DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE–2019–BT–STD–0035]

RIN 1904–AE66

Energy Conservation Program: Energy Conservation Standards for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps

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

ACTION: Notification of proposed determination and request for comment.

SUMMARY: The Energy Policy and Conservation Act, as amended (''EPCA''), prescribes energy conservation standards for various consumer products and certain commercial and industrial equipment, including Packaged Terminal Air Conditioners (''PTACs'') and Packaged Terminal Heat Pumps (''PTHPs''). EPCA also requires the U.S. Department of Energy (''DOE'') to periodically review standards. In this notification of proposed determination (''NOPD''), DOE has preliminarily determined that it lacks clear and convincing evidence that more-stringent standards for PTACs and PTHPs would be economically justified. As such, DOE has preliminarily determined that energy conservation standards for PTACs and PHTPs do not need to be amended. DOE requests comment on this proposed determination and the associated analyses and results.

DATES: *Meeting:* DOE will hold a public meeting via webinar on Wednesday, July 20, 2022, from 1:00 p.m. to 4:00 p.m. See section VII, ''Public Participation,'' for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

Comments: Written comments and information are requested and will be accepted on or before August 23, 2022.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov* under docket number EERE–2019–BT–STD–0035. Follow the instructions for submitting comments.

Alternatively, interested persons may submit comments, identified by docket number EERE–2019–BT–STD–0035, by any of the following methods:

(1) *Email: PTACHP2019STD0035@ee.doe.gov.* Include the docket number EERE–2019–BT–STD–0035in 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 VII of this document.

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

The docket web page can be found at *www.regulations.gov/docket/EERE-2019-BT-STD-0035.* The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section VII, ''Public Participation,'' for further information on how to submit comments through *www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT:

Mr. Lucas Adin, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–5B, 1000 Independence Avenue SW, Washington, DC, 20585–0121. Telephone: (202) 287–5904. Email: *ApplianceStandardsQuestions@ee.doe.gov.*

Ms. Amelia Whiting, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC, 20585–0121. Telephone: (202) 586–2588. Email: *Amelia.Whiting@Hq.Doe.Gov.*

For further information on how to submit a comment 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:

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I. Synopsis of the Proposed Determination

Title III, Part C [1] of EPCA,[2] established the Energy Conservation Program for Certain Industrial Equipment. (42 U.S.C. 6311–6317) Such equipment includes PTACs and PTHPs, the subject of this rulemaking. Pursuant to EPCA, DOE is to consider amending the energy efficiency standards for certain types of commercial and industrial equipment, including the equipment at issue in this document, whenever the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (''ASHRAE'') amends the standard levels or design requirements prescribed in ASHRAE Standard 90.1, ''Energy Standard for Buildings Except Low-Rise Residential Buildings,'' (''ASHRAE Standard 90.1''). Under a separate provision of EPCA, DOE is required to review the existing energy conservation standards for those types of covered equipment subject to ASHRAE Standard 90.1 every six 6 years to determine whether those standards need to be amended. (42 U.S.C. 6313(a)(6)(A)–(C)) DOE is conducting this review of the energy conservation standards for PTACs and PTHPs under EPCA's six-year-lookback authority. (42 U.S.C. 6313(a)(6)(C))

For this proposed determination, DOE analyzed PTACs and PTHPs subject to standards specified in Title 10 of the Code of Federal Regulations (''CFR'') part 431.97. DOE first analyzed the technological feasibility of more energy efficient PTACs and PTHPs. For those PTACs and PTHPs for which DOE determined higher standards to be technologically feasible, DOE estimated energy savings that would result from potential energy conservation standards by conducting a national impacts analysis (''NIA''). DOE also considered whether potential energy conservation standards would be economically justified. As discussed in the following sections, DOE has tentatively determined that it lacks clear and convincing evidence that amended energy conservation standards for PTACs and PTHPs would be economically justified. DOE evaluated whether higher standards would be cost effective by conducting life-cycle cost (''LCC'') and payback period (''PBP'') analyses, and estimated the net present value (''NPV'') of the total costs and benefits experienced by consumers.

Based on the results of the analyses, summarized in section V of this document, DOE has tentatively determined that it lacks clear and convincing evidence that more-stringent standards would result in significant additional energy savings and be technologically feasible and economically justified.

II. Introduction

The following section briefly discusses the statutory authority underlying this proposed determination, as well as some of the historical background relevant to the establishment of standards for PTACs and PTHPs.

A. Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part C of EPCA (42 U.S.C. 6311–6317, as codified), 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. This equipment includes PTACs and PTHPs, the subject of this document. (42 U.S.C. 6311(1)(I)) EPCA prescribed initial standards for this equipment. (42 U.S.C. 6313(a)(3))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) the establishment of Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6311), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), energy conservation standards (42 U.S.C. 6313), and the authority to require information and reports from manufacturers (42 U.S.C. 6316; 42 U.S.C. 6296).

Subject to certain criteria and conditions, DOE is required to develop test procedures to measure the energy efficiency, energy use, or estimated annual operating cost of covered equipment. (42 U.S.C. 6314(a)(2)) Manufacturers of covered equipment must use the Federal test procedures as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(b); 42 U.S.C. 6296), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)) Similarly, DOE uses these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA. The DOE test procedures for PTACs and PTHPs appear at title 10 of the CFR part 431 section 96(g).

EPCA contains mandatory energy conservation standards for commercial heating, air-conditioning, and water-heating equipment. (42 U.S.C. 6313(a)) Specifically, the statute sets standards for small, large, and very large commercial package air conditioning and heating equipment, packaged terminal air conditioners and packaged terminal heat pumps, warm-air furnaces, packaged boilers, storage water heaters, instantaneous water heaters, and unfired hot water storage tanks. *Id.* In doing so, EPCA established Federal energy conservation standards that generally corresponded to the levels in the ASHRAE Standard 90.1 in effect on October 24, 1992 (*i.e.,* ASHRAE Standard 90.1–1989), for each type of covered equipment listed in 42 U.S.C. 6313(a)

If ASHRAE Standard 90.1 is amended with respect to the standard levels or design requirements applicable under that standard for certain commercial equipment, including PTACs and PTHPs, not later than 180 days after the amendment of the standard, DOE must publish in the **Federal Register** for public comment an analysis of the energy savings potential of amended energy efficiency standards. (42 U.S.C.

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

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

6313(a)(6)(A)(i)) DOE must adopt amended energy conservation standards at the new efficiency level in ASHRAE Standard 90.1, unless clear and convincing evidence supports a determination that adoption of a more-stringent efficiency level as a national standard would produce significant additional energy savings and be technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii))

To determine whether a standard is economically justified, EPCA requires that DOE determine whether the benefits of the standard exceed its burdens by considering, to the greatest extent practicable, the following seven factors:

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

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

(3) The total projected amount of energy savings likely to result directly from the standard;

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

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

(6) The need for national energy conservation; and

(7) Other factors the Secretary considers relevant.

(42 U.S.C. 6313(a)(6)(B)(ii))

If DOE adopts as a national standard the efficiency levels specified in the amended ASHRAE Standard 90.1, DOE must establish such a standard not later than 18 months after publication of the amended industry standard. (42 U.S.C. 6313(a)(6)(A)(ii)(I)) If DOE determines that a more-stringent standard is appropriate under the statutory criteria, DOE must establish the more-stringent standard not later than 30 months after publication of the revised ASHRAE Standard 90.1. (42 U.S.C. 6313(a)(6)(B)(i))

EPCA also requires that every six years DOE shall evaluate the energy conservation standards for each class of certain covered commercial equipment, including PTACs and PTHPs, and publish either a notice of determination that the standards do not need to be amended, or a notice of proposed rulemaking (''NOPR'') that includes new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6313(a)(6)(C)(i)) EPCA further provides that, not later than three years after the issuance of a final determination not to amend standards, DOE must publish either a notice of determination that standards for the product do not need to be amended, or a NOPR including new proposed energy conservation standards (proceeding to a final rule, as appropriate). (42 U.S.C. 6313(a)(6)(C)(iii)(II)) DOE must make the analysis on which the determination is based publicly available and provide an opportunity for written comment. (42 U.S.C. 6313(a)(6)(C)(ii))

DOE is publishing this NOPD in satisfaction of the 6-year review requirement in EPCA, having initially determined that DOE lacks clear and convincing evidence that amended standards for PTACs and PTHPs would be economically justified.

B. Background

1. Current Standards

In a final rule published on July 21, 2015 (''July 2015 final rule''), DOE prescribed the current energy conservation standards for PTACs and PTHPs. 80 FR 43162. These levels are expressed in energy efficiency ratio (''EER'') for the cooling mode and in coefficient of performance (''COP'') for the heating mode for PTHPs. EER is defined as the ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in British thermal units (''Btu'')/watt-hour. 10 CFR 431.92. COP is defined as the ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement. 10 CFR 431.92.

