global. Panjiva Market Intelligence. (last accessed July 18, 2023.) panjiva.com/import-export/United-States.

¹⁸ D&B Hoover. Company Profiles. Various companies. (last accessed July 14, 2023.) app.dnbhoovers.com.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of proposed rulemaking.

List of Subjects in 10 CFR Part 430

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

Signing Authority

This document of the Department of Energy was signed on December 28, 2023, 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 December 29, 2023.

Treena V. Garrett,

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

For the reasons set forth in the preamble, DOE proposes to amend part 430 of chapter II, subchapter D, of title 10 of the Code of Federal Regulations, as set forth below:

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

■ 2. Amend appendix A to subpart B of part 430 by:

■ a. In section 1:

■ i. In paragraph (b)(i), removing the text “5.3(e)” and adding in its place the text “5.5”; and

■ ii. Removing the undesignated paragraph immediately following paragraph (b)(ii);

■ b. In section 3, adding, in alphabetical order, definitions for “Door-in-door” and “Transparent door”;

■ c. In section 5.3:

■ i. Removing paragraphs (a) and (f); and

■ ii. Redesignating paragraphs (b) through (e) as paragraphs (a) through (d); and

■ d. Adding new sections 5.4 and 5.5. The additions read as follows:

Appendix A to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Refrigerators, Refrigerator-Freezers, and Miscellaneous Refrigeration Products

* * * * *

3. * * *

Door-in-door means a set of doors or an outer door and inner drawer for which—

(a) Both doors (or both the door and the drawer) must be opened to provide access to the interior through a single opening;

(b) Gaskets for both doors (or both the door and the drawer) are exposed to external ambient conditions on the outside around the full perimeter of the respective openings; and

(c) The space between the two doors (or between the door and the drawer) achieves temperature levels consistent with the temperature requirements of the interior compartment to which the door-in-door provides access.

* * * * *

Transparent door means an external fresh food compartment door which meets the following criteria:

(a) The area of the transparent portion of the door is at least 40 percent of the area of the door.

(b) The area of the door is at least 50 percent of the sum of the areas of all the external doors providing access to the fresh food compartments and cooler compartments.

(c) For the purposes of this evaluation, the area of a door is determined as the product of the maximum height and maximum width dimensions of the door, not considering potential extension of flaps used to provide a seal to adjacent doors.

* * * * *

5. * * *

5.4. Icemaker Energy Use

(a) For refrigerators and refrigerator-freezers: To demonstrate compliance with the energy conservation standards at § 430.32(a) applicable to products manufactured on or after September 15, 2014, but before the compliance date of any amended standards published after January 1, 2022, IET, expressed in kilowatt-hours per cycle, equals 0.23 for a product with one or more automatic icemakers and otherwise equals 0 (zero). To demonstrate compliance with any amended standards published after January 1, 2022, IET, expressed in kilowatt-hours per cycle, is as defined in section 5.9.2.1 of HRF–1–2019.

(b) For miscellaneous refrigeration products: To demonstrate compliance with the energy conservation standards at § 430.32(aa) applicable to products manufactured on or after October 28, 2019, IET, expressed in kilowatt-hours per cycle,

equals 0.23 for a product with one or more automatic icemakers and otherwise equals 0 (zero).

5.5. Triangulation Method

If the three-point interpolation method of section 5.2(b) of this appendix is used for setting temperature controls, the average per-cycle energy consumption shall be defined as follows:

E = E_X + IET

Where:

E is defined in section 5.9.1.1 of HRF–1–2019;

IET is defined in section 5.4 of this appendix; and

E_X is defined and calculated as described in appendix M, section M4(a) of AS/NZS 4474.1:2007. The target temperatures t_{XA} and t_{XB} defined in section M4(a)(i) of AS/NZS 4474.1:2007 shall be the standardized temperatures defined in section 5.6 of HRF–1–2019.

* * * * *

■ 3. Amend appendix B to subpart B of part 430 by:

■ a. In section 5.3:

■ i. Removing paragraph (a);

■ ii. Redesignating paragraphs (b) and (c) as paragraphs (a) and (b); and

■ b. Adding section 5.4.

