number, DG–1420 (ADAMS Accession No. ML24158A060) and the DG, entitled, ''Criteria for the Protection of Class 1E Power Systems and Equipment for Nuclear Power Plants,'' is temporarily identified by its task number, DG–1354 (ADAMS Accession No. ML24158A041).

DG–1420 describes an approach that is acceptable to the NRC staff to meet regulatory requirements for the design, operation, and testing of electric power systems in nuclear power plants. DG–1420 endorses, with exceptions and clarifications, the Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 308 2020, ''IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations.'' In addition, DG–1420 includes the guidance provisions of RG 1.41, Revision 0, ''Preoperational Testing of Redundant On-Site Electric Power Systems to Verify Proper Load Group Assignments,'' which describes methods acceptable to the NRC for independence among redundant, onsite power sources and their load groups as part of the initial preoperational testing program and after major modifications or repairs. The staff plans to withdraw RG 1.41 if DG–1420 is finalized as RG 1.32, Revision 4.

DG–1354 describes an approach that is acceptable to the staff of the NRC for use in complying with NRC regulations that address the protection of Class 1E power systems and equipment at nuclear power plants. DG–1354 endorses, with exceptions, additions and clarifications, IEEE Std. 741–2022, ''IEEE Standard for Criteria for the Protection of Class 1E Power Systems and Equipment for Nuclear Power Generating Stations.''

The staff is also issuing for public comment the draft regulatory analyses (ADAMS Accession Nos. ML24158A062 and ML24158A042). The staff developed these regulatory analyses to assess the value of issuing or revising the RGs as well as alternative courses of action.

As noted in the **Federal Register** on December 9, 2022 (87 FR 75671), this document is being published in the ''Proposed Rules'' section of the **Federal Register** to comply with publication requirements under chapter I of title 1 of the *Code of Federal Regulations* (CFR).

III. Backfitting, Forward Fitting, and Issue Finality

If finalized, DG–1420 and DG–1354, would not constitute backfitting as defined in 10 CFR 50.109, ''Backfitting,'' and as described in NRC Management Directive (MD) 8.4, ''Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests''; affect issue finality of any approval issued under 10 CFR part 52, ''Licenses, Certificates, and Approvals for Nuclear Power Plants''; or constitute forward fitting as defined in MD 8.4, because, as explained in these DGs, licensees would not be required to comply with the positions set forth in these DGs.

IV. Submitting Suggestions for Improvement of Regulatory Guides

A member of the public may, at any time, submit suggestions to the NRC for improvement of existing RGs or for the development of new RGs. Suggestions can be submitted on the NRC's public website at *https://www.nrc.gov/reading-rm/doc-collections/reg-guides/contactus.html.* Suggestions will be considered in future updates and enhancements to the ''Regulatory Guide'' series.

Dated: August 21, 2024.

For the Nuclear Regulatory Commission.

Meraj Rahimi,

Chief, Regulatory Guide and Programs Management Branch, Division of Engineering, Office of Nuclear Regulatory Research.

[FR Doc. 2024–19187 Filed 8–27–24; 8:45 am]

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DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE–2017–BT–STD–0007]

RIN 1904–AD82

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

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

ACTION: Notification of data availability and request for comment.

SUMMARY: On October 10, 2023, the U.S. Department of Energy (''DOE'') published a notice of proposed rulemaking (''NOPR''), in which DOE proposed new and amended energy conservation standards for commercial refrigerators, freezers, and refrigerator-freezers. In this notification of data availability (''NODA''), DOE is providing updated analytical results that reflect updates to the analysis that DOE is considering based on feedback received in response to the October 10, 2023, NOPR. DOE requests comments, data, and information regarding the updated analyses.

DATES: DOE will accept comments, data, and information regarding this NODA no later than September 27, 2024.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov* under docket number EERE–2017–BT–STD–0007. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2017–BT–STD–0007, by any of the following methods:

(1) *Email: CRE2017STD0007@ee.doe.gov.* Include the docket number EERE–2017–BT–STD–0007 in the subject line of the message.

(2) *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.

(3) *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-0007.* 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.*

FOR FURTHER INFORMATION CONTACT:

Mr. Jeremy Dommu, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–5B, 1000

Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 586–9870. Email: *ApplianceStandardsQuestions@ee.doe.gov.*

Ms. Kristin Koernig, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 586–4798. Email: *Kristin.Koernig@hq.doe.gov.*

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

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Introduction

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer equipment and certain industrial equipment. (42 U.S.C. 6291–6317, as codified) Title III, Part C of EPCA,[1] added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. (42 U.S.C. 6311–6317) This equipment includes commercial refrigerators, freezers, or refrigerator-freezers (''CRE''), the subject of this document. (42 U.S.C. 6311(1)(E))

DOE defines a ''commercial refrigerator, freezer, or refrigerator-freezer,'' consistent with EPCA's definition at 42 U.S.C. 6311(9) and codified at title 10 Code of Federal Regulations (''CFR'') 431.62, as refrigeration equipment that is not a consumer product (as defined in 10 CFR 430.2); is not designed and marketed exclusively for medical, scientific, or research purposes; operates at a chilled, frozen, combination chilled and frozen, or variable temperature; displays or stores merchandise and other perishable materials horizontally, semi-vertically, or vertically; has transparent or solid doors, sliding or hinged doors, a combination of hinged, sliding, transparent, or solid doors, or no doors; is designed for pull-down temperature applications or holding temperature applications; and is connected to a self-contained condensing unit or to a remote condensing unit.

On March 28, 2014, DOE published a final rule in the **Federal Register** that prescribed the current energy conservation standards for CRE manufactured on and after March 27, 2017 (''March 2014 Final Rule''). 79 FR 17725. DOE initiated a rulemaking to consider amending energy conservation standards for CRE by publishing a request for information in the **Federal Register** on July 16, 2021. 86 FR 37708. DOE subsequently published a notification of the availability of a preliminary technical support document for CRE in the **Federal Register** on June 28, 2022 (''June 2022 Preliminary Analysis''). 87 FR 38296. In the June 2022 Preliminary Analysis, DOE sought comment on the analytical framework, models, and tools that DOE used to evaluate potential standards for CRE, the results of preliminary analyses performed, and the potential energy conservation standard levels derived from these analyses, which DOE presented in the accompanying Preliminary Technical Support Document (''TSD'') (''June 2022 Preliminary TSD'').[2] *Id.* DOE held a public meeting related to the June 2022 Preliminary Analysis on August 8, 2022.

On October 10, 2023, DOE published in the **Federal Register** a NOPR to establish and amend energy conservation standards for CRE (''October 2023 NOPR''). 88 FR 70196. DOE also sought comment on the analytical framework, models, and tools that DOE used to evaluate the proposed standards for CRE, the results of the NOPR analyses performed, and the proposed new and amended energy conservation standard levels derived from these analyses, which DOE presented in the accompanying NOPR TSD (''October 2023 NOPR TSD'').[3] *Id.* DOE held a public meeting related to the October 2023 NOPR on November 7, 2023 (hereafter, the ''November 2023 Public Meeting'').

DOE is currently considering comments and feedback received in response to the October 2023 NOPR and November 2023 Public Meeting. DOE has also conducted revised analysis with regard to some of the topics on which it received feedback, as discussed throughout this document. Based on this feedback and DOE's additional analysis, DOE is considering updates to certain inputs to the analysis and certain analytical approaches as presented in the October 2023 NOPR. DOE is publishing this NODA to show how such updates would affect the analytical results in comparison to the results presented in the October 2023 NOPR.

This document provides a high-level summary of the analytical updates that DOE is considering. DOE is also publishing a separate support document (''NODA support document'') and its engineering spreadsheet (''NODA engineering spreadsheet''), available in the docket for this proposed rulemaking, that provide greater details and a full set of analytical results that include updates as compared to the analysis conducted for the October 2023 NOPR. DOE is requesting comments, data, and information regarding the updated analysis. DOE also welcomes feedback and public input on the methodological and analytical approaches used in this updated analysis.

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

[2] The June 2022 Preliminary TSD is available in the docket for this rulemaking at *www.regulations.gov/document/EERE-2017-BT-STD-0007-0013.*

[3] The October 2023 NOPR TSD is available in the docket for this proposed rulemaking at *www.regulations.gov/document/EERE-2017-BT-STD-0007-0051.*

DOE notes that, in this document, DOE is not summarizing or responding to any specific comments received in response to the October 2023 NOPR and November 2023 Public Meeting. DOE is continuing to consider all of the stakeholder comments received in response to the October 2023 NOPR and November 2023 Public Meeting in further development of the rulemaking. Based on consideration of all of the public comments received, including any additional comments received in response to this NODA, DOE may adopt energy efficiency levels that are either higher or lower than the standards proposed in the October 2023 NOPR.

II. Discussion

A. Engineering Analysis

The purpose of the engineering analysis is to establish the relationship between the efficiency and cost of the equipment. For each equipment class, DOE estimates the baseline cost (*i.e.,* the cost of minimally compliant equipment), as well as the incremental cost for equipment at efficiency levels above the baseline. The output of the engineering analysis is a set of cost-efficiency ''curves'' that are used in downstream analyses (*i.e.,* the life-cycle cost (''LCC'') and payback period (''PBP'') analyses, the manufacturer impact analysis (''MIA''), and the national impact analysis (''NIA'')).

1. Representative Units

In performing the engineering analysis for CRE, DOE selected representative units for each primary equipment class to serve as analysis points in the development of cost-efficiency curves. In the October 2023 NOPR, DOE presented results for a single representative unit at a specific capacity for each CRE equipment class. 88 FR 70196, 70225. In this NODA, DOE made one change to its approach for selecting representative units for the engineering analysis from the October 2023 NOPR.

DOE analyzed additional representative capacities for certain equipment classes in consideration of recent updates to future refrigerant requirements and safety standards in this NODA. In the October 2023 NOPR, DOE stated that it expects that the use of R–290 generally will improve efficiency as compared with the refrigerants currently in use (*e.g.,* R–404A) because R–290 has a higher refrigeration-cycle efficiency than the current refrigerants. 88 FR 70196, 70227. Therefore, R–290 impacts the baseline energy use, compared to a baseline using current refrigerants, on which each efficiency level is built for the standards analysis. In the October 2023 NOPR, DOE's engineering analysis assumed that manufacturers would convert all self-contained CRE models to propane (designated as R–290) in accordance with the applicable refrigerant global warming potential (''GWP'') limits and compliance dates previously proposed by the Environmental Protection Agency (''EPA'').[4] 88 FR 70196, 70227. The October 2023 NOPR analysis also assumed that all self-contained CRE would have a refrigerant charge (*i.e.,* the amount of refrigerant in the CRE refrigeration system) no greater than the maximum allowable R–290 charge size specified by Underwriters Laboratories (''UL'') 60335–2–89 (corresponding to 304g for units with closed cases and 494 g for units with open cases). *Id.*

Since publishing the October 2023 NOPR, DOE has performed additional analysis as described below—as well as received additional feedback from CRE manufacturers—indicating that larger CRE units, which contain more refrigerant than smaller units, would require more R–290 refrigerant than the maximum allowable charge size specified by UL 60335–2–89. For such equipment, manufacturers will likely instead need to implement other low-GWP refrigerant options to comply with the GWP limits in the October 2023 EPA Final Rule. DOE has identified R–454C and R–455A as alternatives that are mildly flammable (designated ''A2L'') refrigerants currently available and could be used for units with cooling capacities greater than would be achievable using an allowable R–290 charge size.

In recognition of this, DOE analyzed two different representative capacities for the following 7 equipment classes: VOP.SC.M, SVO.SC.M, HZO.SC.L, SOC.SC.M,[5] VCT.SC.M, VCT.SC.L, and VCS.SC.L.[6] For each of these 7 classes, DOE would assume the use of an A2L refrigerant for the large capacity and R–290 for the non-large capacity. DOE requests comment on this analytical approach of assuming use of an A2L refrigerant for the large capacity equipment classes.

Table II.1 presents the 7 equipment classes for which DOE analyzed two representative capacities. This NODA presents analytical results of this approach under consideration for each of these 7 equipment classes.

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[4] EPA published its *Technology Transitions Restrictions on the Use of Certain HFCs* NOPR on December, 15, 2022 (''December 2022 EPA NOPR''). 88 FR 70196. Since the October 2023 NOPR, EPA published a *Technology Transitions Restrictions on the Use of Certain HFCs* Final Rule on October, 24, 2023 (the ''October 2023 EPA Final Rule''). 88 FR 73098. For CRE, the refrigerant GWP limits published in the October 2023 EPA Final Rule are consistent with the proposal in the December 2022 EPA NOPR.

[5] DOE notes that, for the SOC.SC.M equipment class, DOE is considering a smaller representative capacity, as compared to the representative capacity proposed in the October 2023 NOPR, that would assume the use of R–290. For the large representative capacity in the SOC.SC.M equipment class (*i.e.,* the same representative capacity as the October 2023 NOPR), DOE is considering an A2L refrigerant, consistent with the approach in this NODA.

[6] The equipment classes are designated by equipment family, condensing unit configuration, and operating temperature. Equipment Families: VOP—Vertical Open; SVO—Semi-Vertical Open; HZO—Horizontal Open; VCT—Vertical Closed Transparent; HCT—Horizontal Closed Transparent; VCS—Vertical Closed Solid; HCS—Horizontal Closed Solid; SOC—Service Over Counter; CB—Chef Base; PD—Pull Down. Condensing Unit Configurations: RC—Remote Condensing; SC—Self Contained. Operating Temperatures: H—High Temperature; M—Medium Temperature; L—Low Temperature; I—Ice Cream Temperature.

Table II.1 Approach Under Consideration for Equipment Classes with Two Representative Capacities

Condensing Unit Configuration	Equipment Family	Operating Temperature (°F)	Equipment Class Designation	Volume ("V") [ft^3] or TDA [ft^2] Range	Representative Capacity [ft^3] or [ft^2]
Self-Contained (SC)	Vertical Open (VOP)	≥ 32	VOP.SC.M	TDA ≤ 17	14.93*
				TDA > 17	29.86
	Semivertical Open (SVO)	≥ 32	SVO.SC.M	TDA ≤ 15	12.8*
				TDA > 15	25.6
	Horizontal Open (HZO)	< 32	HZO.SC.L	TDA ≤ 35	12*
				TDA > 35	50
	Service Over Counter (SOC)	≥ 32	SOC.SC.M	TDA ≤ 40	20
				TDA > 40	51*
	Vertical Closed Transparent (VCT)	≥ 32	VCT.SC.M	V ≤ 100	49*
				V > 100	150
		< 32	VCT.SC.L	V ≤ 70	49*
				V > 70	73.5
	Vertical Closed Solid (VCS)	< 32	VCS.SC.L	V ≤ 100	49*
				V > 100	150

* These representative volumes or TDAs were analyzed in the October 2023 NOPR.

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In support of this NODA, DOE investigated currently available compressor performance data of compressors using R–404A, R–454C, and R–455A to compare performance for compressors applicable to CRE in the larger volume or TDA range of each equipment class presented in table II.1. This investigation indicates that compressors using R–454C and R–455A have performance similar to compressors with refrigerants already in use (*e.g.,* R–404A) in larger equipment, which is consistent with the findings from other investigations conducted by a compressor manufacturer.[7] Accordingly, for the large representative units considered for these 7 equipment classes, DOE is presenting in this NODA an updated analysis that reflects the use of A2L compressors, based on performance data of R–404A compressors as a proxy to calculate the efficiency of this equipment. Using this approach, the baseline energy use for the large representative capacities in these 7 classes is set equal to the current standard.