The current energy conservation standards are located at 10 CFR 431.97, Table 7 and Table 8 and repeated in Table II–1.

TABLE II–1—FEDERAL ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS

Equipment Class			Efficiency level *	Compliance date: products manufactured on or after
Equipment type	Category	Cooling capacity (British thermal units per hour (''Btu/h''))		
PTAC	Standard Size **	<7,000 Btu/h	EER − 11.9	January 1, 2017.
		≥7,000 Btu/h and ≤15,000 Btu/h	EER-14.0—(0.300 × Cap‡)	January 1, 2017.
		>15,000 Btu/h	EER-9.5	January 1, 2017.
\	Non-Standard Size †	<7,000 Btu/h	EER-9.4	October 7, 2010.
		≥7,000 Btu/h and ≤15,000 Btu/h	EER-10.9—(0.213 × Cap †)	October 7, 2010.
		>15,000 Btu/h	EER-7.7	October 7, 2010.
PTHP	Standard Size **	<7,000 Btu/h	EER-11.9 COP = 3.3	October 8, 2012.
		≥7,000 Btu/h and ≤15,000 Btu/h	EER-14.0—(0.300 × Cap‡) COP = 3.7—(0.052 × Cap ‡)	October 8, 2012.
		>15,000 Btu/h	EER-9.5 COP-2.9	October 8, 2012.
	Non-Standard Size †	<7,000 Btu/h	EER-9.3 COP-2.7	October 7, 2010.
		≥7,000 Btu/h and ≤15,000 Btu/h	EER-10.8—(0.213 × Cap ‡) COP = 2.9—(0.026 × Cap ‡)	October 7, 2010.

TABLE II–1—FEDERAL ENERGY CONSERVATION STANDARDS FOR PTACS AND PTHPS—Continued

Equipment Class			Efficiency level *	Compliance date: products manufactured on or after
Equipment type	Category	Cooling capacity (British thermal units per hour (“Btu/h”))		
	....	>15,000 Btu/h	EER-7.6 .... COP-2.5	October 7, 2010.

* For equipment rated according to the DOE test procedure prescribed at 10 CFR 431.96(g).
** Standard size means a PTAC or PTHP with wall sleeve dimensions having an external wall opening of greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches. 10 CFR 431.92.
† Non-standard size means a PTAC or PTHP with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches. *Id.*
†† Cap means cooling capacity in thousand Btu/h at 95°F outdoor dry-bulb temperature.

2. History of Standards Rulemakings for PTACs and PTHPs

In the July 2015 final rule, DOE published amendments to the PTAC and PTHP standards in response to the 2013 update to ASHRAE Standard 90.1 (“ASHRAE Standard 90.1–2013”). 80 FR 43162. DOE determined that ASHRAE Standard 90.1–2013 amended the standards for three of the 12 PTAC and PTHP equipment classes: PTAC standard size less than 7,000 Btu/h, PTAC standard size greater than or equal 7,000 Btu/h and less than or equal to 15,000 Btu/h, and PTAC standard size greater than 15,000 Btu/h. 80 FR 43162, 43163. DOE adopted the standard levels for these three equipment classes as updated by ASHRAE Standard 90.1–2013, with compliance with the amended standards required for equipment manufactured on or after January 1, 2017. *Id.* DOE did not amend the energy conservation standards for the remaining nine equipment classes which were already aligned with the standards in ASHRAE Standard 90.1–2013. 80 FR 43162, 43166. DOE was unable to show with clear and convincing evidence that energy conservation standards at levels more stringent than the minimum levels specified in the ASHRAE Standard 90.1–2013 for any of the 12 equipment classes would be economically justified. 80 FR 43162, 43163.

Since ASHRAE Standard 90.1–2013 was published, ASHRAE Standard 90.1 has undergone two further revisions. A revision was published on October 26, 2016 (“ASHRAE Standard 90.1–2016”) and a revision was published on October 24, 2019 (“ASHRAE Standard 90.1–2019”). Neither of these publications amended the minimum EER and COP levels for PTACs and PTHPs.

In support of the present review of the PTACs and PTHPs energy conservation standards, DOE published an early assessment review request for information (“RFI”) on December 21, 2020 (“December 2020 ECS RFI”), which identified various issues on which DOE sought comment to inform its determination of whether the standards need to be amended. 85 FR 82952.

DOE received comments in response to the December 2020 ECS RFI from the interested parties listed in Table II–2 of this document. These comments are discussed in detail in section IV of this document.

TABLE II–2—DECEMBER 2020 ECS RFI WRITTEN COMMENTS

Commenter(s)	Reference in this NOPD	Commenter type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	Trade Association.
Appliance Standards Awareness Project	ASAP	Efficiency Organizations.
GE Appliances	GEA	Manufacturer.
Northwest Energy Efficiency Alliance	NEEA	Efficiency Organizations.
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison.	CA IOUs	Utilities.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[3]

C. Deviation From Appendix A

In accordance with section 3(a) of 10 CFR part 430 subpart C, appendix A (“appendix A”), applicable to covered equipment under 10 CFR 431.4, DOE notes that it is deviating from the provision in appendix A regarding the comment period for a NOPR. Section 6(f)(2) of appendix A specifies that the length of the public comment period for a NOPR will not be less than 75 days. For this proposed determination, DOE has opted to instead provide a 60-day comment period. As stated previously, DOE requested comment in the December 2020 ECS RFI on the technical and economic analyses that would be used to determine whether a more stringent standard would result in significant conservation of energy and is technologically feasible and economically justified. DOE has determined that a 60-day comment period, in conjunction with the prior December 2020 ECS RFI, provides sufficient time for interested parties to review the proposed rule and develop comments.

III. General Discussion

DOE developed this proposed determination after considering comments, data, and information from interested parties that represent a variety of interests. This proposed determination addresses issues raised by these commenters.

A. Equipment Classes and Scope of Coverage

When evaluating and establishing energy conservation standards, DOE divides covered equipment into

[3] The parenthetical reference provides a reference for information located in the docket. (Docket No. EERE–2019–BT–STD–0035, which is maintained at *www.regulations.gov).* The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

equipment classes by the type of energy used or by capacity or other performance-related features that justify differing standards. This proposed determination covers PTACs and PTHPs.

PTAC is defined as a wall sleeve and a separate un-encased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. 10 CFR 431.92. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity. *Id.*

PTHP is defined as a PTAC that utilizes reverse cycle refrigeration as its prime heat source, that has a supplementary heat source available, with the choice of hot water, steam, or electric resistant heat, and that is industrial equipment. *Id.*

The scope of coverage is discussed in further detail in section IV.A.1 of this document. The PTAC and PTHP classes for this proposed determination are discussed in further detail in section IV.A.2 of this document.

B. Test Procedure

EPCA sets forth generally applicable criteria and procedures for DOE's adoption and amendment of test procedures. (42 U.S.C. 6314(a)) Manufacturers of covered equipment must use these test procedures to certify to DOE that their product complies with energy conservation standards and to quantify the efficiency of their product. (42 U.S.C. 6314(d)) As discussed, DOE's current energy conservation standards for PTACs and PTHPs are expressed in terms of EER and COP. 10 CFR 431.97.

DOE's current test procedures for PTACs and PTHPs were last updated in a test procedure final rule on June 30, 2015 (''June 2015 TP final rule''). 80 FR 37136. The current test procedure for cooling mode incorporates by reference AHRI Standard 310/380–2014, ''Standard for Packaged Terminal Air-Conditioners and Heat Pumps'' (''AHRI Standard 310/380–2014'') with the following sections applicable to the DOE test procedure: sections 3, 4.1, 4.2, 4.3, and 4.4; American National Standards Institute (''ANSI'')/ASHRAE 16–1983 (RA 2014), ''Method of Testing for Rating Room Air Conditioners and Packaged Terminal Air Conditioners'' (''ANSI/ASHRAE Standard 16–1983'') and ANSI/ASHRAE 37–2009, ''Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment'' (''ANSI/ASHRAE Standard 37–2009''). 10 CFR 431.96(g)(1) The current test procedure for heating mode testing incorporates by reference AHRI Standard 310/380–2014, with the following sections applicable to the DOE test procedure: sections 3, 4.1, 4.2 (except section 4.2.1.2(b)), 4.3, and 4.4; and ANSI/ASHRAE Standard 58–1986 (RA 2014), ''Method of Testing for Rating Room Air-Conditioner and Packaged Terminal Air-Conditioner Heating Capacity'' (''ANSI/ASHRAE Standard 58–1986''). 10 CFR 431.96(g)(2). The currently applicable DOE test procedures for PTACs and PTHPs appear at 10 CFR 431.96 (g).