The addition reads as follows:

Appendix B to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Freezers

* * * * *

5. * * *

5.4. Icemaker Energy Use

For freezers: To demonstrate compliance with the energy conservation standards at § 430.32(a) applicable to products manufactured on or after September 15, 2014, but before the compliance date of any amended standards published after January 1, 2022, IET, expressed in kilowatt-hours per cycle, equals 0.23 for a product with one or more automatic icemakers and otherwise equals 0 (zero). To demonstrate compliance with any amended standards published after January 1, 2022, IET, expressed in kilowatt-hours per cycle, is as defined in section 5.9.2.1 of HRF–1–2019.

■ 4. Amend § 430.32 by:

■ a. Redesignating table 3 to paragraph (b) and table 4 to paragraph (b)(2) as table 6 to paragraph (b)(1) and table 7 to paragraph (b)(2); and

■ b. Revising paragraph (a).

The revision reads as follows:

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

* * * * *

(a) Refrigerators/refrigerator-freezers/freezers. The standards in this paragraph (a) do not apply to refrigerators and refrigerator-freezers with total refrigerated volume exceeding 39 cubic feet (1104 liters) or freezers with total refrigerated volume exceeding

30 cubic feet (850 liters). The energy standards as determined by the equations of the following table(s) shall be rounded off to the nearest kWh per year. If the equation calculation is halfway between the nearest two kWh

per year values, the standard shall be rounded up to the higher of these values.

(1) The following standards apply to products manufactured on or before September 15, 2014, and before the

2029/2030 compliance dates depending on product class (see paragraphs (a)(2) and (3) of this section).

TABLE 1 TO PARAGRAPH (a)(1)

Product class	Equations for maximum energy use (kWh/yr)	
	based on AV (ft ³)	based on av (L)
1. Refrigerators and refrigerator-freezers with manual defrost	7.99AV + 225.0	0.282av + 225.0.
1A. All-refrigerators—manual defrost	6.79AV + 193.6	0.240av + 193.6.
2. Refrigerator-freezers—partial automatic defrost	7.99AV + 225.0	0.282av + 225.0.
3. Refrigerator-freezers—automatic defrost with top-mounted freezer without an automatic icemaker.	8.07AV + 233.7	0.285av + 233.7.
3–BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer without an automatic icemaker.	9.15AV + 264.9	0.323av + 264.9.
3I. Refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service.	8.07AV + 317.7	0.285av + 317.7.
3I–BI. Built-in refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service.	9.15AV + 348.9	0.323av + 348.9.
3A. All-refrigerators—automatic defrost	7.07AV + 201.6	0.250av + 201.6.
3A–BI. Built-in All-refrigerators—automatic defrost	8.02AV + 228.5	0.283av + 228.5.
4. Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker.	8.51AV + 297.8	0.301av + 297.8.
4–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker.	10.22AV + 357.4	0.361av + 357.4.
4I. Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service.	8.51AV + 381.8	0.301av + 381.8.
4I–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service.	10.22AV + 441.4.2	0.361av + 441.4.
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker.	8.85AV + 317.0	0.312av + 317.0.
5–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker.	9.40AV + 336.9	0.332av + 336.9.
5I. Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service.	8.85AV + 401.0	0.312av + 401.0.
5I–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service.	9.40AV + 420.9	0.332av + 420.9.
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	9.25AV + 475.4	0.327av + 475.4.
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	9.83AV + 499.9	0.347av + 499.9.
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	8.40AV + 385.4	0.297av + 385.4.
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	8.54AV + 432.8	0.302av + 431.1.
7–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	10.25AV + 502.6	0.362av + 502.6.
8. Upright freezers with manual defrost	5.57AV + 193.7	0.197av + 193.7.
9. Upright freezers with automatic defrost without an automatic icemaker	8.62AV + 228.3	0.305av + 228.3.
9I. Upright freezers with automatic defrost with an automatic icemaker	8.62AV + 312.3	0.305av + 312.3.
9–BI. Built-In Upright freezers with automatic defrost without an automatic icemaker	9.86AV + 260.9	0.348av + 260.6.
9I–BI. Built-In Upright freezers with automatic defrost with an automatic icemaker	9.86AV + 344.9	0.348av + 344.9.
10. Chest freezers and all other freezers except compact freezers	7.29AV + 107.8	0.257av + 107.8.
10A. Chest freezers with automatic defrost	10.24AV + 148.1	0.362av + 148.1.
11. Compact refrigerators and refrigerator-freezers with manual defrost	9.03AV + 252.3	0.319av + 252.3.
11A. Compact refrigerators and refrigerator-freezers with manual defrost	7.84AV + 219.1	0.277av + 219.1.
12. Compact refrigerator-freezers—partial automatic defrost	5.91AV + 335.8	0.209av + 335.8.
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer.	11.80AV + 339.2	0.417av + 339.2.
13I. Compact refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker.	11.80AV + 423.2	0.417av + 423.2.
13A. Compact all-refrigerator—automatic defrost	9.17AV + 259.3	0.324av + 259.3.
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer	6.82AV + 456.9	0.241av + 456.9.
14I. Compact refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker.	6.82AV + 540.9	0.241av + 540.9.
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer	11.80AV + 339.2	0.417av + 339.2.
15I. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker.	11.80AV + 423.2	0.417av + 423.2.
16. Compact upright freezers with manual defrost	8.65AV + 225.7	0.306av + 225.7.
17. Compact upright freezers with automatic defrost	10.17AV + 351.9	0.359av + 351.9.