Based on feedback to the October 2023 NOPR and in support of this NODA, DOE did not find compressor cost data to indicate that the price of an A2L compressor would be different than the price of an R–290 compressor at the same cooling capacity. As a result, DOE assumes the same cost for an A2L compressor as an R–290 compressor of the same compressor capacity in this NODA. DOE requests comment on any information or cost data that may indicate that the price of an A2L compressor would be different than the price of an R–290 compressor at the same cooling capacity.

2. Baseline Energy Use Estimates

As discussed previously, in the October 2023 NOPR, DOE assumed that manufacturers would convert self-contained CRE models to R–290. The use of R–290 is generally expected to provide higher efficiency performance at the baseline level (compared to current refrigerants), such that the baseline efficiency levels defined in the October 2023 NOPR for each class generally reflected a lower energy use than the currently applicable DOE standards for CRE. 88 FR 70196, 70227–70228. In the October 2023 NOPR, DOE's analysis considered that these efficiency improvements, equipment costs, and manufacturer investments required to comply with the December 2022 EPA NOPR would be in effect prior to the time of compliance for the October 2023 NOPR proposed amended DOE CRE standards for all CRE equipment classes and sizes. 88 FR 70196, 70228. Therefore, in the October 2023 NOPR, DOE noted that the October 2023 NOPR analysis did not consider benefits and costs resulting from the December 2022 EPA NOPR. 88 FR 70196, 70208. DOE clarifies that DOE has not double counted any energy savings from the October 2023 EPA

[7] See p. 15 of *https://e360hub.copeland.com/presentations/preparing-for-emerging-refrigerants-and-carb-compliance.*

Final Rule in this NODA nor in the October 2023 NOPR.

In the October 2023 NOPR, DOE initially determined the energy use associated with the defined baseline efficiency levels for each equipment class by maximizing the single-speed compressor efficiency achievable for each respective equipment class based on the CRE compressors available at the time of the analysis from two commonly-used compressor manufacturers. *Id.* at 88 FR 70228.

In this NODA, DOE updated its analysis of R–290 compressor performance to reflect the average compressor efficiency from the database of CRE compressors it has collected, instead of the maximum compressor efficiency as considered in the October 2023 NOPR. After the publication of the October 2023 NOPR, DOE was able to incorporate into this NODA compressor performance data from an additional compressor manufacturer that was not available to DOE for the October 2023 NOPR. Based on this updated approach, on average, the medium-temperature compressor energy savings presented in this NODA are less than the compressor energy savings in the October 2023 NOPR and the low-temperature compressor energy savings presented in this NODA are greater than the compressor energy savings in the October 2023 NOPR. Table II.2 presents the updated baseline energy use associated with each equipment class, expressed as a reduction in energy compared to the currently applicable standard, for both the R–290 and A2L (if applicable) representative units for each class. As discussed in the previous section, for the large representative capacities (which assume the use of A2L refrigerants), the baseline energy use is set equal to the current standard.

Table II.2 Baseline Energy Use Expressed as Reduction in Energy Use Below Current Applicable Standard

Equipment Class	Baseline energy use reduction below DOE Standard – R-290 (%)	Baseline energy use reduction below DOE Standard – A2L (%)
VOP.SC.M	1.3	0.0
SVO.SC.M	9.7	0.0
HZO.SC.M	14.7	NA*
HZO.SC.L	2.6	0.0
VCT.SC.M	15.1	0.0
VCT.SC.L	5.5	0.0
VCS.SC.M	19.9	NA*
VCS.SC.L	6.1	0.0
HCT.SC.M	0.0	NA*
HCT.SC.L	0.0	NA*
HCS.SC.M	12.6	NA*
HCS.SC.L	0.0	NA*
SOC.SC.M	11.0	0.0
VCT.SC.I	0.0	NA*
HCT.SC.I	0.0	NA*
VCS.SC.I	6.9	NA*

*NA indicates that this class did not contain a second, large representative capacity in this NODA.

3. Baseline Design Components

Based on feedback in response to the October 2023 NOPR and November 2023 Public Meeting and additional test and teardown data conducted since the October 2023 NOPR, DOE is updating certain design specifications and components assumed to be used in models at the baseline efficiency level in this NODA. These updates include the insulation R-Value (changing from 8 per inch to 6.5 per inch, which is more representative of current baseline equipment); insulation thickness (changing to be consistent with the thickness analyzed in the March 2014 Final Rule, which remain applicable to current equipment);[8] baseline fan motor assumptions (considering electronically commutated motors (''ECM'') for evaporator and condenser fan motors for most classes); and use of electronic controls (to assume the use of electronic controls at the baseline for all equipment classes). Additional details regarding all design specification and component updates are provided in section 2 of the NODA support document.

These changes result in adjustments to equipment cost at the baseline level, as well as to the magnitude of efficiency improvement provided by higher efficiency design options whose performance depends on the heat load.

4. Higher Efficiency Level Design Options

In consideration of feedback received in response to the October 2023 NOPR, DOE has removed evaporator fan control and microchannel condensers from consideration as design options and revised the variable speed compressor coefficients, as described in the following sections.

[8] *See* table 5A.2.2 Baseline Specifications in the 2014 Final Rule TSD at *www.regulations.gov/document/EERE-2010-BT-STD-0003-0102.*

a. Evaporator Fan Control

As stated in section 3.3.7.3 of the October 2023 NOPR TSD, evaporator fan motor controls can be programmed such that the evaporator fan motor runs at a 100 percent duty cycle to circulate cold air at all times and to prevent frost build up on the evaporator coil. As a design option, evaporator fan control refers to operating the evaporator fan at an evaporator fan duty cycle less than 100 percent. This design option operates the evaporator fan at an evaporator fan duty cycle that matches the compressor duty cycle, plus some additional operating time to accomplish defrosts and stir cycles.

In the October 2023 NOPR, DOE analyzed the evaporator fan control design option for self-contained, closed CRE. 88 FR 70196, 70222. Feedback received in response to the October 2023 NOPR suggests that the use of evaporator fan controls could reduce air distribution and temperature uniformity in the refrigerated compartment, potentially leading to higher temperatures that would exceed established tolerances for food safety (*e.g.,* as established by National Sanitation Foundation (''NSF'') 7). DOE notes that NSF 7 requirements do not preclude CRE from using evaporator fan controls and that some self-contained, closed CRE may be able to use evaporator fan controls and still comply with NSF 7 requirements. However, recognizing current uncertainty as to whether such food safety requirements could be maintained in certain applications of self-contained, closed CRE with the use of evaporator fan controls, DOE has tentatively screened out evaporator fan control as a design option for CRE. As a result, this NODA presents an updated engineering analysis that does not include evaporator fan control as a design option.

b. Microchannel Condensers

In the October 2023 NOPR, DOE considered microchannel condensers as a design option for self-contained CRE, having observed the use of microchannel condensers in other commercial refrigeration equipment such as automatic commercial ice makers (''ACIMs''), including ACIMs that use R–290. *Id.* DOE is not, however, aware of microchannel condensers in use for CRE and has not observed microchannel condensers in any of the equipment in the teardown analysis. Even though DOE tentatively determined in the October 2023 NOPR that microchannel condensers would be technically feasible for use in CRE, feedback from commenters in response to the October 2023 NOPR suggests that there is current uncertainty as to the practicability to manufacturer, install, or service this technology on the scale necessary to serve the CRE market at the time of the effective date of any new or amended standards. Recognizing this uncertainty, DOE has tentatively screened out microchannel condensers as a design option. As a result, this NODA presents an updated engineering analysis that does not include microchannel condensers as a design option.

c. Variable-Speed Compressors

In the October 2023 NOPR, DOE incorporated the performance data for variable-speed R–290 compressors currently available on the market into DOE's engineering spreadsheet. *Id.* at 88 FR 70219. Since publication of the October 2023 NOPR, DOE has observed that some compressor manufacturers have updated their variable-speed compressor coefficients. To take into account these updates, and to maintain a methodology consistent with that used for single-speed compressors, DOE made updates to its engineering analysis to assume the average efficiency of the current market for variable-speed compressors, selecting the lower-efficiency compressor if only two compressor brands are available at a specific cooling capacity, in this NODA. DOE also adjusted the calculation for the difference in evaporator and condenser temperatures when switching from single-speed to variable-speed compressors to instead use a static temperature difference of +3 °F for the evaporator and −5 °F for the condenser. Implementing these updates results in an energy use reduction from implementing variable-speed R–290 compressors ranging from approximately 2.5 to 19.2 percent, depending on the representative capacity of each equipment class. DOE notes that variable-speed compressors operate more efficiently at lower speeds than single-speed compressors do at full-speed. Therefore, variable-speed compressors have greater energy savings potential as further explained in section 3.3.4.3 of the October 2023 NOPR. Comparatively, in the October 2023 NOPR, DOE estimated approximately 0.5 to 25 percent energy consumption reduction when implementing variable-speed R–290 compressors.[9] *Id.*

5. Compressor Energy Use Adjustment

Since publication of the October 2023 NOPR, DOE has reviewed the Air-Conditioning, Heating, and Refrigeration Institute (''AHRI'') January 2017 white paper, *Tolerances and Uncertainties in Performance Data of Refrigerant Compressors,* which is referenced by the AHRI 540 compressor performance rating standard (''AHRI 540'').[10] Based on this review, DOE applied a 5 percent increase in energy use for all compressors to account for the performance prediction uncertainty as a result of curve-fitted compressor performance maps in this NODA. See the NODA engineering spreadsheet for further details.

6. Revised Cost Analysis

As DOE typically does during the course of a rulemaking, DOE considered updates to core case costs and certain design option costs to reflect current material prices and production factors that are relevant to the CRE industry.

As part of this update, DOE has reviewed current Krypton gas prices and has observed that the cost differential between triple-pane doors with Argon gas and triple pane doors with Krypton gas has increased significantly[11] compared to the cost differential used in the October 2023 NOPR analysis. See chapter 5 of the October 2023 NOPR TSD. This NODA presents updated costs for triple-pane doors with Krypton gas.

In the October 2023 NOPR, DOE assumed an industry average manufacturer markup of 1.40 for all equipment classes. 88 FR 70196, 70247. Based on stakeholder comments in response to the October 2023 NOPR and market share weights, DOE updated the industry average manufacturer markup to 1.38 for all equipment classes and uses this updated value as the basis for the results presented in this NODA.

7. Equipment With Features That Affect Energy Use

In the October 2023 NOPR, DOE proposed less stringent energy conservation standards for equipment of certain classes that have unique features such as forced-air evaporators or certain special door configurations (*e.g.,* roll-in, roll-through, and pass-through). *Id.* at 88 FR 70230. The approach in the October 2023 NOPR involved use of feature-specific multipliers greater than 1.0 that would be applied to the proposed

[9] See section 5.5.3.1 of the October 2023 NOPR TSD.

[10] For the AHRI white paper see *www.ahrinet.org/system/files/2023-06/compressors-white-paper.pdf.*

[11] The cost differential between Argon gas fill and Krypton gas fill for triple-pane doors is approximately seven times greater at the time of this NODA as compared to the October 2023 NOPR.

energy conservation standard for an eligible class to provide less-stringent standards for a feature of that eligible class. *Id.* at 88 FR 70231. More details can be found in tables IV.7 and IV.8 of the October 2023 NOPR.

As an alternative to the feature-specific multiplier approach, DOE is also tentatively considering a simplified multiplier approach to the eligible equipment classes discussed in the October 2023 NOPR, evaluating the use of a single multiplier for all evaluated equipment classes and feature groupings, including pass-through, sliding door, sliding-door pass-through, roll-in, roll-through, forced-air evaporator, and drawers. To select a single multiplier representative of the range of features analyzed, DOE used a shipment-weighted average of the eligible equipment class average multiplier values for each feature. DOE applied this multiplier to the energy use at each efficiency level for each eligible class, which implies that the difference in energy use of each feature compared to CRE without such feature is proportional to the equipment's energy use prior to the addition of each feature. The result of this single multiplier analysis yields a multiplier of 1.07.

DOE notes that EPCA, as codified, 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. 6316(e)(1); 42 U.S.C. 6295(o)(1)) Therefore, any multipliers that may be applied to eligible CRE equipment classes in any future DOE actions for this proposed rulemaking may be limited or adjusted due to the anti-backsliding provision. In this NODA, application of the multiplier to the energy use of each efficiency level of a given class is adjusted accordingly, if needed, to avoid backsliding against the current standard.

Based on consideration of all of the public comments received, including any additional comments received in response to this NODA, DOE may adopt the multiplier approach proposed in the October 2023 NOPR, a revised approach with higher or lower multipliers than proposed in the October 2023 NOPR, an approach with additional or fewer multipliers, or a simpler approach in which a single multiplier would be used for any eligible feature for application to specific eligible classes as presented in this NODA.

B. Energy Use Analysis

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

In the October 2023 NOPR, DOE calculated the energy consumption of the equipment as part of the engineering analysis. *Id.* at 88 70196, 70237. In this NODA, DOE adjusted the annual energy consumption to account for the field operation of occupancy sensors. Specifically, DOE was informed that some purchasers may choose to deactivate CRE occupancy sensors, thereby forgoing energy savings associated with this design option. Accordingly, DOE updated its energy use analysis for CRE at efficiency levels with occupancy sensors so that the benefit of an occupancy sensor is applied to only 75 percent of purchasers of this feature. The remaining 25 percent would incur the increased equipment cost but not the associated energy savings.[12] The analysis presented in this NODA reflects this change under consideration. DOE requests comments, data, and information on the fraction of CRE that may not have the occupancy sensors activated.

Life-Cycle Cost and Payback Period Analysis

For this NODA, DOE conducted an LCC and PBP analysis using the same general methodology described in the October 2023 NOPR. *See Id.* at 88 FR 70237–70238. Table II.3 summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The following sections discuss updates to the source of method for deriving those inputs—as compared to the October 2023 NOPR—that DOE considered and implemented in this NODA analysis for review and comment. Inputs that utilized the same approach or data source as the October 2023 NOPR are not discussed in this NODA.

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[12] DOE selected 25 percent as a reasonable estimation of the fraction of CRE purchasers that may choose to deactivate their occupancy sensors despite purchasing this feature.

Table II.3 Summary of Inputs and Methods for the LCC and PBP Analysis*

Inputs	Source/Method
Equipment Cost	Derived by multiplying MPCs by manufacturer and retailer markups and sales tax, as appropriate. Apply price learning between present (2023) and compliance year (2028) for LED lighting (1.1% average yearly decline) and variable-speed compressor electronics (6.3% average yearly decline), using historical data to derive a price scaling index to project equipment costs for those components.
Installation Cost	Assumed not to change with efficiency level for a given equipment class; therefore, not considered in the LCC and PBP analyses.
Annual Energy Use	Obtained from energy use analysis. Based on the CRE test procedure for each equipment class at each considered efficiency level.
Energy Prices	Electricity: Edison Electric Institute Typical Bills and Average Rates reports. Variability: Regional energy prices across nine census divisions.
Energy Price Trends	Based on *AEO2023*[13] price projections.
Repair and Maintenance Costs	Material costs derived from the engineering analysis and labor costs derived from RS Means 2023. Considered replacement of LED lighting, evaporators, condensers, compressors, and night curtains; assumed LED lighting repair frequency decreases due to the presence of occupancy sensor when in use by purchaser (see section II.B).**
Equipment Lifetime	Average: 10 years for large buildings and 20 years for small buildings. DOE defined small buildings as those less than or equal to 5,000 ft^2, while large buildings are defined as those greater than 5,000 ft^2
Discount Rates	Approach involves identifying all possible debt or asset classes that might be used to purchase the considered equipment or might be affected indirectly. Primary data source was the Federal Reserve Board's Survey of Consumer Finances.
Compliance Year	2028

* References for the data sources mentioned in this table are provided in the sections following this table. Energy price trends, equipment lifetimes, and discount rates are not used for the PBP calculation.