The current test procedures also include additional provisions in paragraphs (c) and (e) of 10 CFR 431.96. 10 CFR 431.96(b)(1). Paragraph (c) of 10 CFR 431.96 specifies provisions for an optional compressor break-in period, and paragraph (e) of 10 CFR 431.96 details what information sources can be used for unit set-up and provides specific set-up instructions for refrigerant parameters (*e.g.,* superheat) and air flow rate.[4]

DOE's current test procedure for PTACs and PTHPs do not include a seasonal metric that includes part-load performance. As part of an ongoing test procedure rulemaking, DOE published a RFI on May 25, 2021 (''May 2021 TP RFI''), in which DOE requested information and data to consider amendments to DOE's test procedure for PTACs and PTHPs. 86 FR 28005. Specifically, DOE requested comment on whether it should consider adopting for PTACs and PTHPs a cooling-mode metric and a heating-mode metric that integrates part-load performance to better represent full-season efficiency. 86 FR 28005, 28010–28011. Were DOE to amend the PTAC and PTHP test procedure to incorporate a part-load metric, it would conduct any analysis for future standards rulemakings, if any, based on the amended test procedure.

DOE received general comments related to the test procedure in response to the December 2020 ECS RFI. DOE will consider such comments in the ongoing test procedure rulemaking. Discussion of part-load technologies as they relate to standards is contained in section IV.A.3 of this document.

For the purpose of this NOPD, DOE relied on the test procedures for PTACs and PTHPs as currently established at 10 CFR 431.96(g).

[4] The amendatory instructions in the June 2015 TP final rule for PTACs and PTHPs includes the reference to AHRI Standard 310/380–2014 in paragraphs (c) and (e), indicating that the requirements do apply to this equipment, even though the current CFR does not include this reference. 80 FR 37136, 37149 (June 30, 2015).

C. Technological Feasibility

1. General

In evaluating potential amendments to energy conservation standards, DOE conducts a screening analysis based on information gathered on all current technology options and prototype designs that could improve the efficiency of the products or equipment that are the subject of the determination. As the first step in such an analysis, DOE develops a list of technology options for consideration in consultation with manufacturers, design engineers, and other interested parties. These technology options are discussed in detail in section IV.A.3 of this document. DOE then determines which of those means for improving efficiency are technologically feasible. DOE considers technologies incorporated in commercially available products or in working prototypes to be technologically feasible. See generally 10 CFR 431.4; sections 6(b)(3)(i) and 7(b)(1) of appendix A to 10 CFR part 430 subpart C (''Process Rule'').

After DOE has determined that particular technology options are technologically feasible, it further evaluates each technology option in light of the following additional screening criteria: (1) practicability to manufacture, install, and service; (2) adverse impacts on product utility or availability; (3) adverse impacts on health or safety; and (4) unique-pathway proprietary technologies. See generally 10 CFR 431.4; sections 6(b)(3)(ii)–(v) and 7(b)(2)–(5) of the Process Rule. Section IV.A.4 of this document discusses the results of the screening analysis for PTACs and PTHPs, particularly the designs DOE considered, those it screened out, and those that are the basis for the standards considered in this proposed determination. For further details on the screening analysis for this proposed determination, see section IV.A.4 of this document.

2. Maximum Technologically Feasible Levels

As when DOE proposes to adopt an amended standard for a type or class of covered equipment, in this analysis it would result in significant conservation of energy and is technologically feasible and economically justified. (*See* 42 U.S.C. 6313(a)(6)(A)(ii)(II)) Accordingly, in the engineering analysis, DOE determined the maximum technologically feasible (''max-tech'') improvements in energy efficiency for PTACs and PTHPs, using the design parameters for the most efficient products available on the market or in working prototypes. The max-tech levels that DOE determined for this analysis are described in section IV.B.4 of this proposed determination.

D. Energy Savings

1. Determination of Savings

For each efficiency level (''EL'') evaluated, DOE projected energy savings from application of the EL to the PTACs and PTHPs purchased in the 30-year period that begins in the assumed year of compliance with the potential standards (2026–2055). The savings are measured over the entire lifetime of the PTACs and PTHPs purchased in the previous 30-year period. DOE quantified the energy savings attributable to each EL as the difference in energy consumption between each standards case and the no-new-standards case. The no-new-standards case represents a projection of energy consumption that reflects how the market for a product would likely evolve in the absence of amended energy conservation standards. DOE used its NIA spreadsheet model to estimate national energy savings (''NES'') from potential amended or new standards for PTACs and PTHPs. The NIA spreadsheet model (described in section V.B of this document) calculates energy savings in terms of site energy, which is the energy directly consumed by products at the locations where they are used. For electricity, DOE reports NES in terms of primary energy savings, which is the savings in the energy that is used to generate and transmit the site electricity. DOE also calculates NES in terms of full-fuel-cycle (''FFC'') energy savings. The FFC metric includes the energy consumed in extracting, processing, and transporting primary fuels (*i.e.,* coal, natural gas, petroleum fuels), and thus presents a more complete picture of the impacts of energy conservation standards.[5] DOE's approach is based on the calculation of an FFC multiplier for each of the energy types used by covered products or equipment. For more information on FFC energy savings, see section IV.G of this document.

2. Significance of Savings

In determining whether amended standards are needed, DOE must consider whether such standards will result in significant conservation of energy.[6] (42 U.S.C. 6313(a)(6)(C)(i)(I)); (42 U.S.C. 6313(a)(6)(A)(ii)(II)) The significance of energy savings offered by a new or amended energy conservation standard cannot be determined without knowledge of the specific circumstances surrounding a given rulemaking.[7] For example, the United States has now rejoined the Paris Agreement on February 19, 2021. As part of that agreement, the United States has committed to reducing GHG emissions in order to limit the rise in mean global temperature.[8] As such, energy savings that reduce GHG emission have taken on greater importance. Additionally, some covered products and equipment have most of their energy consumption occur during periods of peak energy demand. The impacts of these products on the energy infrastructure can be more pronounced than products with relatively constant demand. In evaluating the significance of energy savings, DOE considers differences in primary energy and FFC effects for different covered products and equipment when determining whether energy savings are significant. Accordingly, DOE evaluates the significance of energy savings on a case-by-case basis.

E. Economic Justification

As noted, EPCA provides seven factors to be evaluated in determining whether a potential energy conservation standard is economically justified. (42 U.S.C. 6313(a)(6)(B)(ii)(I)–(VII)) The following sections discuss how DOE has addressed each of those seven factors in this proposed determination.

1. Economic Impact on Manufacturers and Consumers

In determining the impacts of a potential amended standard on manufacturers, DOE conducts a manufacturing impact analysis (''MIA''). DOE first uses an annual cash-flow approach to determine the quantitative impacts. This step includes both a short-term assessment—based on the cost and capital requirements during the period between when a regulation is issued and when entities must comply with the regulation—and a long-term assessment over a 30-year period. The industry-wide impacts analyzed include (1) industry net present value, which values the industry on the basis of expected future cash flows, (2) cash flows by year, (3) changes in revenue and income, and (4) other measures of impact, as appropriate. However, DOE is not proposing amended standards for PTACs and PTHPs, and, therefore, this proposed determination would have no cash-flow impacts on manufacturers. Accordingly, as discussed further in section IV.G of this document, DOE did not conduct an MIA for this NOPD.

For individual consumers, measures of economic impact include the changes in LCC and PBP associated with new or amended standards. These measures are discussed further in the following section. For consumers in the aggregate, DOE also calculates the national net present value (''NPV'') of the consumer costs and benefits expected to result from particular standards. DOE also evaluates the impacts of potential standards on identifiable subgroups of consumers that may be affected disproportionately by a standard. However, DOE is not proposing amended standards for PTACs and PTHPs, and, therefore, this proposed determination would have no disproportionate impact on identifiable subgroups of consumers. Accordingly, DOE did not conduct a subgroup analysis for this NOPD.

2. Savings in Operating Costs Compared to Increase in Price

EPCA requires DOE to consider the savings in operating costs throughout the estimated average life of the covered product in the type (or class) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered product that are likely to result from a standard. (42 U.S.C. 6313(a)(6)(B)(ii)(II)) DOE conducts this comparison in its LCC and PBP analysis.

The LCC is the sum of the purchase price of a product (including its installation) and the operating expense (including energy, maintenance, and repair expenditures) discounted over the lifetime of the product. The LCC analysis requires a variety of inputs, such as product prices, product energy consumption, energy prices, maintenance and repair costs, product lifetime, and discount rates appropriate for consumers. To account for uncertainty and variability in specific inputs, such as product lifetime and

[5] The FFC metric is discussed in DOE's statement of policy and notice of policy amendment. 76 FR 51282 (Aug. 18, 2011), as amended at 77 FR 49701 (Aug. 17, 2012).