TABLE 1 TO PARAGRAPH (a)(1)—Continued

Product class	Equations for maximum energy use (kWh/yr)	
	based on AV (ft ³)	based on av (L)
18. Compact chest freezers	9.25AV + 136.8	0.327av + 136.8.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of this part.
 av = Total adjusted volume, expressed in Liters.

(2) The following standards apply to products manufactured on or after January 31, 2029.

TABLE 2 TO PARAGRAPH (a)(2)

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
3—BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer	8.24AV + 238.4 + 28l	0.291av + 238.4 + 28l.
3A—BI. Built-in All-refrigerators—automatic defrost	(7.22AV + 205.7)*K3ABI	(0.255av + 205.7)*K3ABI.
4—BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer.	(8.79AV + 307.4)*K4BI + 28l ..	(0.310av + 307.4)*K4BI + 28l.
5—BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer.	(8.65AV + 309.9)*K5BI + 28l ..	(0.305av + 309.9)*K5BI + 28l.
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	(7.76AV + 351.9)*K5A	(0.274av + 351.9)*K5A.
5A—BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	(8.21AV + 370.7)*K5ABI	(0.290av + 370.7)*K5ABI.
7—BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer.	(8.82AV + 384.1)*K7BI	(0.311av + 384.1)*K7BI.
8. Upright freezers with manual defrost	5.57AV + 193.7	0.197av + 193.7.
9—BI. Built-In Upright freezers with automatic defrost	(9.37AV + 247.9)*K9BI + 28l ..	(0.331av + 247.9)*K9BI + 28l.
9A—BI. Built-In Upright freezers with automatic defrost with through-the-door ice service.	9.86AV + 288.9	0.348av + 288.9.
10. Chest freezers and all other freezers except compact freezers	7.29AV + 107.8	0.257av + 107.8.
10A. Chest freezers with automatic defrost	10.24AV + 148.1	0.362av + 148.1.
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	7.68AV + 214.5	0.271av + 214.5.
11A. Compact all-refrigerators—manual defrost	6.66AV + 186.2	0.235av + 186.2.
12. Compact refrigerator-freezers—partial automatic defrost	(5.32AV + 302.2)*K12	(0.188av + 302.2)*K12.
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer	10.62AV + 305.3 + 28l	0.375av + 305.3 + 28l.
13A. Compact all-refrigerators—automatic defrost	(8.25AV + 233.4)*K13A	(0.291av + 233.4)*K13A.
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer.	6.14AV + 411.2 + 28l	0.217av + 411.2 + 28l.
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer.	10.62AV + 305.3 + 28l	0.375av + 305.3 + 28l.
16. Compact upright freezers with manual defrost	7.35AV + 191.8	0.260av + 191.8.
17. Compact upright freezers with automatic defrost	9.15AV + 316.7	0.323av + 316.7.
18. Compact chest freezers	7.86AV + 107.8	0.278av + 107.8.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

av = Total adjusted volume, expressed in Liters.

l = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3ABI) are as defined in the following table.