** For the 25% of purchasers assumed to not utilize the occupancy sensors, the LED lighting repair frequency remains the same as for CRE without occupancy sensors.

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1. Energy Prices

Because marginal electricity price more accurately captures the incremental savings associated with a change in energy use from higher efficiency, it provides a better representation of incremental change in consumer costs than average electricity prices. Therefore, DOE applied average electricity prices for the energy use of the equipment purchased in the no-new-standards case, and marginal electricity prices for the incremental change in energy use associated with the other efficiency levels considered in the October 2023 NOPR. *Id.* at 88 FR 70239.

To derive electricity prices for this NODA analysis, DOE followed the same methodology as in the October 2023 NOPR. However, in this NODA, DOE updated the price data for current electricity prices (from 2022 to 2023). In particular, DOE developed electricity prices in 2023 for each census division using data from Edison Electric Institute (''EEI'') ''Typical Bills and Average Rates'' reports.

To estimate energy prices in future years, DOE followed the same approach as in the October 2023 NOPR, *i.e.,* DOE multiplied the 2023 electricity prices by the projection of annual average price changes for each of the nine census divisions from the reference case in *AEO2023,* which has an end year of 2050.[14]

2. Repair and Maintenance Costs

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

In the October 2023 NOPR, DOE calculated repair costs by considering the typical failure rate of refrigeration system components (compressor, lighting, and evaporator and condenser fan motors), component manufacturer production costs (''MPCs'') and associated markups, and the labor cost of repairs, which is assumed to be performed by private vendors. *Id.* at 88 FR 70239. DOE considered the following specific CRE components and associated failure probabilities during typical CRE lifetime in its repair cost approach: compressor (25 percent), evaporator fan motor (50 percent), condenser fan motor (25 percent), and LED lighting (100 percent), with the presence of occupancy sensors decreasing LED lighting repair frequency by half. *Id.*

In this NODA, DOE also considered repair and replacement costs associated with night curtains and has incorporated such costs into this NODA analysis. Specifically, DOE was informed that night curtains are likely to

[13] For further information, see the ''Assumptions to *AEO2023*'' report that sets forther the major assumptions used to generate the projections in the *AEO2023.* Available at *www.eia.gov/outlooks/aeo/assumptions/* (last accessed April 15, 2024).

[14] EIA. *Annual Energy Outlook 2023.* Available at *www.eia.gov/outlooks/aeo/* (last accessed April 15, 2024).

be replaced before the end of the lifetime of CRE. DOE contacted retailers and manufacturers of night curtains of similar cost to the ones contained in the engineering analysis; these manufacturers and sellers stated that the lifetime varies according to user care. One manufacturer reported a recent replacement from a unit that lasted 10 years. In light of these reports, DOE selected 5 years as a reasonable estimate for the average lifetime of all night curtains. As a result, depending on the lifetime associated with each CRE, night curtains may be replaced once or several times during the CRE lifetime. Furthermore, DOE assumed a half-hour night curtain replacement labor duration at the same labor rates (according to RSMeans 2023) as other CRE components assumed to be replaced during the CRE lifetime (*e.g.,* compressors) in the LCC analysis. DOE assigned these labor rates according to each purchaser's Census division to account for national labor cost variability.

3. Residual Value for Refurbished CRE

To model the phenomenon of CRE sold for refurbishment, DOE utilized a residual value for such equipment in the LCC in the October 2023 NOPR. The residual value represents the remaining dollar value of surviving CRE at the average age of refurbishment. In the October 2023 NOPR, DOE estimated that refurbishments would occur at 5 years for small-size food-service buildings (*e.g.,* restaurants) and 10 years for small-size food-sales and other commercial buildings. To account for the value of CRE with remaining life to the consumer, the LCC model applies this residual value as a ''credit'' at the end of the CRE lifetime and discounts it back to the start of the analysis period. This credit was applied to a fraction of self-contained CRE, totaling about 10 percent of all CRE in the LCC sample. *Id.* at 88 FR 70240.

Since the publication of the October 2023 NOPR, DOE made adjustments to its refurbishment assumptions based on the premise that if the refurbishment market offers a favorable economic opportunity, it could be utilized by all businesses, not just businesses in small-size buildings. Accordingly, for this NODA, DOE still applies a credit to about 10 percent of all CRE in the sample; however the credit may apply to any self-contained equipment, regardless of building size.[15] DOE has no reason to expect that businesses occupying larger size buildings would have a different refurbishment schedule than those occupying small-size buildings, and as such DOE retained the same assumptions as in the October 2023 NOPR regarding the average CRE lifetimes at the time of refurbishment, occurring after 5 years for food-service buildings (*e.g.,* restaurants) and after 10 years for food-sales, and other building types (*e.g.,* grocery stores). See *id.*

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

To accurately estimate the share of consumers that would be affected by a potential energy conservation standard at a particular efficiency level, DOE's LCC analysis considers the projected distribution (market shares) of equipment efficiencies under the no-new-standards case (*i.e.,* the case without amended or new energy conservation standards) in the compliance year. This approach reflects the fact that some consumers may purchase equipment with efficiencies greater than the baseline levels in the absence of new or amended standards.

To estimate the energy efficiency distribution of CRE for 2028 in the October 2023 NOPR, DOE used test data, feedback from manufacturer interviews, surveys, and the ''Single Compartment Commercial Refrigeration Equipment'' data from DOE's CCD, accessed in March 2024.[16] *Id.* In this NODA, DOE presents the following updates to its LCC analysis, which are incorporated into this NODA analysis: (1) using CCD data retrieved on April 15, 2024 in place of CCD data used in the October 2023 NOPR that was retrieved on February 21, 2023, (2) deriving distributions for the new self-contained (large) capacities from CCD, and (3) grouping some self-contained (non-large) categories that had few observations in the CCD.

To create a robust sample for the energy efficiency distribution used in the LCC analysis, DOE separated the analyzed CRE equipment classes into 27 separate groups for this NODA analysis. DOE notes that the analysis for the October 2023 NOPR was based on 21 separate groups; DOE is considering adding new groups to account for equipment classes with two representative capacities (discussed in section II.A.1 of this document), and some self-contained equipment classes were grouped together if there were few model counts in the CCD. For the equipment classes that DOE relied on CCD model count data to formulate the efficiency distributions, this approach was used to allow equipment classes with a limited sample to share the efficiency distribution of a group of similar classes with a larger sample in the CCD. DOE compared energy use data from the CCD with energy use equations from the engineering analysis to derive model counts at each efficiency level. For the 7 self-contained equipment classes with large representative capacities, model counts for each representative unit were taken from subsets of the CCD, filtered by the appropriate volume or TDA. Equipment classes whose efficiency distributions were derived from aggregated data from manufacturer interviews, surveys, and test data were assigned their own groups (these 9 classes are the same ones from the October 2023 NOPR.) The estimated market shares for the no-new-standards case for CRE and the corresponding groupings are shown in table II.4.

In advance of the October 2023 NOPR, DOE conducted manufacturer interviews and collected shipments data for several equipment classes. The equipment classes for which DOE collected shipments data account for 75 percent of total shipments and are marked with an asterisk in table II.4.[17] For the remainder of the equipment classes for which DOE was not able to collect representative shipments data from manufacturers due to low sample sizes, DOE utilized the CCD database to estimate the no-new-standards-case efficiency distribution; this is the same approach used in the October 2023 NOPR. See *Id.*

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[15] Due to the installation complexity of remote condensing CRE, DOE assumed that such equipment are not likely to be refurbished.

[16] U.S. Department of Energy. Compliance Certification Database (''CCD'') for Refrigeration Equipment—Commercial, Single Compartment. Available at *www.regulations.doe.gov/certification-data/* (last accessed April 15, 2024).

[17] For some of these classes, such as chef bases or griddle stands and high-temperature refrigerators, DOE also developed the efficiency distributions based on DOE's test data, data submitted by manufacturers, ENERGY STAR certified data, and data from DOE's CCD.

Table II.4 No-New-Standards Case Efficiency Distributions in 2028

Equipment Class	Group	Market Share by Efficiency Level**							
		EL 0	EL 1	EL 2	EL 3	EL 4	EL 5	EL 6	EL 7
Remote-Condensing Units									
HZO.RC.L	15	100%	--	--	--	--	--	--	--
HZO.RC.M	15	100%	--	--	--	--	--	--	--
SOC.RC.M	13	12%	50%	0%	1%	37%	--	--	--
SVO.RC.M	11	58%	12%	31%	--	--	--	--	--
VCT.RC.L	3	15%	61%	9%	15%		--	--	--
VCT.RC.M	3	9%	35%	5%	8%	43%	--	--	--
VOP.RC.L	1	36%	11%	53%	--	--	--	--	--
VOP.RC.M	1	36%	11%	53%	--	--	--	--	--
Self-Contained Condensing Units (Non-Large)									
CB.SC.L*	20	31%	15%	15%	38%	--	--	--	--
CB.SC.M*	19	23%	0%	23%	54%	--	--	--	--
HCS.SC.L	18	40%	60%	--	--	--	--	--	--
HCS.SC.M	18	24%	35%	41%	--	--	--	--	--
HCT.SC.I	17	26%	3%	21%	1%	1%	8%	40%	
HCT.SC.L	17	26%	3%	21%	1%	1%	8%	40%	
HCT.SC.M	17	43%	6%	35%	1%	2%	13%	--	--
HZO.SC.L	16	7%	48%	45%	--	--	--	--	--
HZO.SC.M	16	7%	48%	45%	--	--	--	--	--
SOC.SC.M	14	41%	2%	1%	5%	0%	7%	0%	44%
SVO.SC.M	12	51%	5%	3%	8%	2%	30%	--	--
VCS.SC.H*	8	0%	25%	50%	25%	--	--	--	--
VCS.SC.I	10	8%	7%	53%	32%	--	--	--	--
VCS.SC.L*	10	52%	0%	44%	4%	--	--	--	--
VCS.SC.M*	9	45%	26%	30%	--	--	--	--	--
VCT.SC.H*	4	27%	14%	14%	0%	9%	9%	0%	27%
VCT.SC.I	7	2%	10%	37%	52%	--	--	--	--
VCT.SC.L*	6	40%	50%	0%	0%	0%	10%	--	--
VCT.SC.M*	5	43%	16%	1%	1%	0%	1%	39%	
VOP.SC.M*	2	90%	0%	2%	4%	1%	4%	--	--
Self-Contained Condensing Units (Large)									
HZO.SC.L	27	6%	94%	--	--	--	--	--	--
SOC.SC.M	26	42%	2%	1%	5%	0%	7%	0%	44%
SVO.SC.M	25	78%	4%	1%	2%	1%	14%	--	--
VCS.SC.L	24	8%	7%	53%	33%	--	--	--	--
VCT.SC.L	23	5%	75%	0%	0%	2%	18%	--	--
VCT.SC.M	22	0%	0%	98%	0%	0%	0%	2%	--
VOP.SC.M	21	76%	1%	1%	4%	2%	16%	--	--

* The distributions for these equipment classes were derived from aggregated data from the Trade Associations Survey, test data, and manufacturer interview data.
** As seen in the table, certain equipment classes have large percentages of shipments at both baseline and at max tech; these distributions are due to variability in equipment design across the market.

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

C. Shipments Analysis

DOE uses projections of annual equipment shipments to calculate the national impacts of potential amended or new energy conservation standards on energy use, net present value ("NPV"), and future manufacturer cashflows.[18] The shipments model takes an accounting approach, tracking market shares of each equipment class and the vintage of units in the stock. Stock accounting uses equipment shipments as inputs to estimate the age distribution of in-service equipment stocks for all years. The age distribution of in-service equipment stocks is a key input to calculations of both the NES and NPV because operating costs for any year depend on the age distribution of the stock.

For the shipments analysis conducted for this NODA, DOE followed the same approach as the October 2023 NOPR, with the exception of CRE that may be subject to refurbishment, as discussed in the following paragraph.

To account for a potential increase in refurbished CRE as a result of increased prices from CRE standards, in the October 2023 NOPR, DOE assumed a price elasticity effect for a fraction of CRE shipments, which was limited to small-sized buildings. *Id.* at 88 FR 70242. In this NODA, DOE modified its price elasticity approach based on the premise that if the refurbishment market offers a favorable economic opportunity, it could be utilized by all businesses. Accordingly, for this NODA, the price elasticity effect [19] applies to all self-contained units, regardless of the building size where those units are installed. DOE assumed that remote condensing CRE are generally not refurbished as they are less likely to be removed from service when being part of a separate condensing system. DOE notes that the price elasticity effect, and a resulting reduction in CRE shipments, is dependent on the price difference between the price consumers pay in the no-new-standards case and the standards case. DOE also acknowledges that, while a CRE refurbishment market may well exist and its magnitude may have recently increased due to supply chain and equipment price increases, this phenomenon applies to the CRE market overall, and is not a result of energy efficiency standards on CRE. With regard to self-contained units, DOE estimates that their market share is approximately 87 percent of the overall new (*i.e.,* not refurbished) CRE market.

D. National Impact Analysis

The NIA assesses the national energy savings ("NES") and the NPV from a national perspective of total consumer costs and savings that would be expected to result from new or amended standards at specific efficiency levels.[20] ("Consumer" in this context refers to consumers of the equipment being regulated.) DOE calculates the NES and NPV for the potential standard levels considered based on projections of annual equipment shipments, along with the annual energy consumption and total installed cost data from the energy use and LCC analyses. For the October 2023 NOPR, DOE projected the energy savings, operating cost savings, equipment costs, and NPV of consumer benefits over the lifetime of CRE sold from 2028 through 2057. *Id.* at 88 FR 70243.

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

Table II.5 summarizes the inputs and methods DOE used for the NIA for this NODA. DOE made updates to some of the key inputs to the NIA analysis compared to the NIA analysis performed in the October 2023 NOPR. In particular, the NIA for this NODA includes slightly updated shipments (see section II.D of this document), slightly updated efficiency distribution (see section II.C of this document), updated annual energy consumption per unit (see section II.A of this document) and updated total installed costs per unit (see section II.A.6 of this document).

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

[19] DOE applied an elasticity constant of −0.5 to shipments for self-contained CRE and scaled this constant down to −0.15 over a period of 20 years from the current year of calculations, holding it constant at that rate for the remainder of the analysis period. This is the same constant and scaling methodology used in the October 2023 NOPR.

[20] The NIA accounts for impacts in the United States and U.S. territories.

Table II.5 Summary of Inputs and Methods for the National Impact Analysis

Inputs	Method
Shipments	Annual shipments from shipments model.
Compliance Date of Standard	2028
Efficiency Trends	N/A (No efficiency trends were applied)
Annual Energy Consumption per Unit	Annual weighted-average values are a function of energy use at each EL.
Total Installed Cost per Unit	Annual weighted-average values are a function of cost at each EL. Incorporates projection of future equipment prices.
Annual Energy Cost per Unit	Annual weighted-average values as a function of the annual energy consumption per unit and energy prices.
Repair and Maintenance Cost per Unit	Annual, weighted-average values from the LCC model.
Energy Price Trends	Prices from LCC analysis and *AEO2023* projections (to 2050) and extrapolation after 2050.
Energy Site-to-Primary and FFC Conversion	Time-series conversion factors based on *AEO2023*.
Discount Rate	3 percent and 7 percent
Present Year	2024

1. Sensitivity Analysis for Equipment With Unique Energy Use Characteristics

As discussed in section II.A.7 of this document, to account for CRE with certain features (*e.g.,* pass-through, sliding door, sliding-door pass-through, roll-in, roll-through, forced-air evaporator, and drawers), DOE applied a single multiplier of 1.07 to the energy use of CRE with such features.