[6] In setting a more stringent standard for ASHRAE equipment, DOE must have ''clear and convincing evidence'' that doing so ''would result in significant additional conservation of energy'' in addition to being technologically feasible and economically justified. 42 U.S.C. 6313(a)(6)(A)(ii)(II). This language indicates that Congress had intended for DOE to ensure that, in addition to the savings from the ASHRAE standards, DOE's standards would yield additional energy savings that are significant. In DOE's view, this statutory provision shares the requirement with the statutory provision applicable to covered products and non-ASHRAE equipment that ''significant conservation of energy'' must be present (42 U.S.C. 6295(o)(3)(B)) —and supported with ''clear and convincing evidence''—to permit DOE to set a more stringent requirement than ASHRAE.

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

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

discount rate, DOE uses a distribution of values, with probabilities attached to each value.

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

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

3. Energy Savings

Although significant conservation of energy is a separate statutory requirement for adopting an energy conservation standard, EPCA requires DOE, in determining the economic justification of a standard, to consider the total projected energy savings that are expected to result directly from the standard. (42 U.S.C. 6313(a)(6)(B)(ii)(III)) As discussed in section IV.G of this document, DOE uses the NIA spreadsheet models to project national energy savings.

4. Lessening of Utility or Performance of Products

In establishing product classes and in evaluating design options and the impact of potential standard levels, DOE evaluates potential standards that would not lessen the utility or performance of the considered products. (42 U.S.C. 6313(a)(6)(B)(ii)(IV)) DOE is not proposing amended standards for PTACs and PTHPs, and, therefore, this proposed determination would not impact the utility of such equipment.

5. Impact of Any Lessening of Competition

EPCA directs DOE to consider the impact of any lessening of competition, as determined in writing by the Attorney General that is likely to result from a proposed standard. (42 U.S.C. 6313(a)(6)(B)(ii)(V)) Because DOE is not proposing standards for PTACs and PTHPs, DOE did not transmit a copy of its proposed determination to the Attorney General for anti-competitive review.

6. Need for National Energy Conservation

DOE also considers the need for national energy and water conservation in determining whether a new or amended standard is economically justified. (42 U.S.C. 6313(a)(6)(B)(ii)(VI)) The energy savings from the proposed standards are likely to provide improvements to the security and reliability of the Nation's energy system. Reductions in the demand for electricity also may result in reduced costs for maintaining the reliability of the Nation's electricity system. DOE conducts a utility impact analysis to estimate how standards may affect the Nation's needed power generation capacity. However, DOE is not proposing amended standards for PTACs and PTHPs, and therefore, did not conduct this analysis.

DOE maintains that environmental and public health benefits associated with the more efficient use of energy are important to take into account when considering the need for national energy conservation. For example, energy conservation standards result in environmental benefits in the form of reduced emissions of air pollutants and greenhouse gases (''GHGs'') associated with energy production and use. DOE conducts an emissions analysis to estimate how potential standards may affect these emissions. DOE also estimates the economic value of emissions reductions resulting from each trial standard level (''TSL'') (*i.e.,* standards case above the base case).[9] However, DOE is not proposing amended standards for PTACs and PTHPs, and, therefore, did not conduct this analysis.

7. Other Factors

In determining whether an energy conservation standard is economically justified, DOE may consider any other factors that the Secretary deems to be relevant. (42 U.S.C. 6313(a)(6)(B)(ii)(VII)) To the extent DOE identifies any relevant information regarding economic justification that does not fit into the other categories described previously, DOE could consider such information under ''other factors.''

IV. Methodology and Discussion of Related Comments

This section addresses the analyses DOE has performed for this proposed determination with regard to PTACs and PTHPs. Separate subsections address each component of DOE's analyses. DOE used several analytical tools to estimate the impact of potential energy conservation standards. The first tool is a spreadsheet that calculates the LCC savings and PBP of potential energy conservation standards. The NIA uses a second spreadsheet set that provides shipments projections and calculates NES and net present value of total consumer costs and savings expected to result from potential energy conservation standards. These spreadsheet tools are available on the website: *www.regulations.gov/docket/EERE–2019–BT–STD–0035.*

A. Market and Technology Assessment

DOE develops information in the market and technology assessment that provides an overall picture of the market for the products concerned, including the purpose of the products, the industry structure, manufacturers, market characteristics, and technologies used in the products. This activity includes both quantitative and qualitative assessments, based primarily on publicly available information. The subjects addressed in the market and technology assessment for this proposed determination include: (1) a determination of the scope and classes, (2) market and industry trends and (3) technologies or design options that could improve the energy efficiency of PTAC and PTHPs. The key findings of DOE's market assessment are summarized in the following sections. See the supplemental file DOE made available for comment (Document ID No. EERE–2019–BT–STD–0035–0001) for a review of the current PTAC and PTHP market and efficiency distributions.

1. Scope of Coverage

In this analysis, DOE relied on the definition of PTACs and PTHPs in 10 CFR 431.92. Any equipment meeting the definition of PTAC or PTHP is included in DOE's scope of coverage.

PTAC is defined as a wall sleeve and a separate un-encased combination of heating and cooling assemblies

[9] On March 16, 2022, the Fifth Circuit Court of Appeals (No. 22–30087) granted the federal government's emergency motion for stay pending appeal of the February 11, 2022, preliminary injunction issued in *Louisiana* v. *Biden,* No. 21-cv-1074–JDC–KK (W.D. La.). As a result of the Fifth Circuit's order, the preliminary injunction is no longer in effect, pending resolution of the federal government's appeal of that injunction or a further court order. The preliminary injunction enjoined the federal government from relying on the interim estimates of the social cost of greenhouse gases—which were issued by the Interagency Working Group on the Social Cost of Greenhouse Gases on February 26, 2021—to monetize the benefits of reducing greenhouse gas emissions. In the absence of further intervening court orders, DOE will revert to its approach prior to the injunction and present monetized benefits in accordance with applicable Executive orders.

specified by the builder and intended for mounting through the wall, and that is industrial equipment. 10 CFR 431.92. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity. *Id.*

PTHP is defined as a PTAC that utilizes reverse cycle refrigeration as its prime heat source, that has a supplementary heat source available, with the choice of hot water, steam, or electric resistant heat, and that is industrial equipment. *Id.*

On October 7, 2008, DOE published a final rule (''October 2008 final rule'') amending the energy conservation standards for PTACs and PTHPs in which DOE divided equipment classes based on whether a PTAC or PTHP is a standard size or non-standard size. 73 FR 58772.

DOE defines ''standard size'' as a PTAC or PTHP with wall sleeve dimensions having an external wall opening of greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches. 10 CFR 431.92.

DOE defines ''non-standard size'' as a PTAC or PTHP with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches. *Id.*

In the December 2020 ECS RFI, DOE requested comment on whether the definitions for PTACs, PTHPs, standard size and non-standard size require any revisions—and if so, what revisions are needed and how those definitions should be revised. 82 FR 82952, 82956. DOE also requested comment on whether additional equipment definitions are necessary to close any potential gaps in coverage between equipment types and whether there were opportunities to combine equipment classes that could reduce regulatory burden. *Id.*

In response, AHRI stated that the current definitions for PTACs and PTHPs do not require revisions at this time and the subcategory definitions currently in place for ''standard size'' and ''non-standard size'' are also appropriate and require no modifications. AHRI also explained that the current equipment classes are appropriate and that any modifications should be first made through ASHRAE Standard 90.1 process. AHRI further commented that DOE is required to consider amending its standards for PTACs and PTHPs when ASHRAE Standard 90.1 is amended, which includes equipment definitions and classes, and as no amendment has occurred the existing scheme is appropriate (AHRI, No. 8 at p. 4) DOE did not receive any further comments pertaining to these issues of coverage.

For this NOPD DOE maintains the current definitions for PTACs, PTHPs, standard size and non-standard size.

2. Equipment Classes

For PTACs and PTHPs, the current energy conservation standards specified in 10 CFR 431.97(c) are based on 12 equipment classes determined according to the following: whether the equipment is an air conditioner or a heat pump, whether the equipment is standard size or non-standard size, and the cooling capacity in Btu/h. Table IV–1 lists the current 12 equipment classes for PTACs and PTHPs specified in Table 7 and Table 8 to 10 CFR 431.97.

TABLE IV–1—CURRENT PTAC AND PTHP EQUIPMENT CLASSES

Equipment Class			
1	PTAC	Standard Size	<7,000 Btu/h.
2	PTAC	Standard Size	≥7,000 Btu/h and ≤15,000 Btu/h.
3	PTAC	Standard Size	>15,000 Btu/h.
4	PTAC	Non-Standard Size	<7,000 Btu/h.
5	PTAC	Non-Standard Size	≥7,000 Btu/h and ≤15,000 Btu/h.
6	PTAC	Non-Standard Size	>15,000 Btu/h.
7	PTHP	Standard Size	<7,000 Btu/h.
8	PTHP	Standard Size	≥7,000 Btu/h and ≤15,000 Btu/h.
9*	PTHP	Standard Size	>15,000 Btu/h.
10	PTHP	Non-Standard Size	<7,000 Btu/h.
11	PTHP	Non-Standard Size	≥7,000 Btu/h and ≤15,000 Btu/h.
12	PTHP	Non-Standard Size	>15,000 Btu/h.