TABLE 3 TO PARAGRAPH (a)(2)

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K3ABI	1.10	1.0	1.0
K4BI	1.10	1.06	1 + 0.02 * (N _d - 2)
K5BI	1.10	1.06	1 + 0.02 * (N _d - 2)
K5A	1.10	1.06	1 + 0.02 * (N _d - 3)
K5ABI	1.10	1.06	1 + 0.02 * (N _d - 3)
K7BI	1.10	1.06	1 + 0.02 * (N _d - 2)
K9BI	1.0	1.0	1 + 0.02 * (N _d - 1)

TABLE 3 TO PARAGRAPH (a)(2)—Continued

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K12	1.0	1.0	$1 + 0.02 * (N_d - 1)$
K13A	1.10	1.0	1.0

Notes:

¹ N_d is the number of external doors.

² The maximum N_d values are 2 for K12, 3 for K9BI, and 5 for all other K values.

(3) The following standards apply to products manufactured on or after January 31, 2030.

TABLE 4 TO PARAGRAPH (a)(3)

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft ³)	Based on av (L)
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost.	$6.79AV + 191.3$	$0.240av + 191.3$.
1A. All-refrigerators—manual defrost	$5.77AV + 164.6$	$0.204av + 164.6$.
2. Refrigerator-freezers—partial automatic defrost	$(6.79AV + 191.3)*K2$	$(0.240av + 191.3)*K2$.
3. Refrigerator-freezers—automatic defrost with top-mounted freezer	$6.86AV + 198.6 + 28I$	$0.242av + 198.6 + 28I$.
3A. All-refrigerators—automatic defrost	$(6.01AV + 171.4)*K3A$	$(0.212av + 171.4)*K3A$.
4. Refrigerator-freezers—automatic defrost with side-mounted freezer	$(7.28AV + 254.9)*K4 + 28I$	$(0.257av + 254.9)*K4 + 28I$.
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer	$(7.61AV + 272.6)*K5 + 28I$	$(0.269av + 272.6)*K5 + 28I$.
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	$7.14AV + 280.0$	$0.252av + 280.0$.
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	$(7.31AV + 322.5)*K7$	$(0.258av + 322.5)*K7$.
9. Upright freezers with automatic defrost	$(7.33AV + 194.1)*K9 + 28I$	$(0.259av + 194.1)*K9 + 28I$.

AV = Total adjusted volume, expressed in ft³, as determined in appendices A and B of subpart B of 10 CFR part 430.

av = Total adjusted volume, expressed in Liters.

I = 1 for a product with an automatic icemaker and = 0 for a product without an automatic icemaker. Door Coefficients (e.g., K3A) are as defined in the following table.

TABLE 5 TO PARAGRAPH (a)(3)

Door coefficient	Products with a transparent door	Products without a transparent door with a door-in-door	Products without a transparent door or door-in-door with added external doors
K2	1.0	1.0	$1 + 0.02 * (N_d - 1)$
K3A	1.10	1.0	1.0
K4	1.10	1.06	$1 + 0.02 * (N_d - 2)$
K5	1.10	1.06	$1 + 0.02 * (N_d - 2)$
K7	1.10	1.06	$1 + 0.02 * (N_d - 2)$
K9	1.0	1.0	$1 + 0.02 * (N_d - 1)$

Notes:

¹ N_d is the number of external doors.

² The maximum N_d values are 2 for K2, and 5 for all other K values.

* * * * *