To evaluate the impact of CRE with these unique energy use characteristics in the NIA, DOE conducted a sensitivity analysis in this NODA and estimated the NES and NPV for all CRE, applying a 1.07 energy use multiplier to CRE with these features. Given a lack of market data regarding CRE with these unique energy use characteristics, DOE relied on CCD model counts to estimate their market share. Table II.6 presents the estimated market share of CRE with unique energy use characteristics compared to their corresponding equipment class.

Table II.6 Market Shares of Equipment with Unique Features

Corresponding Equipment Class	Market Share
VCT.RC.M	0.5%
VCT.SC.M (Non-Large)	4.6%
VCT.SC.L (Non-Large)	0.4%
VCS.SC.M	6.4%
VCS.SC.L (Non-Large)	3.9%
HCS.SC.L	8.5%

To model this sensitivity, DOE assumed that the efficiency distribution of the equipment with unique features is the same as that of the overall equipment class. DOE assumed an increased energy consumption for the affected equipment by a factor of 7 percent. DOE modelled another sensitivity with the assumption that 5 percent of equipment in the specified equipment classes will have unique features instead of the market shares shown in table II.6. The results of these sensitivity analyses are shown in the accompanying NODA support document.

E. Manufacturer Impact Analysis

DOE uses the Government Regulatory Impact Model (''GRIM'') to quantify the changes in cash flow due to new or amended standards that result in a higher or lower industry value. The GRIM uses a standard, annual, discounted cash-flow analysis that incorporates manufacturer costs, manufacturer markups, shipments, and industry financial information as inputs. The GRIM models changes in costs, distribution of shipments, investments, and manufacturer margins that could result from a new or amended energy conservation standard. The GRIM spreadsheet uses the inputs to arrive at a series of annual cash flows, beginning in 2024 (the base year of the analysis) and continuing 30 years after the analyzed 2028 compliance year. For this NODA analysis, DOE calculated industry net present value (''INPV'') by summing the stream of annual discounted cash flows during the analysis period. Consistent with the October 2023 NOPR, DOE used a real discount rate of 10.0 percent for the CRE industry. *Id.* at 88 FR 70246. Key inputs to the GRIM (*i.e.,* MPCs, shipments projections, conversion costs, refrigerant transition expenses, and manufacturer markup scenarios) are discussed in the following sections.

1. Manufacturer Production Costs

The changes in the MPCs of covered equipment can affect the revenues, gross margins, and cash flow of the industry. See section II.A of this document for details on the NODA updated engineering analysis.

2. Shipments Projections

The GRIM estimates manufacturer revenues based on total unit shipment projections and the distribution of those shipments by efficiency level. Consistent with the October 2023 NOPR, the GRIM uses the NIA's annual shipment projections derived from the shipments analysis. *Id.* at 88 FR 70196, 70242–70243. See section II.D of this document for details on the NODA updated shipments analysis.

3. Product and Capital Conversion Costs

DOE made certain refinements to the product conversion cost analysis in the October 2023 NOPR, which are incorporated into the analysis conducted for this NODA. 88 FR 70196, 70246–70247. Specifically, for this NODA analysis, DOE incorporated the most recent Department of Labor's Bureau of Labor Statistics (''BLS'') wage data [21] into its product conversion cost estimates and refreshed its equipment database to include up-to-date model listings from its CCD [22] and California Energy Commission's Modernized Appliance Efficiency Database System for covered CRE.[23] Furthermore, to account for the potential increase in testing and certification costs associated with new safety standards (*i.e.,* UL 60335–2–89), which go into effect September 29, 2024, DOE doubled product conversion costs associated with UL testing and certification. For this NODA, DOE updated its capital conversion cost estimates from the October 2023 NOPR to 2023$ and manufacturer counts based on its refreshed model database but otherwise maintained its capital conversion cost methodology from the October 2023 NOPR. *Id.*

4. Refrigerant Transition Investments

As discussed in section II.A.1 of this document, the October 2023 EPA Final Rule restricts the use of hydrofluorocarbons (''HFCs'') in specific sectors or subsectors, including use in certain CRE analyzed in this NODA. Consistent with the October 2023 NOPR, DOE accounted for the costs associated with redesigning CRE to make use of low-GWP refrigerants and retrofitting production facilities to accommodate flammable refrigerants in the GRIM in the no-new-standards case and standards cases. DOE considered the October 2023 EPA Final Rule and the expenses associated with the refrigerant transition in the analytical baseline of this analysis since manufacturers would need to comply with the October 2023 EPA Final Rule regardless of whether or not DOE amended or established standards for CRE. *Id.* at 88 FR 70247. Although refrigerant transition costs associated with the October 2023 EPA Final Rule are not attributed to this rulemaking, DOE accounted for these refrigerant transition costs in the no-new-standards case and standards cases to better reflect industry finances and cash flow over the analysis period.

In this NODA, DOE made refinements to its research and development (''R&D'') refrigerant transition estimate to account for increased testing costs associated with third-party laboratories, as well as adjustments to the timeline of when manufacturers would need to make investments related to the refrigerant transition to align with the revised compliance dates for CRE in the October 2023 EPA Final Rule. *See Id.* at 88 FR 70284. Accordingly, for this NODA, DOE assumed that the transition to low-GWP refrigerants would require industry to invest approximately $14.6 million in R&D and $19.0 million in capital expenditures from 2024 (the NODA reference year) to 2026. Consistent with the October 2023 NOPR, DOE notes that its refrigerant transition estimates of $14.6 million in R&D and $19.0 million capital expenditures reflect an estimate of *future* investments industry would incur to comply with Federal or State refrigerant regulations. DOE acknowledges that manufacturers have already invested a significant amount of time and capital into transitioning CRE to low-GWP refrigerants.

5. Manufacturer Markup Scenarios

This NODA analysis used the same manufacturer markup scenarios as the October 2023 NOPR. *See Id.* at 88 FR 70247–70248.

F. Emissions Analysis, and Monetizing Emissions Impacts

For this NODA pertaining to CRE, DOE conducted the emissions analyses using the same methodology and data sources as in the October 2023 NOPR. *See Id.* at 88 FR 70251–70257. However, DOE updated its social cost of greenhouse gases (''GHG) (''SC–GHG'') estimates, discussed as follows.

To monetize the benefits of reducing GHG emissions, the October 2023 NOPR used the interim SC–GHG 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 on the Social Cost of Greenhouse Gases (''IWG''). As a member of the IWG involved in the development of the February 2021 SC–GHG TSD, DOE agreed that the interim SC–GHG estimates represented the most appropriate estimate of the SC–GHG until revised estimates were developed reflecting the latest, peer-reviewed science. *See Id.* at 88 FR 70253–70255 for discussion of the development and details of the IWG SC–GHG estimates. The IWG has continued working on updating the interim estimates but has not published final estimates.

Accordingly, in the regulatory analysis of its December 2023 Final Rule, ''Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review,'' EPA estimated climate benefits using a new, updated set of SC–GHG estimates (''2023 SC–GHG estimates''). EPA documented the methodology underlying the new estimates in the regulatory impact analysis (''RIA'') for the December 2023 Final Rule and in greater detail in a technical report entitled *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances* that was presented as Supplementary Material to the RIA.[24] The 2023 SC–GHG estimates ''incorporate recent research addressing recommendations of the Natural

[21] U.S. Department of Labor, ''Occupational Employment and Wage Statistics,'' (May 2023). Available at: *www.bls.gov/oes/current/oes_stru.htm#17–0000* (last accessed May 22, 2024).

[22] U.S. Department of Energy's Compliance Certification Database is available at *www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A** (last accessed Jan. 31, 2024).

[23] California Energy Commission's Modernized Appliance Efficiency Database System is available at *cacertappliances.energy.ca.gov/Pages/Search/AdvancedSearch.aspx* (last accessed Jan. 31, 2024).

[24] *https://www.epa.gov/system/files/documents/2023-12/eo12866_oil-and-gas-nsps-eg-climate-review-2060-av16-final-rule-20231130.pdf; https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf* (last accessed July 3, 2024).

Academies of Science, Engineering, and Medicine (''National Academies''), responses to public comments on an earlier sensitivity analysis using draft SC–GHG estimates included in the EPA's December 2022 proposal in the oil and natural gas sector standards of performance rulemaking, and comments from a 2023 external peer review of the accompanying technical report.'' [25]

On December 22, 2023, the IWG issued a memorandum directing that ''agencies should use their professional judgment to determine which estimates of the SC–GHG reflect the best available evidence, are most appropriate for particular analytical contexts, and best facilitate sound decision-making'' consistent with OMB Circular No. A–4 and applicable law.[26]

DOE has been extensively involved in the IWG process and related work on the SC–GHGs for over a decade. This involvement includes DOE's role as the federal technical monitor for the seminal 2017 report on the SC–GHG issued by the National Academies, which provided extensive recommendations on how to strengthen and update the SC–GHG estimates.[27] DOE has also participated in the IWG's work since 2021. DOE technical experts involved in this work reviewed the 2023 SC–GHG methodology and report in light of the National Academies' recommendations and DOE's understanding of the state of the science.

Based on this review, DOE has preliminarily determined that the updated 2023 SC–GHG estimates, including the approach to discounting, represent a significant improvement in estimating the SC–GHG through incorporating the most recent advancements in the scientific literature and by addressing recommendations on prior methodologies. In particular, the 2023 SC–GHG estimates implement the key recommendations of the National Academies, and the 2023 SC–GHG estimates incorporate the extensive scientific findings and methodological advances that have occurred since the last IWG updates in 2013, 2015, and 2016.

The 2023 SC–GHG estimates have also been peer-reviewed. As indicated by their statements, the peer reviewers strongly supported the new methodology, calling it ''a huge advance,'' ''a real step change'' and ''an important improvement'' in estimating the SC–GHG, and noting that it addressed the National Academies' and others' recommendations and ''generally represents well the emerging consensus in the literature.''

The most significant improvements in the 2023 SC–GHG estimates carry out recommendations made by the National Academies. In its report, the National Academies' principal recommendation was to develop and use ''a new framework that would strengthen the scientific basis, provide greater transparency, and improve characterization of the uncertainties of the estimates.'' [28] The IWG's estimates since 2010 have relied on averaging the values produced by three integrated assessment models, each of which generates a set of SC–GHG emissions estimates based on the inputs and assumptions built into that particular model.[29] The National Academies recommended an entirely new approach that would ''unbundle'' this process and instead use a framework in which each step of the SC–GHG calculation is developed as one of four separate but integrated ''modules'': the socioeconomic module, the climate module, the damages module, and the discounting module. The report provided detailed recommendations on developing and using these modules, including how to address discounting, socioeconomic projections, climate modeling, and uncertainty.

DOE preliminarily concludes that the 2023 SC–GHG estimates are consistent with the National Academies' 2017 recommendations and represent major scientific advancements over the IWG's approach. In addition, DOE supports the incorporation of more recent scientific findings and data throughout the development of each of the 2023 SC–GHG modules and the underlying components of those modules.

Thus, in accordance with the IWG memo, and having reviewed the 2023 SC–GHG methodologies and updates, DOE has preliminarily determined that the updated 2023 SC–GHG estimates reflect the best available scientific and analytical evidence and methodologies, are accordingly the most appropriate for DOE analyses, and best facilitate sound decision-making by substantially improving the transparency of the estimates and representations of uncertainty inherent in such estimates. DOE welcomes comment on this preliminary determination.[30] In a final rulemaking, DOE will determine what role, if any, these estimates will play in any final decision adopting new and amended energy conservation standards for CRE.

For this NODA, DOE used these updated 2023 SC–GHG values to monetize the climate benefits of the emissions reductions associated at each efficiency level (''EL'') for CRE. These results are shown in the accompanying NODA support document in table 6.7 through table 6.15. Using these the 2023 SC–GHG estimates provides a better-informed range of potential climate benefits associated with the proposed new and amended standards. The EPA technical report presents SC–GHG values for emissions years through 2080; therefore, DOE did not monetize the climate benefits of GHG emissions reductions occurring after 2080. DOE expects additional climate impacts to accrue from GHG emissions changes post 2080, but due to a lack of readily available SC–GHG estimates for emissions years beyond 2080 and the relatively small emission effects expected from those years, DOE has not monetized these additional impacts in this analysis. The overall climate benefits are generally greater when using the higher, updated 2023 SC–GHG estimates, compared to the climate benefits using the older IWG SC–GHG estimates, which were used in the October 2023 NOPR. To facilitate a comparison, DOE also performed a sensitivity analysis using the IWG's 2021 interim SC–GHG estimates. The results are shown in the accompanying NODA support document.[31] In setting energy efficiency standards for CRE in any subsequent final rule, DOE will, as in the NOPR, consider whether the standards result in positive net benefits under either SC–GHG calculation methodology, as well as in the absence

[25] *https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf* (last accessed July 3, 2024).

[26] *https://www.whitehouse.gov/wp-content/uploads/2023/12/IWG-Memo-12.22.23.pdf* (last accessed July 3, 2024).

[27] Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide √ The National Academies Press. (available at: *https://nap.nationalacademies.org/catalog/24651/valuing-climate-damages-updating-estimation-of-the-social-cost-of*) (last accessed July 3, 2024).

[28] Report Recommends New Framework for Estimating the Social Cost of Carbon √ National Academies (available at: *https://www.nationalacademies.org/news/2017/01/report-recommends-new-framework-for-estimating-the-social-cost-of-carbon*) (last accessed July 3, 2024).

[29] *See https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf at p. 6,* (last accessed July 3, 2024).

[30] See EPA's SC–GHG website for all of the technical files related to the updated estimates, including the final SC–GHG report (provided as Supplementary Material to the Dec 2023 Oil and Gas rule final RIA); all replication instructions and computer code for the estimates; all files related to the public comment and peer review process; and a workbook to assist analysts in applying the estimates: *https://www.epa.gov/environmental-economics/scghg.*

[31] See tables 6.16 through 6.17 in the NODA support document.

of the estimated, monetized climate benefits.

For this NODA, DOE monetized NO_X and SO_2 using the same methodology and data sources as described in chapter 14 of the October 2023 NOPR TSD.

III. Analytical Results

A. Compliance Period

EPCA requires that amended standards would apply to CRE on or after a date that is 3 years after the final rule is published in the **Federal Register** or, if the Secretary determines that 3 years is inadequate, not later than 5 years after the final rule is published in the **Federal Register**. (See 42 U.S.C. 6313(c)(6)(C)) Consistent with the October 2023 NOPR, DOE assumed new and amended standards would apply to CRE manufactured 3 years after the date on which any new and amended standards are published. Currently, DOE anticipates publication of a final rule in the second half of 2024. Therefore, for purposes of its analysis, DOE used 2028 as the first full year of compliance with any new or amended standards for CRE.

Extending the compliance lead-in period from 3 years to a date between 3 to 5 years after a final rule is published in the **Federal Register** would delay the compliance year analyzed in this NODA from 2028 to 2029 or 2030. With regard to the LCC analysis and the NIA, a longer compliance period after publication of a final rule is not expected to result in significant changes to the results of the LCC and the NIA.