*Based on DOE's review of equipment currently available on the market, DOE did not identify any Standard Size PTHP models with a cooling capacity greater than 15,000 Btu/h.

In the December 2020 ECS RFI, DOE requested feedback on the current PTAC and PTHP equipment classes and whether any changes to these individual equipment classes and their descriptions should be made or whether certain classes should be merged or separated. 85 FR 82952, 82957. Specifically, DOE requested comment on opportunities to combine equipment classes that could reduce regulatory burden. *Id.* DOE further requested feedback on whether combining certain classes could impact equipment utility by eliminating any performance-related features or impact the stringency of the current energy conservation standard for this equipment. *Id.* DOE also requested comment on separating any of the existing equipment classes and whether it would impact equipment utility by eliminating any performance-related features or reduce any compliance burdens. *Id.*

In response, AHRI commented that they do not recommend changes at this time (AHRI, No. 8 at p. 4) DOE did not receive any further comments on this issue.

DOE also sought information regarding any other new product classes it should consider for inclusion in its analysis. 85 FR 82952, 82957. Specifically, DOE requested information on the performance-related features that provide unique consumer utility and data detailing the corresponding impacts on energy use that would justify separate product classes (*i.e.,* explanation for why the presence of these performance-related features would increase energy consumption). *Id.*

In response, AHRI stated that they support the current equipment classes and that they should not be expanded. (AHRI, No. 8 at p. 5) DOE did not receive any further comments on this issue.

For this NOPD, DOE maintains the current equipment classes.

a. Make-Up Air PTACs and PTHPs

In the May 2021 TP RFI, DOE described ''make-up air'' PTACs and their additional function of dehumidification. 86 FR 28005, 28007–28009. As discussed in section II.B.1 of this document, for PTACs and PTHPs, DOE currently specifies EER as the test metric for cooling efficiency and COP as the metric for heating efficiency. Neither the current test procedure, at 10 CFR 431.96(g), nor the industry test procedure incorporated by reference, AHRI Standard 310/380–2014, account for the energy associated with the conditioning of make-up air introduced by the unit.

In the December 2020 ECS RFI, DOE requested comment on appropriate definitions for ''make-up air PTAC'' and ''make-up air PTHP'' and what characteristics could be used to distinguish make-up air PTACs and PTHPs from other PTACs and PTHPs. 85 FR 82952, 82957. DOE requested information on the consumer utility and the energy use associated with the function of providing ''make-up air.'' *Id.* DOE also requested comment on whether the same capacity ranges used for non- ''make-up air'' PTACs and PTHPs would be appropriate to use for equipment classes for possible ''make-up air'' PTAC and PTHP equipment classes (*i.e.,* less than 7,000 Btu/h, greater than or equal to 7,000 Btu/h and less than or equal to 15,000 Btu/h, and greater than 15,000 Btu/h). *Id.* Finally, DOE requested comment on if there are both Standard Size and Non-Standard Size ''make-up air'' PTACs and PTHPs. *Id.*

AHRI commented that make-up air PTACs and make-up air PTHPs are not included as equipment categories in ASHRAE Standard 90.1 and therefore should not be considered as separate equipment categories in this DOE rulemaking. (AHRI, No. 8 at p. 5) AHRI further commented that their research did not indicate that a sufficient number of products would benefit from a separate class to include the energy for either a specialized feature for outdoor air conditioning or dehumidification. *Id.* AHRI stated that no manufacturer has submitted a waiver to modify the current test procedure indicating that the results of the test procedure remain representative of actual energy use or efficiency and all products defined as PTACs and PTHPs and are able to be tested in accordance with AHRI Standard 310/380. *Id.* AHRI also asserted that there is a significant testing barrier to accurately measuring dehumidification, stating that psychrometric chambers are not enabled to test dehumidification of outside air and any changes to incorporate dehumidification would therefore require research to determine an appropriate procedure. *Id.*

GEA also commented that PTACs [10] with make-up air capabilities do not require separate product classes, stating that: these units do not make a sufficient segment of the market to justify a separate class; they are not included as equipment classes in ASHRAE Standard 90.1; all equipment defined as PTACs and PTHPs are able to be tested in accordance with AHRI Standard 310/380 and that there are significant issues with testing of make-up air units related to the design of existing test rooms, particularly with respect to dehumidification, which would require substantial investment to modify test facilities. (GEA, No. 10 at p. 2)

The CA IOUs stated that more research is needed before a determination can be made with respect to whether units that provide make-up air warrant separate equipment classes, including testing the equipment and market analysis. (CA IOUs, No. 7 at p. 4) The commenters recommended that DOE investigate the size and potential market growth for this feature. *Id.* Additionally, they also stated that appendix M1 (to subpart B of 10 CFR part 430), which the CA IOUs recommended that DOE adopt for PTACs and PTHPs, does not have provisions for testing units while they provide make-up air. *Id.* The commenters urged DOE to use caution in creating a separate product class for units that provide make-up air, asserting it will likely make compliance, enforcement, and product comparison difficult. *Id.*

DOE notes that while the market for make-up air PTACs and PTHPs may be small currently, new building code requirements may lead to increased demand for these units. As discussed in the May 2021 TP RFI, building designs that supply make-up air via corridors are generally no longer permissible under the building codes adopted in most U.S. states. 86 FR 28005, 28008. Chapter 10, Section 1018.5 of the 2009 International Building Code (''IBC'') states that, with some exceptions, ''corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.'' [11] The International Code Council (''ICC'') tracks the adoption of the IBC by state. The ICC reports that, as of February 2022, only seven states had not fully adopted the 2009 version or a more recent version of the IBC.[12]

DOE is cognizant of the potential testing challenges associated with the testing of make-up air PTACs and PTHPs and is considering this in the ongoing test procedure rulemaking. 86 FR 28005, 28008–28009. Were DOE to amend the PTAC and PTHP test procedure to incorporate measurement of dehumidification energy for make-up air PTACs and PTHPs, a separate equipment class for this type of units may be warranted. At such time, DOE would conduct the analysis for future standards rulemakings, if any, based on the amended test procedure. However, DOE is not proposing to establish separate equipment classes for make-up air PTACs and PTHPs at this time.

3. Technology Options

In the December 2020 ECS RFI, DOE identified several technology options that would be expected to improve the efficiency of PTACs and PTHPs, as measured by the DOE test procedure. 85 FR 82952, 82957–82958. Based on the technologies identified in the analysis for the July 2015 final rule and a preliminary survey of the current market using the DOE Compliance Certification Database (''CCD''),[13] DOE separately provided potential technology options in two categories: technologies that may increase efficiency at both full-load and part-load conditions (designated as Table II.2 in the December 2020 ECS RFI and re-listed as Table IV–2 in this document); and technologies that may only increase efficiency at part-load conditions (designated as Table II.3 in the December 2020 ECS RFI and re-listed as Table IV–3 in this document). *Id.*

[10] In their comments, GEA referred generally to ''PTACs.'' However, based on the context of their comments, DOE understands GEA's comments to apply to both PTACs and PTHPs.

[11] International Code Council. 2009 International Building Code. Available at: *https://codes.iccsafe.org/content/chapter/4641/.*

[12] International Code Council (2022). ''International Codes—Adoption by State.'' Available at: *https://www.iccsafe.org/wp-content/uploads/Master-I-Code-Adoption-Chart-FEB-22.pdf.*

[13] DOE's Compliance Certification Database can be found at: *www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A** (accessed March 9th, 2022).

TABLE IV–2—TECHNOLOGY OPTIONS FOR PTACS AND PTHPS PRESENTED IN THE DECEMBER 2020 ECS RFI THAT MAY INCREASE EFFICIENCY AT BOTH FULL-LOAD AND PART-LOAD CONDITIONS

Technology options	Source
Heat Exchanger Improvements:	
Increased Heat Exchanger Area	July 2015 Final Rule.
Indoor Blower and Outdoor Fan Improvements:	
Higher Efficiency Fan Motors	July 2015 Final Rule.
Improved Air Flow and Fan Design	July 2015 Final Rule.
More Efficient Fan Geometries	New Technology Option.
Compressor Improvements:	
Higher Efficiency Compressors	July 2015 Final Rule.
Scroll Compressors	Screened out of July 2015 Final Rule.
Other Improvements:	
Heat Pipes	Screened out of July 2015 Final Rule.
Alternative Refrigerants	Screened out of July 2015 Final Rule.

TABLE IV–3—TECHNOLOGY OPTIONS FOR PTACS AND PTHPS PRESENTED IN THE DECEMBER 2020 ECS RFI THAT MAY INCREASE EFFICIENCY AT ONLY PART-LOAD CONDITIONS

Technology options	Source
Indoor Blower and Outdoor Fan Improvements:	
Variable speed condenser fan/motor	* New Technology Option.
Variable speed indoor blower/motor	New Technology Option.
Compressor Improvements:	
Variable Speed Compressors	July 2015 Final Rule. *
Other Improvements:	
Electronic Expansion Valves (“EEV”)	New Technology Option.
Thermal Expansion Valves (“TEV”).	July 2015 Final Rule.*

* Identified technology was not analyzed in the July 2015 because of no full-load benefit.

In the December 2020 ECS RFI, DOE requested information on the technologies listed in Table IV–2 regarding their applicability to the current market, how these technologies may impact the efficiency of PTACs and PTHPs, how these technologies have changed since the July 2015 final rule and the range of efficiencies or performance characteristics that are currently available for each technology option. 85 FR 82952, 82958. DOE also sought comment on whether the new technologies mentioned would affect a determination as to whether DOE could propose a ''no new standard'' determination because a more stringent standard: would not result in a significant savings of energy; is not technologically feasible; is not economically justified; or any combination of the foregoing. *Id.* Specifically, DOE sought information on the new technologies regarding their market adoption, costs, and any concerns with incorporating them into equipment (*e.g.,* impacts on consumer utility, potential safety concerns, manufacturing/production/ implementation issues, etc.), particularly as to changes that may have occurred since the July 2015 final rule. *Id.* DOE also sought comment on other technology options that it should consider for inclusion in its analysis and if these technologies may impact equipment features or consumer utility. *Id.*

AHRI suggested that DOE contact manufacturers independently to provide feedback on the technologies listed in in the December 2020 ECS RFI regarding their applicability to the current market and how these technologies may impact the efficiency of PTACs and PTHPs as measured according to the DOE test procedure. (AHRI, No. 4 at p. 6) Additionally, AHRI stated that it was not aware of any advanced development of technologies screened out in the July 2015 final rule, with the exception of variable speed compressors. *Id.* AHRI stated that two manufacturers offer PTACs and PTHPs with variable speed compressors; however, the current test procedure referencing AHRI Standard 310/380–2014 provides only a full load performance rating. AHRI further stated that in its review of the certification database, AHRI found only a handful of products that may benefit from the additional test burden that would be imposed by moving to a part-load metric. *Id.* AHRI commented that determining performance at multiple load points, rather than one, and the additional calculations to determine a seasonal efficiency adds considerable time to testing and a change in metric requires all existing products to be retested, which will benefit few products on the market. *Id.* AHRI commented that no manufacturer had submitted a waiver to modify the current test procedure indicating that the results of a test procedure remain representative of actual energy use or efficiency and all products defined as PTACs and PTHPs are able to be tested in accordance with AHRI Standard 310/ 380. AHRI also commented that to their knowledge, no manufacturer is currently using the new technology options captured in Table IV–3. *Id.* AHRI stated that they had no suggestions on additional technology options that DOE should consider for inclusion in its analysis. *Id.*

NEEA agreed with the list of technology options included in the 2015 ECS final rule and recommended that DOE continue to include those technologies in this rulemaking. In addition to the listed technology options, NEEA suggested the following technology options for consideration: use of intake and exhaust ducts to reduce infiltration, alternative refrigerants, microchannel heat exchangers and separate indoor and outdoor blower motors. (NEEA, No. 9 at pp. 4–5) NEEA noted that separate indoor and outdoor blower motors are used as a strategy to improve efficiency while also reducing unit noise by at least one manufacturer. *Id.*

ASAP encouraged DOE to evaluate the range of technology options identified in the RFI, stating that many of these technology options were not analyzed in the July 2015 final rule, which, per ASAP, suggests that significantly greater energy savings may be possible than the max-tech levels in the previous rule. (ASAP, No. 6 at p. 1) ASAP commented that the technology options that can increase part-load efficiency such as variable-speed compressors, variable-speed fans, and electronic expansion valves have the potential to provide large savings. *Id.* ASAP also encouraged DOE to consider improvements to heating performance at low temperatures as technology options—stating that design changes such as added defrost capability can allow a PTHP to continue to use the heat pump cycle at lower ambient temperatures to provide significant energy savings. (ASAP, No. 6 at p. 2) ASAP suggested that improved defrost control strategies be added as a technology option. *Id.*

The CA IOUs recommended that DOE include low global warming potential (''GWP'') refrigerants, such as R–32, in its engineering analysis. (CA IOUs, No. 7 at p. 3) The CA IOUs asserted that PTAC and PTHPs manufactured after an updated standard takes effect will likely use low-GWP refrigerants. *Id.*

As discussed earlier in section III.B of this document, DOE may consider adopting for PTACs and PTHPs a cooling-mode metric and a heating-mode metric that integrates part-load performance. In the December 2020 ECS RFI, DOE requested data on the market penetration and efficiency improvement associated with the technology options that may increase efficiency at part-load conditions, as listed in Table IV–3 of this document. 85 FR 82952, 82958. In addition, DOE requested data on any other technology options not listed above that would improve the efficiency of equipment under part-load conditions. *Id.*

AHRI and GEA did not support moving to a part-load metric. (AHRI, No. 8 at p.7; GEA, No. 10 at p.2) AHRI commented that very few products use advanced compressors, but all products would be required to be retested if a part-load metric was adopted. (AHRI, No. 8 at p. 7) AHRI asserted that industry burdens would make a switch to a new metric untimely. *Id.* GEA stated that moving the entire industry to a part load metric would have little benefit to consumers and would have little to no effect on energy efficiency, while creating substantial cost and testing burden. (GEA, No. 10 at p. 2) GEA suggested that instead DOE should allow the industry to follow the test procedure waiver process which allows for adding appropriate provisions for variable speed compressor products while maintaining stability in the vast majority of the market that does not include variable speed compressors. *Id.* GEA stated that once the technology is sufficiently mature, moving the test procedure and standards to a part load metric may make sense—however, this product category has not yet reached that stage. *Id.*

ASAP, NEEA and CA IOUs expressed support for moving to a part-load metric. (ASPA, No. 6 at p. 1; NEEA, No.9 at p. 1–2; CA IOUs, No.7 at p. 1) ASAP recommended that DOE evaluate potential amended standard levels based on metrics that reflect annual energy consumption and capture low-temperature heating performance. (ASAP, No. 6 at p. 1) NEEA recommended that DOE update energy conservation standard efficiency levels for PTACs and PTHPs, even if it does not proceed with a test procedure update, asserting that a range of efficiencies exist today with many models exceeding the current federal standards by approximately 10–30 percent, depending on the product category. (NEEA, No. 9 at p. 3) Additionally, NEEA stated that their market research suggested an increasing number of inverter-driven variable speed units have been introduced, and asserted that the Federal test procedure captures some of the efficiency impact of this technology, as evidenced by the higher EER and COP values shown for inverter-driven units. *Id.* at p. 4. NEEA suggested inclusion of technology options that can improve part-load and low temperature performance including electronic expansion valves, variable speed fans, multistage or variable speed compressors, demand-based defrost controls, electric resistance boost control strategies and compressor cut out controls. (NEEA, No. 9 at p. 2) NEEA stated that demand-based defrost controls (as compared to time-based defrost) can reduce energy use by defrosting only when needed, rather than at set time intervals. *Id.* They also stated that electric resistance boost features can result in significant increased energy use and that DOE should consider control strategies that limit the use of electric resistance boost usage in technology options. *Id.* NEEA also suggested that DOE should consider compressor cut out controls, which control the temperature below which the compressor will not operate and the temperature at which it resumes operation, and include compressor cut out control strategies as a technology option. *Id.*

CA IOUs stated that under the 2015 ECS final rule, several technologies, such as variable-speed compressors and thermal expansion valves, were not included in the engineering analysis despite their potential improvements to part-load performance, commenting that DOE did not consider these technologies because it was believed that PTAC and PTHPs operate at full-load conditions more often than at part-load conditions. (CA IOUs, No. 7 at p. 2) CA IOUs referenced product marketing literature from compressor manufacturers that claimed efficiency improvements of 25 to 35 percent when replacing single-speed compressors with variable-speed compressor. *Id.* CA IOUs also commented that at least five manufacturers now sell variable-speed compressor products, and that it is expected this technology will increase in prevalence. *Id.*

For this analysis, DOE considered the technology options shown in Table IV–4 of this document, including options listed in the December 2020 ECS RFI and options suggested in stakeholder comments, for improving energy efficiency of PTACs and PTHPs.

TABLE IV–4—POTENTIAL TECHNOLOGY OPTIONS FOR IMPROVING ENERGY EFFICIENCY OF PTACS AND PTHPS

Technology options	Source
Heat Exchanger Improvements:	
Increased Heat Exchanger Area	July 2015 Final Rule.
Microchannel Heat Exchangers	Screened out of July 2015 final rule; Suggested for Inclusion by Commenter.