Although a number of inputs to the LCC analysis and NIA are time-dependent (*e.g.,* electricity prices, shipments drivers such as floorspace projections, and costs of certain design options that experience price learning, such as light-emitting diode (''LED'') lighting, and electronic components of variable speed compressors), these inputs would not result in significant changes to the results of the LCC and NIA for a 5-year compliance date (2030) compared to a 3-year compliance date (2028).

For the LCC, the relative changes in inputs that are time-dependent are small over a two-year delay. Commercial electricity prices averaged on a national level are forecast by *AEO 2023* to decrease by 1 percent from 2028 to 2030, but expected to exceed 2028 prices again in 2033 and beyond. Equipment costs for higher efficiency levels using LED lighting and variable-speed compressors are expected to decrease up to 0.8 percent from 2028 to 2030 due to the cost reduction associated with price learning.[32] These variations in LCC inputs have only minor effects on the relative comparison of efficiency levels and, as a consequence, would lead only to a slight increase in life-cycle cost savings associated with higher efficiency equipment. Therefore, there are no negative impacts for consumers by a 2-year delay of the compliance year. Furthermore, the efficiency distribution of purchasers does not change over time in the no-new-standards scenario, meaning that a delay of 2 years would not change the percentage of purchasers impacted by a new standard.

Regarding the NIA results, time-dependent inputs (*e.g.,* equipment costs and electricity prices) will cause small variations to the undiscounted NPV. For example, a 2030 compliance date will result in a slight increase in NPV for CRE with design options that experience price learning because their future prices are expected to decrease over time. A delayed compliance date will result in a minor increase in energy savings primarily due to an overall increasing shipments trend in future years. Regarding MIA results, extending the compliance lead-in would allow manufacturers more flexibility to spread out investments over a longer period. Considered in isolation, extending the compliance lead-in could lessen reductions in annual free cash flow over the conversion period in the standards case because the same investments could be spread out over 4 or 5 years instead of 3 years. Because INPV is the sum of discounted annual cash flows over the analysis period, standards case INPV would be similarly impacted by a longer compliance period. Holding other factors constant, the projected change in INPV at more stringent levels would look less negative (or more positive) with a 4 or 5 year compliance period compared to a 3-year compliance period.

B. Life-Cycle Cost and Payback Period

In this NODA, DOE analyzed the economic impacts on CRE consumers by looking at the effects that potential new and amended standards at each EL would have on the LCC and PBP. DOE also examined the impacts of potential standards on selected consumer subgroups. These analyses are discussed in the following sections.

In general, higher-efficiency equipment affect consumers in two ways: (1) purchase price increases and (2) annual operating costs decrease. Inputs used for calculating the LCC and PBP include total installed costs (*i.e.,* equipment price plus installation costs), and operating costs (*i.e.,* annual energy use, energy prices, energy price trends, repair costs, and maintenance costs). The LCC calculation also uses equipment lifetime and a discount rate. Chapter 8 of the October 2023 NOPR TSD provides detailed information on the LCC and PBP analyses.

Table III.1 through table III.66 show the LCC and PBP results based on the updated analysis for the ELs considered for each equipment class in this NODA. In the first of each pair of tables, the simple payback is measured relative to the baseline equipment. In the second table, impacts are measured relative to the efficiency distribution in the no-new-standards case in the compliance year (see section II.C.4 of this document). Because some consumers purchase equipment with higher efficiency in the no-new-standards case, the average savings are less than the difference between the average LCC of the baseline equipment and the average LCC at each EL. The savings refer only to consumers who are affected by a standard at a given EL. Those who already purchase equipment with efficiency at or above a given EL are not affected. Consumers for whom the LCC increases at a given EL experience a net cost.

1. Remote-Condensing Units

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[32] For more details on the price learning methodology, see chapter 8 of the October 2023 NOPR TSD.

Table III.1 LCC and PBP Results by Efficiency Level for SOC.RC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	13,136.48	972.68	10,088.94	23,225.42	--	13.0
1	13,183.92	971.66	10,079.51	23,263.43	46.4	13.0
2	13,378.48	905.46	9,062.59	22,441.08	3.6	13.0
3	13,456.06	904.97	9,058.05	22,514.10	4.7	13.0
4	14,383.60	903.80	9,047.31	23,430.91	18.1	13.0

Table III.2 Average LCC Savings for SOC.RC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	(37.96)	12%
2	814.70	16%
3	741.68	16%
4	(183.08)	37%

Table III.3 LCC and PBP Results by Efficiency Level for SVO.RC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	6,753.52	1,277.44	12,473.84	19,227.36	--	13.1
1	6,943.70	1,197.05	12,190.98	19,134.68	2.4	13.1
2	7,164.79	1,158.82	11,576.13	18,740.92	3.5	13.1

Table III.4 Average LCC Savings for SVO.RC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	95.63	26%
2	471.11	15%

Table III.5 LCC and PBP Results by Efficiency Level for VCT.RC.L

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	8,873.09	1,449.41	14,490.26	23,363.36	--	14.0
1	9,094.49	1,425.49	14,100.03	23,194.52	9.3	14.0
2	9,368.27	1,419.62	14,042.79	23,411.07	16.6	14.0
3	12,642.21	1,383.08	13,686.67	26,328.88	56.8	14.0

Table III.6 Average LCC Savings for VCT.RC.L

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	173.32	4%
2	(183.10)	70%
3	(3,081.12)	86%

Table III.7 LCC and PBP Results by Efficiency Level for VCT.RC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	8,669.99	491.77	5,259.61	13,929.60	--	14.0
1	8,837.37	485.70	5,200.50	14,037.88	27.6	14.0
2	9,058.71	459.41	4,788.21	13,846.92	12.0	14.0
3	9,332.42	458.04	4,774.88	14,107.29	19.6	14.0
4	12,605.47	454.80	4,743.40	17,348.87	106.5	14.0

Table III.8 Average LCC Savings for VCT.RC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	(108.54)	9%
2	169.39	11%
3	(109.12)	32%
4	(3,334.00)	56%

Table III.9 LCC and PBP Results by Efficiency Level for VOP.RC.L

Efficiency Level	Average Costs 2023$				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	9,533.47	4,529.90	42,618.48	52,151.95	--	13.0
1	9,723.64	4,317.78	41,119.32	50,842.96	0.9	13.0
2	9,944.73	4,269.76	40,358.76	50,303.49	1.6	13.0

Table III.10 Average LCC Savings for VOP.RC.L

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	1,296.79	0%
2	1,525.93	3%

Table III.11 LCC and PBP Results by Efficiency Level for VOP.RC.M

Efficiency Level	Average Costs 2023$				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	8,693.14	1,645.12	16,031.53	24,724.67	--	13.0
1	8,883.34	1,537.89	15,498.95	24,382.29	1.8	13.0
2	9,104.46	1,489.97	14,738.80	23,843.26	2.7	13.0

Table III.12 Average LCC Savings for VOP.RC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	335.51	4%
2	795.52	7%

2. Self-Contained Condensing Units (Non-Large)

Table III.13 LCC and PBP Results by Efficiency Level for CB.SC.L

Efficiency Level	Average Costs 2023$				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	2,611.44	275.14	2,632.47	5,176.13	--	13.4
1	2,617.77	269.67	2,582.50	5,132.34	1.2	13.4
2	2,632.90	262.86	2,522.21	5,086.78	1.8	13.4
3	2,776.39	234.00	2,279.53	4,983.86	4.0	13.4

Table III.14 Average LCC Savings for CB.SC.L

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	44.25	0%
2	75.26	0%
3	159.16	9%

Table III.15 LCC and PBP Results by Efficiency Level for CB.SC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	1,941.35	106.86	1,040.26	2,931.53	--	13.3
1	1,947.68	103.43	1,009.80	2,907.24	1.9	13.3
2	1,962.81	99.15	973.79	2,885.97	2.8	13.3
3	2,106.29	83.06	853.70	2,905.66	6.9	13.3

Table III.16 Average LCC Savings for CB.SC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	24.56	0%
2	46.28	1%
3	3.63	27%

Table III.17 LCC and PBP Results by Efficiency Level for HCS.SC.L

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	1,562.04	64.87	626.51	2,146.29	--	13.4
1	1,575.69	60.55	589.36	2,122.44	3.2	13.4

Table III.18 Average LCC Savings for HCS.SC.L

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	24.04	4%

Table III.19 LCC and PBP Results by Efficiency Level for HCS.SC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	1,572.71	46.16	463.79	1,993.39	--	13.3
1	1,583.05	43.50	441.56	1,981.22	3.9	13.3
2	1,596.69	40.18	414.07	1,966.99	4.0	13.3

Table III.20 Average LCC Savings for HCS.SC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	12.34	3%
2	18.85	9%

Table III.21 LCC and PBP Results by Efficiency Level for HCT.SC.I

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	1,371.76	130.49	1,305.56	2,644.01	--	13.5
1	1,444.95	120.09	1,207.15	2,617.01	7.0	13.5
2	1,457.24	118.22	1,189.45	2,611.30	7.0	13.5
3	1,600.51	105.10	1,095.51	2,657.15	9.0	13.5
4	1,689.08	104.02	1,072.50	2,720.56	12.0	13.5
5	1,709.18	103.49	1,067.42	2,735.09	12.5	13.5
6	1,949.61	102.23	1,055.55	2,957.82	20.5	13.5

Table III.22 Average LCC Savings for HCT.SC.I

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	26.52	10%
2	29.09	11%
3	(29.44)	35%
4	(92.38)	41%
5	(104.53)	44%
6	(313.86)	59%

Table III.23 LCC and PBP Results by Efficiency Level for HCT.SC.L

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	1,283.18	81.18	821.28	2,071.89	--	13.4
1	1,356.35	74.97	762.85	2,084.76	11.8	13.4
2	1,368.64	73.93	752.98	2,086.87	11.8	13.4
3	1,457.20	72.86	730.06	2,150.26	20.9	13.4
4	1,477.30	72.51	726.77	2,166.56	22.4	13.4
5	1,620.57	70.97	743.66	2,323.08	33.1	13.4
6	1,860.99	70.18	736.19	2,549.92	52.5	13.4

Table III.24 Average LCC Savings for HCT.SC.L

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	(12.47)	18%
2	(13.06)	21%
3	(70.98)	49%
4	(86.50)	50%
5	(240.45)	52%
6	(434.44)	61%

Table III.25 LCC and PBP Results by Efficiency Level for HCT.SC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	1,240.77	37.81	406.12	1,612.25	--	13.3
1	1,313.94	35.90	388.21	1,665.47	38.3	13.3
2	1,326.23	35.50	384.53	1,673.73	37.1	13.3
3	1,414.77	34.44	361.71	1,736.98	51.6	13.3
4	1,434.87	34.31	360.48	1,755.29	55.4	13.3
5	1,675.24	34.00	357.62	1,986.08	114.1	13.3

Table III.26 Average LCC Savings for HCT.SC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	(53.45)	43%
2	(55.80)	48%
3	(95.77)	83%
4	(112.86)	84%
5	(341.01)	86%

Table III.27 LCC and PBP Results by Efficiency Level for HZO.SC.L (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	2,710.51	1,254.57	11,345.57	13,996.53	--	12.6
1	2,724.11	1,246.72	11,278.62	13,942.88	1.7	12.6
2	3,206.59	1,047.39	9,578.24	12,714.36	2.4	12.6

Table III.28 Average LCC Savings for HZO.SC.L (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	53.87	0%
2	1,232.01	0%

Table III.29 LCC and PBP Results by Efficiency Level for HZO.SC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	2,098.34	521.41	4,712.40	6,764.14	--	12.5
1	2,111.94	515.32	4,661.49	6,726.53	2.2	12.5
2	2,255.04	462.10	4,217.25	6,422.20	2.6	12.5

Table III.30 Average LCC Savings for HZO.SC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	39.14	0%
2	307.76	1%

Table III.31 LCC and PBP Results by Efficiency Level for SOC.SC.M (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	7,372.64	439.42	4,375.09	11,590.67	--	12.5
1	7,396.63	385.87	3,907.48	11,146.53	0.5	12.5
2	7,413.60	380.83	3,866.94	11,122.61	0.7	12.5
3	7,420.61	374.56	3,812.54	11,075.06	0.7	12.5
4	7,563.67	353.84	3,657.23	11,059.75	2.2	12.5
5	7,579.48	353.21	3,651.60	11,069.60	2.4	12.5
6	7,774.02	335.05	3,343.32	10,951.70	3.9	12.5
7	8,109.01	334.37	3,337.22	11,273.44	7.0	12.5

Table III.32 Average LCC Savings for SOC.SC.M (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	440.56	0%
2	447.33	0%
3	480.41	0%
4	447.88	3%
5	437.99	4%
6	499.66	5%
7	178.05	23%

Table III.33 LCC and PBP Results by Efficiency Level for SVO.SC.M (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	3,808.09	1,028.58	9,468.39	13,194.32	--	12.5
1	3,871.48	953.93	8,977.61	12,765.55	0.9	12.5
2	3,884.11	940.55	8,861.44	12,661.74	0.9	12.5
3	3,914.28	923.89	8,720.71	12,550.53	1.0	12.5
4	4,535.76	841.83	8,017.73	12,455.61	3.9	12.5
5	4,650.73	830.12	7,829.91	12,380.28	4.3	12.5

Table III.34 Average LCC Savings for SVO.SC.M (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	428.87	0%
2	492.37	0%
3	574.54	0%
4	599.45	10%
5	662.18	9%

Table III.35 LCC and PBP Results by Efficiency Level for VCS.SC.H

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	3,754.59	83.08	851.62	4,511.51	--	13.5
1	3,760.94	80.66	830.48	4,496.55	2.6	13.5
2	3,776.07	77.65	806.12	4,486.94	4.0	13.5
3	3,919.54	66.46	731.18	4,551.85	9.9	13.5

Table III.36 Average LCC Savings for VCS.SC.H

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	0.00	0%
2	9.75	6%
3	(61.77)	60%

Table III.37 LCC and PBP Results by Efficiency Level for VCS.SC.I

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	4,319.62	684.98	6,517.91	10,719.43	--	13.4
1	4,325.95	679.51	6,468.24	10,675.91	1.2	13.4
2	4,341.08	672.70	6,408.29	10,630.68	1.8	13.4
3	4,628.05	587.55	5,668.30	10,169.81	3.2	13.4

Table III.38 Average LCC Savings for VCS.SC.I

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	45.01	0%
2	70.64	0%
3	478.44	4%

Table III.39 LCC and PBP Results by Efficiency Level for VCS.SC.L (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	3,878.36	479.45	4,553.43	8,325.28	--	13.3
1	3,884.69	473.98	4,503.82	8,281.84	1.2	13.3
2	3,899.82	467.17	4,443.99	8,236.72	1.8	13.3
3	4,043.29	404.60	3,887.25	7,819.51	2.2	13.3

Table III.40 Average LCC Savings for VCS.SC.L (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	43.22	0%
2	87.86	0%
3	465.30	0%

Table III.41 LCC and PBP Results by Efficiency Level for VCS.SC.M

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	3,762.88	128.78	1,283.16	4,946.67	--	13.5
1	3,778.00	123.75	1,239.71	4,917.96	3.0	13.5
2	3,921.46	112.56	1,164.70	4,982.61	9.8	13.5