TABLE IV–4—POTENTIAL TECHNOLOGY OPTIONS FOR IMPROVING ENERGY EFFICIENCY OF PTACS AND PTHPS—Continued

Technology options	Source
Indoor Blower and Outdoor Fan Improvements:	
Higher Efficiency Fan Motors	July 2015 Final Rule.
Improved Air Flow and Fan Design (including more Efficient Fan Geometries)	July 2015 Final Rule.
Variable speed condenser fan/motor	New Technology Option.
Variable speed indoor blower/motor	New Technology Option.
Separate indoor and outdoor motors (to improve efficiency while reducing noise)	New Technology Option Suggested by Commenter.
Compressor Improvements:	
Higher Efficiency Compressors	July 2015 Final Rule.
Scroll Compressors	Screened out of July 2015 Final Rule.
Variable Speed Compressors	July 2015 Final Rule.*
Other Improvements:	
Heat Pipes	Screened out of July 2015 Final Rule.
Alternative Refrigerants	Screened out of July 2015 Final Rule.
EEV	New Technology Option.
TEV	July 2015 Final Rule.*
Intake and Exhaust Ducts (to reduce infiltration through and around the unit)	New Technology Option Suggested by Commenter.
Defrost Control Strategies & Demand-based Defrost Controls (for improved low ambient heating).	New Technology Option Suggested by Commenter.
Electric resistance boost control strategies (to limit the use of electric resistance boost)	New Technology Option Suggested by Commenters.
Compressor cut out control strategies (to allow compressor operation at lower temperatures).	New Technology Option Suggested by Commenter.

* Identified technology was not analyzed in the July 2015 final rule because of no full-load benefit.

EEVs regulate the flow of liquid refrigerant entering the evaporator and can adapt to changes in operating conditions, such as variations in temperature, humidity, and compressor staging. As a result, EEVs can control for optimum system operating parameters over a wide range of operating conditions and are a consideration in evaluating improved seasonal efficiency. Variable-speed compressors enable modulation of the refrigeration system capacity, allowing the unit to adjust capacity to match the cooling or heating load. This modulation can improve efficiency by reducing off-cycle losses and can improve heat exchanger effectiveness at part-load conditions by operating at a lower mass flow rate. Variable speed condenser fan motors and variable speed indoor blower allow for varying fan speed to reduce airflow rate at part-load operation.

Detailed descriptions of the technology options from the July 2015 final rule can be found in chapters 3 and 4 of the July 2015 final rule technical support document (''TSD'').[14]

4. Screening Analysis

DOE uses the following five screening criteria to determine which technology options are suitable for further consideration in an energy conservation standards rulemaking:

(1) *Technological feasibility.* Technologies that are not incorporated in commercial products or in working prototypes will not be considered further.

(2) *Practicability to manufacture, install, and service.* If it is determined that mass production and reliable installation and servicing of a technology in commercial products could not be achieved on the scale necessary to serve the relevant market at the time of the projected compliance date of the standard, then that technology will not be considered further.

(3) *Impacts on product utility or product availability.* If it is determined that a technology would have significant adverse impact on the utility of the product to significant subgroups of consumers or would result in the unavailability of any covered product type with performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as products generally available in the United States at the time, it will not be considered further.

(4) *Adverse impacts on health or safety.* If it is determined that a technology would have significant adverse impacts on health or safety, it will not be considered further.

(5) *Unique-Pathway Proprietary Technologies.* If a design option utilizes proprietary technology that represents a unique pathway to achieving a given efficiency level, that technology will not be considered further due to the potential for monopolistic concerns.

See 10 CFR part 430, subpart C, appendix A, sections 6(c)(3) and 7(b). In summary, if DOE determines that a technology, or a combination of technologies, fails to meet one or more of the listed five criteria, it will be excluded from further consideration in the engineering analysis.

a. Screened-Out Technologies

In the July 2015 final rule, DOE screened out three technology options based on the applicable criteria discussed previously. The screened-out technology options are presented below in Table IV–5.

[14] Available at: *www.regulations.gov/document/EERE-2012-BT-STD-0029-0040.*

TABLE IV–5—PREVIOUSLY SCREENED OUT TECHNOLOGY OPTIONS FROM THE JULY 2015 FINAL RULE

Screened technology option	Technological feasibility	Screening criteria (X = basis for screening out)			
		Practicability to manufacture, install, and service	Adverse impact on equipment utility	Adverse impacts on health and safety	Unique-pathway proprietary technologies
Scroll Compressors	X				
Heat Pipes	X				
Alternative Refrigerants	X				

In the December 2020 ECS RFI, DOE requested comment on these technology options previously screened out in the July 2015 final rule. 85 FR 82952, 82959. Specifically, DOE requested information as to whether these options would, based on current and projected assessments regarding each of them, remain screened out under the four screening criteria [15] described in this section and what steps, if any, could be (or have already been) taken to facilitate the introduction of each option as a means to improve the energy performance of PTACs and PTHPs and the potential to impact consumer utility of the PTACs and PTHPs. *Id.*

Heat Pipes, Scroll Compressors

AHRI commented that there had been no technical advances in heat pipes and thus no reason to include the technology option in the analysis. (AHRI, No. 8 at p. 7) AHRI commented that scroll compressors should remain screened out stating that compressor manufacturers are currently working to develop full product lines to accommodate A2L [16] refrigerants. Since this effort requires significant research and design resources, PTAC and PTHP manufacturers must prioritize obtaining compliant components for a single complete product line using new refrigerants for jurisdictions limiting GWP. *Id.* AHRI asserted that because of this additional product options, such as scroll compressors, will likely take time to bring to market and conduct all of the product research, design, and testing. *Id.*

DOE did not receive any further comments for heat pipes or scroll compressors. DOE is not aware of any PTACs or PTHPs that are currently using heat pipes or PTHPs using scroll compressors. Regarding scroll compressors, DOE is not aware of any scroll compressors of suitable capacity and size with better efficiency than available rotary compressors. DOE has therefore tentatively concluded to keep heat pipes and scroll compressors screened out of the engineering analysis.

Alternate Refrigerants

Nearly all PTAC and PTHP equipment is designed with R–410A as the refrigerant. The U.S. Environmental Protection Agency (''EPA'') Significant New Alternatives Policy (''SNAP'') Program evaluates and regulates substitutes for the ozone-depleting chemicals (such as air conditioning refrigerants) that are being phased out under the stratospheric ozone protection provisions of the Clean Air Act (''CAA''). (42 U.S.C. 7401 *et seq.*) [17] The EPA SNAP Program currently includes 31 [18] acceptable alternatives for refrigerant used in the new Residential and Light Commercial Air Conditioning class of equipment (which includes PTAC and PTHP equipment).[19] On May 6, 2021, the EPA published a final rule allowing the use of R–32, R–452B, R–454A, R–454B, R–454C and R–457A, subject to use conditions. 86 FR 24444.

On December 27, 2020, the American Innovation and Manufacturing Act of 2020 was enacted in section 103 in Division S, Innovation for the Environment, of the Consolidated Appropriations Act, 2021 (Pub. L. 116–260; codified at 42 U.S.C. 7675). The American Innovation and Manufacturing Act of 2020 provides EPA specific authority to address hydrofluorocarbons (''HFC''), including to: (1) phase down HFC production and consumption of listed HFCs through an allowance allocation and trading program, (2) establish requirements for the management of HFCs and HFC substitutes in equipment (*e.g.,* air conditioners); and (3) facilitate sector-based transitions away from HFCs. 42 U.S.C. 7675(e), (h), (i) Under the American Innovation and Manufacturing Act of 2020, EPA is authorized to issue rules in response to petitions to establish sector-based HFC restrictions. 42 U.S.C. 7675(i)(3) On October 14, 2021, EPA granted ten petitions in full, including one petition by AHRI et al., titled, ''Restrict the Use of HFCs in Residential and Light Commercial Air Conditioners'' (''AHRI petition''), in which the petitioners requested EPA to require residential and light commercial air conditioners (which includes PTAC and PTHP equipment) to use refrigerants with GWP of 750 or less, with such requirement applying to these equipment manufactured after January 1, 2025, excluding variable refrigerant flow (''VRF'') equipment.[20] 86 FR 57141. DOE is also aware that the California Air Resources Board (''CARB'') finalized a rulemaking effective January 1, 2022, which prohibits the use of refrigerants with a GWP of 750 or greater starting January 1, 2023, in several new air-conditioning equipment, including PTACs and PTHPs.[21]

In response to the December 2020 ECS RFI, DOE received several comments regarding the consideration of alternate refrigerants as a technology option. AHRI suggested that alternative refrigerants should remain a screened-out technology. (AHRI, No. 8 at p. 7) AHRI stated that California is seeking to establish a January 1, 2023, effective date to limit the GWP of refrigerants in PTACs and PTHPs to 750,[22]

[15] While the December 2020 ECS RFI referenced four screening criteria, DOE notes that there are five screening criteria under Appendix A. 86 FR 70924. *See* 10 CFR part 430, subpart C, appendix A, sections 6(c)(3) and 7(b).