Table III.42 Average LCC Savings for VCS.SC.M

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	28.98	3%
2	(46.13)	53%

Table III.43 LCC and PBP Results by Efficiency Level for VCT.SC.H

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	4,154.00	123.17	1,307.44	5,355.09	--	13.4
1	4,160.32	120.76	1,286.43	5,340.25	2.6	13.4
2	4,175.43	117.76	1,262.20	5,330.73	4.0	13.4
3	4,318.69	103.36	1,156.36	5,364.50	8.3	13.4
4	4,385.66	101.92	1,142.82	5,416.21	10.9	13.4
5	4,500.77	99.05	1,087.00	5,472.56	14.4	13.4
6	4,610.28	98.59	1,082.63	5,574.89	18.6	13.4
7	5,919.80	97.50	1,072.33	6,840.60	68.8	13.4

Table III.44 Average LCC Savings for VCT.SC.H

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	14.60	1%
2	19.21	7%
3	(20.61)	37%
4	(72.33)	42%
5	(117.70)	55%
6	(205.24)	69%
7	(1,471.06)	73%

Table III.45 LCC and PBP Results by Efficiency Level for VCT.SC.I

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	6,920.79	814.90	7,869.55	14,620.80	--	13.4
1	7,035.90	812.66	7,813.69	14,677.23	51.4	13.4
2	7,145.39	807.49	7,765.22	14,735.57	30.3	13.4
3	8,454.73	775.31	7,463.64	15,711.25	38.7	13.4

Table III.46 Average LCC Savings for VCT.SC.I

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	(57.03)	2%
2	(68.81)	11%
3	(991.06)	48%

Table III.47 LCC and PBP Results by Efficiency Level for VCT.SC.L (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	6,116.42	678.68	6,528.63	12,473.35	--	13.4
1	6,131.53	671.89	6,468.70	12,428.11	2.2	13.4
2	6,418.11	592.68	5,785.08	12,023.03	3.5	13.4
3	6,533.25	589.83	5,729.60	12,079.45	4.7	13.4
4	6,642.77	587.05	5,703.46	12,159.76	5.7	13.4
5	7,952.52	569.77	5,540.80	13,270.08	16.9	13.4

Table III.48 Average LCC Savings for VCT.SC.L (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	45.12	0%
2	427.63	8%
3	370.84	12%
4	290.56	22%
5	(819.86)	83%

Table III.49 LCC and PBP Results by Efficiency Level for VCT.SC.M (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	4,166.13	205.26	2,065.13	6,131.40	--	13.3
1	4,181.23	200.27	2,022.44	6,103.45	3.0	13.3
2	4,324.49	181.27	1,876.08	6,096.92	6.6	13.3
3	4,391.45	178.86	1,853.55	6,139.74	8.5	13.3
4	4,506.57	176.02	1,798.13	6,196.67	11.6	13.3
5	4,616.07	175.24	1,790.87	6,296.28	15.0	13.3
6	5,925.51	173.41	1,773.72	7,557.16	55.2	13.3

Table III.50 Average LCC Savings for VCT.SC.M (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	27.96	3%
2	28.63	27%
3	(14.45)	39%
4	(70.92)	45%
5	(170.30)	52%
6	(1,426.42)	61%

Table III.51 LCC and PBP Results by Efficiency Level for VOP.SC.M (Non-Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	6,064.25	1,274.48	11,835.07	17,768.25	--	12.6
1	6,127.64	1,180.61	11,168.70	17,163.89	0.7	12.6
2	6,146.60	1,160.61	10,994.06	17,007.81	0.7	12.6
3	6,191.84	1,135.70	10,782.64	16,840.64	0.9	12.6
4	6,477.98	989.72	9,529.29	15,867.22	1.5	12.6
5	6,619.47	975.16	9,290.79	15,767.15	1.9	12.6

Table III.52 Average LCC Savings for VOP.SC.M (Non-Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	602.98	0%
2	758.60	0%
3	913.23	0%
4	1,854.34	0%
5	1,932.42	0%

3. Self-Contained Condensing Units (Large)

Table III.53 LCC and PBP Results by Efficiency Level for HZO.SC.L (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	4,445.44	4,418.96	39,798.25	44,147.29	--	12.5
1	4,499.86	4,387.51	39,531.08	43,933.35	1.7	12.5

Table III.54 Average LCC Savings for HZO.SC.L (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	214.07	0%

Table III.55 LCC and PBP Results by Efficiency Level for SOC.SC.M (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	13,730.99	1,190.20	11,590.72	25,023.04	--	12.6
1	13,816.61	1,035.61	10,244.87	23,760.94	0.6	12.6
2	13,848.31	1,022.45	10,134.97	23,682.05	0.7	12.6
3	13,865.22	1,006.07	9,991.91	23,555.53	0.7	12.6
4	13,972.60	999.42	9,957.20	23,625.86	1.3	12.6
5	14,020.03	997.30	9,938.01	23,653.08	1.5	12.6
6	14,214.59	953.81	9,261.49	23,166.88	2.1	12.6
7	15,219.69	951.50	9,240.71	24,129.30	6.2	12.6

Table III.56 Average LCC Savings for SOC.SC.M (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	1,254.83	0%
2	1,287.15	0%
3	1,382.73	0%
4	1,185.29	5%
5	1,158.17	5%
6	1,511.88	3%
7	551.11	19%

Table III.57 LCC and PBP Results by Efficiency Level for SVO.SC.M (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	5,580.76	2,081.36	19,173.54	24,628.22	--	12.5
1	5,707.55	1,922.78	18,054.79	23,633.39	0.8	12.5
2	5,732.83	1,895.97	17,821.62	23,424.93	0.8	12.5
3	5,793.16	1,862.58	17,539.30	23,201.57	1.0	12.5
4	5,895.88	1,825.87	17,233.66	22,996.32	1.2	12.5
5	6,010.85	1,800.97	16,853.81	22,728.85	1.5	12.5

Table III.58 Average LCC Savings for SVO.SC.M (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	992.95	0%
2	1,151.00	0%
3	1,354.69	0%
4	1,531.38	0%
5	1,776.97	1%

Table III.59 LCC and PBP Results by Efficiency Level for VCS.SC.L (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	6,455.59	1,445.05	13,681.47	19,970.75	0.0	13.4
1	6,468.26	1,429.85	13,542.14	19,843.76	0.8	13.4
2	6,498.52	1,416.21	13,422.19	19,753.29	1.5	13.4
3	6,642.00	1,343.01	12,765.26	19,236.15	1.8	13.4

Table III.60 Average LCC Savings for VCS.SC.L (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	129.20	0%
2	163.19	0%
3	553.84	0%

Table III.61 LCC and PBP Results by Efficiency Level for VCT.SC.L (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	7,096.31	1,018.36	9,707.28	16,613.23	--	13.3
1	7,126.52	997.48	9,519.95	16,455.29	1.5	13.3
2	7,269.76	950.85	9,114.04	16,188.78	2.6	13.3
3	7,384.86	946.51	9,037.93	16,224.68	4.0	13.3
4	7,549.10	941.65	8,992.37	16,338.95	5.9	13.3
5	9,513.04	911.37	8,708.89	17,966.66	22.6	13.3

Table III.62 Average LCC Savings for VCT.SC.L (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	156.55	0%
2	274.84	3%
3	238.83	9%
4	123.87	34%
5	(1,506.56)	81%

Table III.63 LCC and PBP Results by Efficiency Level for VCT.SC.M (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	7,375.84	665.95	6,720.94	13,894.31	--	13.4
1	7,406.05	660.74	6,679.80	13,882.55	5.8	13.4
2	7,549.30	643.91	6,551.92	13,894.00	7.9	13.4
3	7,716.71	636.51	6,482.16	13,987.04	11.6	13.4
4	7,831.82	610.38	6,113.29	13,730.12	8.2	13.4
5	8,105.58	608.00	6,090.79	13,973.87	12.6	13.4
6	11,379.14	602.36	6,037.70	17,104.45	63.0	13.4

Table III.64 Average LCC Savings for VCT.SC.M (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	10.73	0%
2	(17.35)	<1%
3	(93.04)	96%
4	164.79	25%
5	(78.93)	66%
6	(3,209.30)	98%

Table III.65 LCC and PBP Results by Efficiency Level for VOP.SC.M (Large)

Efficiency Level	Average Costs *2023$*				Simple PBP *years*	Average Lifetime *years*
	Installed Cost	First Year's Operating Cost	Lifetime Operating Cost	LCC		
Baseline	6,360.07	2,402.14	22,212.09	28,436.22	--	12.6
1	6,455.13	2,214.28	20,765.30	27,082.45	0.5	12.6
2	6,480.38	2,187.30	20,529.72	26,871.57	0.6	12.6
3	6,540.71	2,153.69	20,243.99	26,644.89	0.7	12.6
4	6,633.90	2,080.29	19,606.35	26,098.43	0.9	12.6
5	6,775.35	2,051.08	19,156.90	25,787.40	1.2	12.6

Table III.66 Average LCC Savings for VOP.SC.M (Large)

Efficiency Level	Average LCC Savings *2023$*	% of Consumers that Experience Net Cost
1	1,359.47	0%
2	1,557.08	0%
3	1,765.96	0%
4	2,233.06	0%
5	2,489.70	0%

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4. Consumer Subgroup Analysis

In the consumer subgroup analysis in this NODA, DOE estimated the impact of the considered ELs on small businesses. As in the October 2023 NOPR, DOE applies small business-specific discount rates, which are mostly higher than those in the full consumer sample. For this NODA, DOE also applied small business-specific energy prices, which are generally higher than those in the full consumer sample. Table III.67 compares the average LCC savings and PBP at each efficiency level for the consumer subgroups with similar metrics for the entire consumer sample for CRE. In most cases, the average LCC savings and PBP for small businesses at the considered efficiency levels are not substantially different from the average for all consumers.

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Table III.67 Comparison of LCC Savings and PBP for Small Businesses and All Businesses

Equipment Class	EL	Average LCC Savings		Simple Payback Period		Net Cost	
		2023$		*years*		*%*	
		Small Business	Ref. Case	Small Business	Ref. Case	Small Business	Ref. Case
Remote-Condensing Units							
SOC.RC.M	1	-37.36	-37.96	37.5	46.4	12%	12%
	2	796.91	814.70	2.9	3.6	16%	16%
	3	724.19	741.68	3.8	4.7	16%	16%
	4	-199.67	-183.08	14.6	18.1	31%	37%
SVO.RC.M	1	217.33	95.63	1.9	2.4	3%	26%
	2	555.42	471.11	2.8	3.5	12%	15%
VCT.RC.L	1	156.59	173.32	7.5	9.3	4%	4%
	2	-184.12	-183.10	13.5	16.6	69%	70%
	3	-3068.27	-3,081.12	46.2	56.8	86%	86%
VCT.RC.M	1	-106.12	-108.54	22.4	27.6	9%	9%
	2	157.07	169.39	9.8	12.0	11%	11%
	3	-119.57	-109.12	16.0	19.6	30%	32%
	4	-3341.57	-3,334.00	86.5	106.5	56%	56%
VOP.RC.L	1	1511.61	1,296.79	0.7	0.9	0%	0%
	2	1674.17	1,525.93	1.3	1.6	3%	3%
VOP.RC.M	1	479.03	335.51	1.4	1.8	0%	4%
	2	888.14	795.52	2.1	2.7	3%	7%
Self-Contained Condensing Units (Non-Large)							
CB.SC.L	1	46.60	44.25	0.9	1.2	0%	0%
	2	80.14	75.26	1.4	1.8	0%	0%
	3	178.26	159.16	3.3	4.0	3%	9%
CB.SC.M	1	26.36	24.56	1.5	1.9	0%	0%
	2	50.58	46.28	2.3	2.8	0%	1%
	3	17.49	3.63	5.6	6.9	19%	27%
HCS.SC.L	1	26.25	24.04	2.6	3.2	0%	4%
HCS.SC.M	1	14.00	12.34	3.2	3.9	1%	3%
	2	21.66	18.85	3.3	4.0	4%	9%
HCT.SC.I	1	30.98	26.52	5.7	7.0	2%	10%
	2	33.87	29.09	5.7	7.0	2%	11%
	3	-17.03	-29.44	7.3	9.0	32%	35%
	4	-81.89	-92.38	9.8	12.0	44%	41%
	5	-94.15	-104.53	10.2	12.5	47%	44%
	6	-304.97	-313.86	16.7	20.5	60%	59%
HCT.SC.L	1	-9.90	-12.47	9.6	11.8	20%	18%
	2	-10.35	-13.06	9.6	11.8	22%	21%
	3	-71.10	-70.98	17.0	20.9	50%	49%
	4	-86.51	-86.50	18.2	22.4	51%	50%
	5	-235.48	-240.45	26.8	33.1	52%	52%
	6	-430.51	-434.44	42.6	52.5	61%	61%
HCT.SC.M	1	-52.75	-53.45	31.2	38.3	43%	43%
	2	-55.03	-55.80	30.2	37.1	48%	48%

Equipment Class	EL	Average LCC Savings		Simple Payback Period		Net Cost	
		2023$		*years*		*%*	
		Small Business	Ref. Case	Small Business	Ref. Case	Small Business	Ref. Case
	3	-97.02	-95.77	42.0	51.6	83%	83%
	4	-114.10	-112.86	45.1	55.4	84%	84%
	5	-342.85	-341.01	92.9	114.1	86%	86%
HZO.SC.L (Non-Large)	1	59.30	53.87	1.4	1.7	0%	0%
	2	1373.26	1232.01	1.9	2.4	0%	0%
HZO.SC.M	1	43.12	39.14	1.8	2.2	0%	0%
	2	348.24	307.76	2.1	2.6	0%	1%
SOC.SC.M (Non-Large)	1	476.46	440.56	0.4	0.5	0%	0%
	2	485.68	447.33	0.6	0.7	0%	0%
	3	521.83	480.41	0.6	0.7	0%	0%
	4	502.44	447.88	1.8	2.2	2%	3%
	5	492.92	437.99	1.9	2.4	2%	4%
	6	537.95	499.66	3.1	3.9	4%	5%
	7	215.94	178.05	5.7	7.0	18%	23%
SVO.SC.M (Non-Large)	1	506.31	428.87	0.7	0.9	0%	0%
	2	571.64	492.37	0.7	0.9	0%	0%
	3	661.16	574.54	0.8	1.0	0%	0%
	4	731.25	599.45	3.2	3.9	3%	10%
	5	786.21	662.18	3.4	4.3	3%	9%
VCS.SC.H	1	0.00	0.00	2.1	2.6	0%	0%
	2	11.45	9.75	3.2	4.0	4%	6%
	3	-52.49	-61.77	8.1	9.9	64%	60%
VCS.SC.I	1	47.61	45.01	0.9	1.2	0%	0%
	2	75.47	70.64	1.4	1.8	0%	0%
	3	524.32	478.44	2.6	3.2	0%	4%
VCS.SC.L (Non-Large)	1	46.03	43.22	0.9	1.2	0%	0%
	2	94.45	87.86	1.4	1.8	0%	0%
	3	501.22	465.30	1.8	2.2	0%	0%
VCS.SC.M	1	31.37	28.98	2.5	3.0	0%	3%
	2	-36.25	-46.13	8.0	9.8	52%	53%
VCT.SC.H	1	15.94	14.60	2.1	2.6	0%	1%
	2	21.91	19.21	3.2	4.0	3%	7%
	3	-8.16	-20.61	6.8	8.3	30%	37%
	4	-59.47	-72.33	8.9	10.9	44%	42%
	5	-110.28	-117.70	11.7	14.4	59%	55%
	6	-198.89	-205.24	15.1	18.6	72%	69%
	7	-1468.12	-1471.06	56.0	68.8	73%	73%
VCT.SC.I	1	-61.66	-57.03	41.8	51.4	2%	2%
	2	-67.57	-68.81	24.7	30.3	11%	11%
	3	-979.89	-991.06	31.5	38.7	48%	48%
	1	48.76	45.12	1.8	2.2	0%	0%

Equipment Class	EL	Average LCC Savings		Simple Payback Period		Net Cost	
		2023$		*years*		*%*	
		Small Business	Ref. Case	Small Business	Ref. Case	Small Business	Ref. Case
VCT.SC.L (Non-Large)	2	471.13	427.63	2.9	3.5	1%	8%
	3	410.83	370.84	3.8	4.7	3%	12%
	4	331.37	290.56	4.7	5.7	8%	22%
	5	-775.98	-819.86	13.7	16.9	88%	83%
VCT.SC.M (Non-Large)	1	30.89	27.96	2.5	3.0	0%	3%
	2	43.48	28.63	5.4	6.6	15%	27%
	3	1.00	-14.45	6.9	8.5	32%	39%
	4	-59.12	-70.92	9.5	11.6	46%	45%
	5	-158.48	-170.30	12.2	15.0	56%	52%
	6	-1417.85	-1426.42	44.9	55.2	61%	61%
VOP.SC.M (Non-Large)	1	689.96	602.98	0.6	0.7	0%	0%
	2	858.78	758.60	0.6	0.7	0%	0%
	3	1029.15	913.23	0.7	0.9	0%	0%
	4	2064.56	1854.34	1.2	1.5	0%	0%
	5	2133.24	1932.42	1.5	1.9	0%	0%
Self-Contained Condensing Units (Large)							
HZO.SC.L (Large)	1	235.22	214.07	1.4	1.7	0%	0%
SOC.SC.M (Large)	1	1,356.76	1,254.83	0.5	0.6	0%	0%
	2	1,394.68	1,287.15	0.6	0.7	0%	0%
	3	1,498.53	1,382.73	0.6	0.7	0%	0%
	4	1,297.49	1,185.01	1	1.3	5%	5%
	5	1,271.51	1,157.89	1.2	1.5	5%	5%
	6	1,768.87	1,715.83	1.7	2.1	1%	0%
	7	806.78	755.06	5.1	6.2	12%	14%
SVO.SC.M (Large)	1	1,142.27	992.95	0.7	0.8	0%	0%
	2	1,310.89	1,151.00	0.7	0.8	0%	0%
	3	1,535.24	1,354.68	0.8	1	0%	0%
	4	1,734.40	1,531.32	1	1.2	0%	0%
	5	2,063.24	1,886.47	1.2	1.5	0%	0%
VCS.SC.L (Large)	1	135.93	129.2	0.7	0.8	0%	0%
	2	173.27	163.19	1.2	1.5	0%	0%
	3	591.52	553.84	1.5	1.8	0%	0%
VCT.SC.L (Large)	1	169.87	156.55	1.2	1.5	0%	0%
	2	301.64	274.5	2.1	2.6	0%	4%
	3	283.57	263.8	3.3	4	1%	6%
	4	170.27	148.78	4.8	5.9	11%	28%
	5	-1,452.97	-1,482.17	18.4	22.6	82%	81%
VCT.SC.M (Large)	1	13.9	10.73	4.7	5.8	0%	0%
	2	-2.22	-17.35	6.4	7.9	0%	0%
	3	-90.63	-93.04	9.5	11.6	97%	96%
	4	228.53	246.85	6.7	8.2	24%	23%

Equipment Class	EL	Average LCC Savings		Simple Payback Period		Net Cost	
		2023$		years		%	
		Small Business	Ref. Case	Small Business	Ref. Case	Small Business	Ref. Case
	5	-15.12	3.13	10.3	12.6	44%	52%
	6	-3,153.64	-3,127.24	51.4	63	98%	98%
VOP.SC.M (Large)	1	1,502.70	1,359.47	0.4	0.5	0%	0%
	2	1,714.79	1,557.08	0.5	0.6	0%	0%
	3	1,942.66	1,765.96	0.6	0.7	0%	0%
	4	2,444.87	2,232.78	0.7	0.9	0%	0%
	5	2,800.22	2,623.51	1	1.2	0%	0%

5. Rebuttable Presumption Payback

EPCA establishes a rebuttable presumption that an energy conservation standard is economically justified if the increased purchase cost for equipment that meets the standard is less than three times the value of the first-year energy savings resulting from the standard. (42 U.S.C. 6316(e)(1); 42 U.S.C. 6295(o)(2)(B)(iii)) In calculating a rebuttable presumption payback period for each of the considered Els in this NODA, DOE used discrete values and, as required by EPCA, based the energy use calculation on the DOE test procedure for CRE. In contrast, the PBPs presented in section III.B of this document were calculated using distributions that reflect the range of energy use in the field.

Table III. presents the rebuttable-presumption payback periods for the considered ELs for CRE.

Table III.68 Rebuttable-Presumption Payback Periods

Equipment Class	Rebuttable Presumption PBP (years)						
	EL 1	EL 2	EL 3	EL 4	EL 5	EL 6	EL 7
Remote-Condensing Units							
SOC.RC.M	39.7	3.3	4.3	16.7			
SVO.RC.M	2.2	3.2					
VCT.RC.L	8.4	15	51.4				
VCT.RC.M	24.7	10.8	17.7	96			
VOP.RC.L	0.8	1.5					
VOP.RC.M	1.6	2.4					
Self-Contained Condensing Units (Non-Large)							
	EL 1	EL 2	EL 3	EL 4	EL 5	EL 6	EL 7
CB.SC.L	1.1	1.6	3.6				
CB.SC.M	1.6	2.4	6.3				
HCS.SC.L	2.9						
HCS.SC.M	3.7	3.8					
HCT.SC.I	6.3	6.3	8.1	10.8	11.3	18.4	
HCT.SC.L	10.2	10.2	18.2	19.5	29.2	46.8	
HCT.SC.M	36.8	35.8	48.6	48.7	99.2		
HZO.SC.L (Non-Large)	1.6	2.2					
HZO.SC.M	2	2.4					
SOC.SC.M (Non-Large)	0.4	0.6	0.7	2.1	2.2	3.5	6.5
SVO.SC.M (Non-Large)	0.8	0.8	0.9	3.6	3.9		
VCS.SC.H	2.3	3.6	9				
VCS.SC.I	1	1.5	2.8				
VCS.SC.L (Non-Large)	1.1	1.6	2				
VCS.SC.M	2.7	8.9					
VCT.SC.H	2.3	3.6	7.5	9.9	13	16.6	61.6
VCT.SC.I	34.8	24.9	34.3				
VCT.SC.L (Non-Large)	2	3.2	4.2	5.2	15.2		
VCT.SC.M (Non-Large)	2.7	5.9	7.6	10.4	13.5	49.6	
VOP.SC.M (Non-Large)	0.6	0.7	0.8	1.3	1.7		
Self-Contained Condensing Units (Large)							
	EL 1	EL 2	EL 3	EL 4	EL 5	EL 6	EL 7

HZO.SC.L (Large)	1.6						
SOC.SC.M (Large)	0.5	0.6	0.7	1.2	1.4	1.9	5.8
SVO.SC.M (Large)	0.7	0.8	0.9	1.1	1.4		
VCS.SC.L (Large)	0.8	1.3	1.6				
VCT.SC.L (Large)	1.3	2.3	3.6	5.3	20.4		
VCT.SC.M (Large)	5.4	7.1	10.4	7.4	11.3	56.8	
VOP.SC.M (Large)	0.5	0.5	0.7	0.8	1.1		

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B. Economic Impacts on Manufacturers

Table III.69 shows the efficiency level grouping analyzed in the GRIM in this NODA. The MIA does not present results by equipment class and efficiency level because redesign and investments for one equipment class may impact multiple equipment classes because different equipment classes can share the same architecture, tooling, and production lines. Therefore, the MIA presents results based on a representative combination of efficiency levels for remote-condensing units, self-contained condensing units (non-large), and self-contained condensing units (large). The accompanying NODA support document shows the analyzed design options and energy use equations for each considered efficiency level.

1. Industry Cashflow Analysis Results

Table III.70 through table III.72 present the GRIM results for the updated CRE analysis discussed in this NODA for the CRE remote-condensing units, the CRE self-contained condensing units (non-large), and the CRE self-contained condensing units (large). The methodology and assumptions used in the MIA did not change from the October 2023 NOPR except for the analytical changes described in prior sections of this document. Details of the MIA inputs and methodology are available in chapter 12 of the October 2023 NOPR TSD.

Table III.69 Efficiency Level Groupings for Manufacturer Impact Analysis

Equipment Group		Efficiency Level Group				
		1	2	3	4	5
Remote-Condensing Unit	HZO.RC.L	EL 0	EL 0	EL 0	EL 0	EL 0
	HZO.RC.M	EL 0	EL 0	EL 0	EL 0	EL 0
	SOC.RC.M	EL 0	EL 0	EL 0	EL 3	EL 4
	SVO.RC.M	EL 1	EL 1	EL 1	EL 2	EL 2
	VCT.RC.L	EL 0	EL 0	EL 0	EL 1	EL 3
	VCT.RC.M	EL 0	EL 0	EL 0	EL 2	EL 4
	VOP.RC.L	EL 1	EL 1	EL 1	EL 2	EL 2
	VOP.RC.M	EL 1	EL 1	EL 1	EL 2	EL 2
Self-Contained Condensing Unit (Non-Large)	CB.SC.L	EL 1	EL 3	EL 3	EL 3	EL 3
	CB.SC.M	EL 1	EL 3	EL 3	EL 3	EL 3
	HCS.SC.L	EL 1	EL 1	EL 1	EL 1	EL 1
	HCS.SC.M	EL 1	EL 2	EL 2	EL 2	EL 2
	HCT.SC.I	EL 1	EL 2	EL 2	EL 2	EL 6
	HCT.SC.L	EL 0	EL 6	EL 0	EL 0	EL 6
	HCT.SC.M	EL 0	EL 5	EL 0	EL 0	EL 5
	HZO.SC.L (Non-Large)	EL 1	EL 2	EL 2	EL 2	EL 2
	HZO.SC.M	EL 1	EL 2	EL 2	EL 2	EL 2
	SOC.SC.M (Non-Large)	EL 1	EL 7	EL 5	EL 7	EL 7
	SVO.SC.M (Non-Large)	EL 1	EL 4	EL 4	EL 5	EL 5
	VCS.SC.H	EL 2	EL 2	EL 2	EL 2	EL 3
	VCS.SC.I	EL 1	EL 3	EL 3	EL 3	EL 3
	VCS.SC.L (Non-Large)	EL 1	EL 2	EL 3	EL 3	EL 3
	VCS.SC.M	EL 1	EL 1	EL 1	EL 1	EL 2
	VCT.SC.H	EL 1	EL 2	EL 2	EL 2	EL 7
	VCT.SC.I	EL 0	EL 0	EL 0	EL 0	EL 3
	VCT.SC.L (Non-Large)	EL 1	EL 3	EL 2	EL 4	EL 5
	VCT.SC.M (Non-Large)	EL 1	EL 4	EL 2	EL 2	EL 6
	VOP.SC.M (Non-Large)	EL 1	EL 4	EL 4	EL 5	EL 5
Self-Contained Condensing Unit (Large)	HZO.SC.L (Large)	EL 1	EL 1	EL 1	EL 1	EL 1
	SOC.SC.M (Large)	EL 1	EL 1	EL 5	EL 7	EL 7
	SVO.SC.M (Large)	EL 1	EL 4	EL 4	EL 5	EL 5
	VCS.SC.L (Large)	EL 1	EL 3	EL 3	EL 3	EL 3
	VCT.SC.L (Large)	EL 1	EL 5	EL 2	EL 4	EL 5
	VCT.SC.M (Large)	EL 1	EL 3	EL 1	EL 4	EL 6
	VOP.SC.M (Large)	EL 1	EL 4	EL 4	EL 5	EL 5

Table III.70 Manufacturer Impact Analysis Results – Remote-Condensing Units

	Unit	No-New-Standards Case	Efficiency Level Group				
			1	2	3	4	5
INPV	*2023$ Million*	756.7	754.8 to 756.5	754.8 to 756.5	754.8 to 756.5	739.3 to 746.5	716.0 to 823.9
Change in INPV	*2023$ Million*	-	(1.9) to (0.3)	(1.9) to (0.3)	(1.9) to (0.3)	(17.5) to (10.2)	(40.7) to 67.2
	%	-	(0.3) to (0.0)	(0.3) to (0.0)	(0.3) to (0.0)	(2.3) to (1.3)	(5.4) to 8.9
Free Cashflow (2027)	*2023$ Million*	66.3	65.4	65.4	65.4	57.1	52.5
Change in Free Cashflow (2027)	*%*	-	(1.4)	(1.4)	(1.4)	(13.9)	(20.9)
Product Conversion Costs	*2023$ Million*	-	2.9	2.9	2.9	26.2	39.7
Capital Conversion Costs	*2023$ Million*	-	0.0	0.0	0.0	0.9	1.2
Total Conversion Costs	*2023$ Million*	-	2.9	2.9	2.9	27.1	40.9

*Parentheses denote negative (-) values.

Table III.71 Manufacturer Impact Analysis Results –Self-Contained Condensing Units (Non-Large)

	Unit	No-New-Standards Case	Efficiency Level Group				
			1	2	3	4	5
INPV	*2023$ Million*	2,265.9	2,240.9 to 2,243.2	2,156.6 to 2,195.7	2,180.9 to 2,208.7	2,177.1 to 2,210.7	2,059.8 to 2,253.6
Change in INPV	*2023$ Million*	-	(24.9) to (22.7)	(109.3) to (70.2)	(84.9) to (57.2)	(88.8) to (55.2)	(206.1) to (12.2)
	%	-	(1.1) to (1.0)	(4.8) to (3.1)	(3.7) to (2.5)	(3.9) to (2.4)	(9.1) to (0.5)
Free Cashflow (2027)	*2023$ Million*	198.2	185.1	145.8	157.5	156.5	123.4
Change in Free Cashflow (2027)	*%*	-	(6.6)	(26.4)	(20.5)	(21.1)	(37.8)
Product Conversion Costs	*2023$ Million*	-	39.1	125.5	95.7	97.7	183.8
Capital Conversion Costs	*2023$ Million*	-	0.0	22.9	19.1	19.9	29.4
Total Conversion Costs	*2023$ Million*	-	39.1	148.4	114.8	117.6	213.2

*Parentheses denote negative (-) values.

Table III.72 Manufacturer Impact Analysis Results –Self-Contained Condensing Units (Large)

	Unit	No-New-Standards Case	Efficiency Level Group				
			1	2	3	4	5
INPV	*2023$ Million*	239.9	239.4 to 239.8	221.4 to 235.8	227.6 to 229.2	222.6 to 229.8	202.8 to 259.3
Change in INPV	*2023$ Million*	-	(0.5) to (0.1)	(18.5) to (4.1)	(12.3) to (10.7)	(17.2) to (10.1)	(37.1) to 19.5
	%	-	(0.2) to (0.0)	(7.7) to (1.7)	(5.1) to (4.4)	(7.2) to (4.2)	(15.4) to 8.1
Free Cashflow (2027)	*2023$ Million*	21.0	20.8	13.6	14.6	12.9	11.8
Change in Free Cashflow (2027)	*%*	-	(1.0)	(35.2)	(30.7)	(38.8)	(43.6)
Product Conversion Costs	*2023$ Million*	-	0.6	14.7	13.3	16.2	19.2
Capital Conversion Costs	*2023$ Million*	-	0.0	5.5	4.4	6.1	6.1
Total Conversion Costs	*2023$ Million*	-	0.6	20.2	17.7	22.3	25.3

*Parentheses denote negative (-) values.

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2. Direct Impacts on Employment

For the direct employment analysis, DOE revised the methodology used to estimate the lower bound impacts to domestic production employment in the October 2023 NOPR, which was incorporated into the analysis conducted for this NODA. DOE maintained the same estimate of U.S. labor percentage of 77 percent from the October 2023 NOPR for this NODA. *See* at *Id.* 88 FR 70196, 70282–70283.

Using the GRIM, DOE estimated that in the absence of new and amended energy conservation standards, there would be 1,966 domestic production and non-production workers for CRE remote-condensing units in 2028, 9,613 domestic production and non-production workers for CRE self-contained condensing units (non-large) in 2028, and 928 production and non-production workers for CRE self-contained condensing units (large) in 2028. Table III.73 through table III.75 show the range of impacts of energy conservation standards on U.S. manufacturing employment in the CRE industry for remote-condensing units, self-contained condensing units (non-large), and self-contained condensing units (large).

Table III.73 Direct Employment Impacts for Domestic CRE Manufacturers in 2028 –Remote-Condensing Units

	No-New-Standards Case	Efficiency Level Group				
		1	2	3	4	5
Direct Employment in 2028 (Production Workers + Non-Production Workers)	1,966	1,966	1,966	1,966	1,429 to 1,967	1,079 to 2,113
Potential Changes in Direct Employment in 2028*	-	-	-	-	(537) to 1	(887) to 147

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

Table III.74 Direct Employment Impacts for Domestic CRE Manufacturers in 2028 – Self-Contained Condensing Units (Non-Large)

	No-New-Standards Case	Efficiency Level Group				
		1	2	3	4	5
Direct Employment in 2028 (Production Workers + Non-Production Workers)	9,613	9,606 to 9,613	9,523 to 9,613	5,585 to 9,513	5,582 to 9,509	4,615 to 9,271
Potential Changes in Direct Employment in 2028*	-	(7) to 0	(90) to 0	(4,028) to (100)	(4,031) to (104)	(4,998) to (342)

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

Table III.75 Direct Employment Impacts for Domestic CRE Manufacturers in 2028 – Self-Contained Condensing Units (Large)

	No-New-Standards Case	Efficiency Level Group				
		1	2	3	4	5
Direct Employment in 2028 (Production Workers + Non-Production Workers)	928	926 to 928	317 to 911	671 to 922	316 to 921	313 to 842
Potential Changes in Direct Employment in 2028*	-	(2) to 0	(611) to (17)	(257) to (6)	(612) to (7)	(615) to (86)

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

The upper bound estimate corresponds to a potential change in the number of domestic production workers that would result from new and amended energy conservation standards if manufacturers continue to produce the same scope of covered equipment within the United States after the analyzed compliance date. Most of the design options analyzed in the engineering analysis require manufacturers to purchase more-efficient components from suppliers. These components do not require significant additional labor to assemble or significant production line updates. For this NODA, DOE modeled an incremental increase in labor content associated with implementing improved door designs (*i.e.,* moving to double-pane, triple-pane, or vacuum-insulated glass door designs).

The lower bound estimate conservatively assumes that some domestic manufacturing either is eliminated or moves abroad at more stringent efficiency levels. For levels that require capital investment and higher per-unit labor content, DOE assumed that some manufacturing could move abroad as relocating production to lower-labor cost countries could become increasingly attractive.

The employment impacts discussed in this section are independent of the employment impacts from the broader U.S. economy.

C. National Impact Analysis

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

1. National Energy Savings

To estimate the energy savings attributable to potential new and amended standards for CRE, DOE compared their energy consumption under the no-new-standards case to their anticipated energy consumption at each EL in this NODA. The savings are measured over the entire lifetime of equipment purchased in the 30-year period that begins in the year of anticipated compliance with new and amended standards 2028–2057. Table III.76 presents DOE's projections of the national energy savings for each EL for CRE. The savings were calculated using the approach described in section II.E of this document.

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Table III.76 Cumulative National Energy Savings for CRE; 30 Years of Shipments 2028–2057 Full Fuel Cycle Energy Savings

	Efficiency Level						
	1	2	3	4	5	6	7
	Quads						
Self-Contained Condensing Units (Non-Large)							
CB.SC.L	0.000	0.000	0.000	--	--	--	--
CB.SC.M	0.001	0.002	0.008	--	--	--	--
HCS.SC.L	0.002	--	--	--	--	--	--
HCS.SC.M	0.001	0.002	--	--	--	--	--
HCT.SC.I	0.001	0.002	0.005	0.005	0.005	0.005	--
HCT.SC.L	0.001	0.001	0.001	0.001	0.002	0.002	--
HCT.SC.M	0.000	0.000	0.001	0.001	0.001	--	--
HZO.SC.L	0.000	0.002	--	--	--	--	--
HZO.SC.M	0.000	0.001	--	--	--	--	--
SOC.SC.M	0.005	0.005	0.006	0.008	0.008	0.010	0.011
SVO.SC.M	0.010	0.012	0.014	0.028	0.030	--	--
VCS.SC.H	-	0.000	0.002	--	--	--	--
VCS.SC.I	0.000	0.000	0.014	--	--	--	--
VCS.SC.L	0.018	0.040	0.414	--	--	--	--
VCS.SC.M	0.048	0.217	--	--	--	--	--
VCT.SC.H	0.000	0.000	0.002	0.002	0.002	0.002	0.002
VCT.SC.I	0.000	0.000	0.004	--	--	--	--
VCT.SC.L	0.008	0.227	0.234	0.241	0.278	--	--
VCT.SC.M	0.031	0.194	0.214	0.239	0.245	0.253	--
VOP.SC.M	0.016	0.019	0.023	0.048	0.050	--	--
Self-Contained Condensing Units (Large)							
HZO.SC.L	0.000	--	--	--	--	--	--
SOC.SC.M	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SVO.SC.M	0.032	0.038	0.045	0.053	0.058	--	--
VCS.SC.L	0.000	0.000	0.007	--	--	--	--
VCT.SC.L	0.001	0.030	0.032	0.035	0.052	--	--
VCT.SC.M	0.000	0.000	0.012	0.054	0.057	0.060	--
VOP.SC.M	0.039	0.045	0.052	0.068	0.074	--	--
Remote Condensing Units							
SOC.RC.M	0.000	0.004	0.004	0.004	--	--	--
SVO.RC.M	0.037	0.058	--	--	--	--	--
VCT.RC.L	0.008	0.018	0.089	--	--	--	--
VCT.RC.M	0.001	0.034	0.035	0.041	--	--	--
VOP.RC.L	0.001	0.001	--	--	--	--	--
VOP.RC.M	0.068	0.107	--	--	--	--	--

* A value of 0.000 indicates savings of less than 0.0005

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2. Net Present Value of Consumer Costs and Benefits

DOE estimated the cumulative NPV of the total costs and savings for consumers that would result from the ELs considered for CRE. In accordance with OMB's guidelines on regulatory analysis,[33] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table III.77 and table III.78 show the consumer NPV results at 3 percent and 7 percent discount rates with impacts counted over the lifetime of equipment purchased during the period 2028–2057.

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[33] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. *https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A4/a-4.pdf* (last accessed June 6, 2024).

Table III.77 Cumulative Net Present Value of Consumer Benefits for CRE; 30 Years of Shipments (2028–2057) at 3 Percent Discount Rate

	Efficiency Level						
	1	2	3	4	5	6	7
	(Million 2023$)						
Self-Contained Condensing Units (Non-Large)							
CB.SC.L	0.1	0.2	0.6	--	--	--	--
CB.SC.M	2.7	5.1	12.4	--	--	--	--
HCS.SC.L	4.9	--	--	--	--	--	--
HCS.SC.M	1.5	5.9	--	--	--	--	--
HCT.SC.I	2.4	2.9	3.7	(3.0)	(4.6)	(33.9)	--
HCT.SC.L	(0.3)	(0.3)	(6.9)	(8.7)	(22.7)	(52.2)	--
HCT.SC.M	(4.7)	(5.5)	(15.6)	(18.8)	(59.2)	--	--
HZO.SC.L	0.0	6.6	--	--	--	--	--
HZO.SC.M	0.0	2.1	--	--	--	--	--
SOC.SC.M	23.3	24.7	27.4	31.9	31.4	43.3	24.4
SVO.SC.M	32.6	41.5	51.7	73.7	84.0	--	--
VCS.SC.H	-	0.3	(0.7)	--	--	--	--
VCS.SC.I	0.4	1.3	49.7	--	--	--	--
VCS.SC.L	76.0	156.3	1,650	--	--	--	--
VCS.SC.M	152.0	61.3	--	--	--	--	--
VCT.SC.H	0.4	0.7	1.7	(0.4)	(2.5)	(8.2)	(74.8)
VCT.SC.I	(0.1)	(0.7)	(49.7)	--	--	--	--
VCT.SC.L	30.5	777.5	718.5	617.9	(740.4)	--	--
VCT.SC.M	97.5	370.5	210.2	34.2	(369.8)	(5,385)	--
VOP.SC.M	56.3	71.1	87.4	193.5	206.3	--	--
Self-Contained Condensing Units (Large)							
HZO.SC.L	0.0	--	--	--	--	--	--
SOC.SC.M	3.5	3.8	4.2	4.1	4.0	6.9	3.9
SVO.SC.M	115	141	169	201	255	--	--
VCS.SC.L	0.7	1.6	27.6	--	--	--	--
VCT.SC.L	3.5	108.1	112.1	80.9	(364.9)	--	--
VCT.SC.M	0.0	0.1	(62.0)	183.4	4.5	(2,087)	--
VOP.SC.M	161.2	186.9	215.1	290.9	336.9	--	--
Remote Condensing Units							
SOC.RC.M	(0.17)	27.3	25.5	2.7	--	--	--
SVO.RC.M	20.4	165	--	--	--	--	--
VCT.RC.L	39.9	(124)	(2,635)	--	--	--	--
VCT.RC.M	(11.0)	145.2	(14.6)	(2,351)	--	--	--
VOP.RC.L	2.36	3.87	--	--	--	--	--
VOP.RC.M	115	401	--	--	--	--	--

* A value of 0.0 indicates savings of less than 0.05

** Numbers in brackets indicate negative values

Table III.78 Cumulative Net Present Value of Consumer Benefits for CRE; 30 Years of Shipments (2028–2057) at 7 Percent Discount Rate

	Efficiency Level						
	1	2	3	4	5	6	7
	(Million 2023$)						
Self-Contained Condensing Units (Non-Large)							
CB.SC.L	0.0	0.1	0.2	--	--	--	--
CB.SC.M	1.1	2.1	2.6	--	--	--	--
HCS.SC.L	1.9	--	--	--	--	--	--
HCS.SC.M	0.6	2.2	--	--	--	--	--
HCT.SC.I	0.6	0.8	(0.5)	(4.5)	(5.5)	(21.9)	--
HCT.SC.L	(0.6)	(0.7)	(4.7)	(5.8)	(13.7)	(30.1)	--
HCT.SC.M	(2.8)	(3.3)	(9.5)	(11.3)	(33.6)	--	--
HZO.SC.L	0.0	2.8	--	--	--	--	--
HZO.SC.M	0.0	0.9	--	--	--	--	--
SOC.SC.M	10.3	10.9	12.0	13.3	13.0	17.1	6.6
SVO.SC.M	14.2	18.1	22.4	26.8	30.4	--	--
VCS.SC.H	-	0.1	(1.4)	--	--	--	--
VCS.SC.I	0.2	0.6	20.1	--	--	--	--
VCS.SC.L	33.0	66.5	695	--	--	--	--
VCS.SC.M	60.8	(80.8)	--	--	--	--	--
VCT.SC.H	0.1	0.3	0.1	(1.2)	(2.7)	(5.8)	(42.7)
VCT.SC.I	(0.1)	(0.5)	(29.7)	--	--	--	--
VCT.SC.L	12.7	310.0	268.1	209	(564)	--	--
VCT.SC.M	38.9	104.3	3.9	(126)	(352)	(3,135)	--
VOP.SC.M	24.7	31.2	38.1	83.1	87.5	--	--
Self-Contained Condensing Units (Large)							
HZO.SC.L	0.0	--	--	--	--	--	--
SOC.SC.M	1.6	1.7	1.8	1.8	1.7	2.6	0.9
SVO.SC.M	50.4	61.6	73.5	86.8	102.6	--	--
VCS.SC.L	0.3	0.7	11.7	--	--	--	--
VCT.SC.L	1.5	44.3	38.3	19.3	(236.3)	--	--
VCT.SC.M	0.0	0.0	(41.0)	95.4	(6.1)	(1,193)	
VOP.SC.M	71.2	82.4	94.4	127.3	146.2	--	--
Remote Condensing Units							
SOC.RC.M	(0.1)	11.6	10.6	(2.1)	--	--	--
SVO.RC.M	4.8	63.5	--	--	--	--	--
VCT.RC.L	14.1	(82.7)	(1,520)	--	--	--	--
VCT.RC.M	(6.9)	49.4	(40.5)	(1,345)	--	--	--
VOP.RC.L	1.0	1.7	--	--	--	--	--
VOP.RC.M	45.6	164.5	--	--	--	--	--

* A value of 0.0 indicates savings of less than 0.05

** Numbers in brackets indicate negative values

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D. Need of the Nation To Conserve Energy

Enhanced energy efficiency, where economically justified, improves the Nation's energy security, strengthens the economy, and reduces the environmental impacts (costs) of energy production. Reduced electricity demand due to energy conservation standards is also likely to reduce the cost of maintaining the reliability of the electricity system, particularly during peak-load periods.

Energy conservation resulting from potential energy conservation standards for CRE is expected to yield environmental benefits in the form of reduced emissions of certain air pollutants and greenhouse gases. DOE also estimated monetary benefits likely to result from the reduced emissions that DOE estimated for each of the considered ELs for CRE. Chapter 6 of the accompanying NODA support document provides DOE's estimate of cumulative emissions reductions and associated monetized benefits expected to result at each EL.

IV. Public Participation

DOE requests comment on the updated analysis for CRE presented in the NODA. As noted in the October 2023 NOPR, DOE may adopt energy efficiency levels that are either higher or lower than the proposed standards in the October 2023 NOPR. *Id.* at 88 FR 70196, 70203.

DOE will accept comments, data, and information regarding this NODA no later than the date provided in the **DATES** section at the beginning of this document. Interested parties may submit comments, data, and other information using any of the methods described in the **ADDRESSES** section at the beginning of this document.

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

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

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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).

V. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notification of data availability and request for comment.

Signing Authority

This document of the Department of Energy was signed on August 17, 2024, by Jeffrey Marootian, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on August 21, 2024.

Treena V. Garrett,

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

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 27

[Docket No. FAA–2024–0875; Notice No. 27–24–01–SC]

Special Conditions: Skyryse, Robinson Helicopter Company Model R66 Helicopter; Interaction of Systems and Structures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for the Robinson Helicopter Company (Robinson) Model R66 helicopter. This helicopter, as modified by Skyryse, will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for normal category helicopters. This design feature is a novel control input and fly-by-wire (FBW) system. The applicable airworthiness regulations do not contain