[16] A2L is an ASHRAE safety group classification for refrigerants denoting lower toxicity and lower flammability. More information regarding ASHRAE refrigerant safety classification can be found here: *www.ashrae.org/file%20library/technical%20resources/refrigeration/factsheet_ashrae_english_20200424.pdf.*

[17] Additional information regarding EPA's SNAP Program is available online at: *www.epa.gov/ozone/snap/.*

[18] Refrigerant THR–03 is not included in this count because it is acceptable for use only in residential window air conditioners; Refrigerants R–1270 and R–443A were deemed unacceptable as of Jan 3, 2017; Refrigerants R–417C, R–427A and R–458A are only approved for retrofit applications.

[19] Information available at: *www.epa.gov/snap/substitutes-residential-and-light-commercial-air-conditioning-and-heat-pumps.*

[20] Available at: *www.regulations.gov/document/EPA-HQ-OAR-2021-0289-0011.*

[21] Available at: *ww2.arb.ca.gov/rulemaking/2020/hfc2020.*

[22] As discussed previously, the CARB finalized this regulation order effective January 1, 2022.

commenting that only R–32 is available currently, but six other options are pending EPA approval as part of SNAP Rule 23.[23] *Id.* AHRI commented that sourcing components for new refrigerants in a complete product line will be challenging, particularly to meet a deadline less than two years away, without a full range of refrigerant options approved. Additionally, for any new refrigerant, AHRI asserted that manufacturers will need to retest products for both efficiency and to meet relevant safety standards. *Id.* GEA requested that DOE consider the substantial regulatory burden created by the complex refrigeration transition from both state-led low-GWP refrigerant requirements and by shifting federal requirements for refrigerant use and restrictions in municipal building codes. (GEA, No. 10 at pp. 2–3)

NEEA, ASAP and CA IOUs recommended that DOE consider alternate refrigerants in the analysis. NEEA stated that additional refrigerants have been proposed by the EPA for SNAP since standards were last considered for PTACs and PTHPs and that given the likelihood that the new SNAP rules will be finalized in advance of an updated standard, DOE should consider efficiency improvements from alternative refrigerants, such as hydrocarbons. (NEEA, No. 9 at p. 5) The CA IOUs asserted that PTAC and PTHPs manufactured after an updated standard takes effect will likely use low-GWP refrigerants. (CA IOUs, No. 7 at p. 3) The CA IOUs stated that the passage of the American Innovation and Manufacturing Act of 2020 effectively mandates a phase-out of HFCs and therefore, urged DOE to consider the potential benefits of these low-GWP refrigerants. *Id.* The CA IOUs additionally commented that California and other states are also pursuing regulations to require low-GWP refrigerants in residential air conditioners and heat pumps starting January 1, 2025. *Id.*

DOE is aware of the changing landscape of refrigerants as they relate to PTACs and PTHPs, particularly the AHRI petition that requested the EPA to require residential and light commercial air conditioners to use refrigerants with GWP of 750 or less, with such requirement applying to this equipment manufactured after January 1, 2025, excluding VRF,[24] and that was granted on October 14, 2021. 86 FR 57141.[25] On December 29, 2021, EPA published a notification informing the public that they would not be using the negotiated rulemaking procedure to develop a proposed rule or rules associated with the eleven American Innovation and Manufacturing Act of 2020 petitions (including the AHRI petition), but will instead use the traditional regular notice-and-comment rulemaking process. 86 FR 74080.

In light of the petition to require use of with GWP of 750 or less in PTAC and PTHP equipment, DOE reviewed certain SNAP approved substitutes that met this criterion. These are listed in Table IV–6.

TABLE IV–6—POTENTIAL SUBSTITUTES FOR HFCS IN NEW RESIDENTIAL AND LIGHT COMMERCIAL AIR CONDITIONING EQUIPMENT, WITH GWP OF 750 OR LESS

Approved substitute	GWP value	Approval date	ASHRAE safety classification[26]
R–290 (Propane)	3	April 10, 2015	A3.
R–441A	<5	April 10, 2015	A3.
R–457A	140	May 6, 2021	A2L.
R–454C	150	May 6, 2021	A2L.
R–454A	240	May 6, 2021	A2L.
R–454B	470	May 6, 2021	A2L.
HFC–32 (R–32)	675	May 6, 2021	A2L.
R–452B	700	May 6, 2021	A2L.

DOE had previously considered the feasibility of including R–290 and R–441A as alternative refrigerants in the July 2015 final rule, in which DOE noted that the EPA's final rule published on April 10, 2015 (''EPA April 2015 final rule'') limited the maximum design charge amount of these refrigerants in PTAC and PTHP applications. 80 FR 43162, 43171. For instance, for a PTAC or PTHP with cooling capacity of 9,000 Btu/h, the EPA April 2015 final rule imposes a maximum design charge of 140 grams of R–290 or 160 grams of R–441A. 80 FR 19454, 19500. In comparison, DOE reverse engineered eleven units with cooling capacities around 9,000 Btu/h and found that these units had refrigerant charges ranging from 600 grams to 950 grams and all units used refrigerant R–410A. 80 FR 43162, 43171. The refrigerant charges currently used in current PTAC and PTHP designs far exceed the maximum charges that are allowed for these alternative refrigerants under the EPA April 2015 final rule. Additionally, in response to the December 2020 ECS RFI, CA IOUs commented that R–290 will likely not be used in PTAC and PTHPs because the model safety code that most states will likely adopt, Board of Standards Review (''BSR'')/ASHRAE Standard 15.2P, ''Safety Standard for Refrigeration Systems in Residential Applications'' (''BSR/ASHRAE Standard 15.2P''), does not allow the use of A3 refrigerants in residential air conditioners and heat pumps. (CA IOUs, No. 7 at p. 3) PTACs and PTHPs are commercial equipment under DOE's regulations, but DOE is aware of their use in certain applications that are treated as ''residential'' under BSR/ASHRAE Standard 15.2P (*e.g.,* multi-family housing). Therefore, DOE did not further consider R–290 and R–441A as alternate refrigerants in this analysis.

For the remaining substitute refrigerants, DOE considered comments received and conducted a literature review to evaluate whether these alternate refrigerants could enable better

[23] EPA finalized a rule on May 6, 2021, allowing R–452B, R–454A, R–454B, R–454C, R–457A and R–32 for new residential and light commercial air conditioning and heat pumps. 86 FR 24444.

[24] Available at: *www.regulations.gov/document/EPA-HQ-OAR-2021-0289-0011.*

[25] After granting a petition, EPA must initiate a rulemaking and publish a final rule within 2 years of the petition grant date *i.e.* Oct 15, 2023.

[26] ASHRAE assigns safety classification to the refrigerants based on toxicity and flammability data. The capital letter designates a toxicity class based on allowable exposure and the numeral denotes flammability. For toxicity, Class A denotes refrigerants of lower toxicity, and Class B denotes refrigerants of higher toxicity. For flammability, class 1 denotes refrigerants that do not propagate a flame when tested as per the standard; class 2 and 2L denotes refrigerants of lower flammability; and class 3, for highly flammable refrigerants such as the hydrocarbons.

energy efficiency than R–410A for PTAC and PTHP equipment. ASAP stated that it was their understanding that typical PTACs and PTHPs use R–410A as the refrigerant and that alternatives to R–410A such as R–32, R–452B, and R–454B can improve efficiency by at least 5%. (ASAP, No. 6 at p. 1) The CA IOUs also stated that R–32 is the likely replacement for R–410A in air conditioners and heat pumps, and recommended that DOE consider R–32 as a design option in this standards analysis, citing initial studies showing that R–32 improved the COP for VRF systems by five percent. (CA IOUs, No. 7 at p. 3)

DOE reviewed several studies to gauge the efficiency improvements of the substitute refrigerants as compared to R–410A. Most of these studies suggested comparable performance to R410A, with some studies showing slightly below-par performance and others showing improvement as high as 6% (for R–32). DOE notes that most of these studies were performed with drop-in applications (where an alternate refrigerant replaces the existing refrigerant in a system that is optimized for the existing refrigerant) and were not performed on PTAC or PTHP equipment specifically. It is possible that these substitute refrigerants might show efficiencies higher than R–410A in specific applications that have been optimized for such refrigerants. However, given the uncertainty associated with the studies reviewed, DOE was unable to conclude whether these refrigerants will improve energy efficiency and by how much. Therefore, DOE has tentatively decided to keep alternate refrigerants as a screened-out technology.

Intake and Exhaust Ducts To Reduce Infiltration

DOE has tentatively determined to screen out intake and exhaust ducts as a technology option. NEEA suggested that infiltration through and around a PTAC or PTHP can result in significant wasted energy and that DOE should consider technology options that reduce infiltration such as the use of air intake and exhaust ducts. (NEEA, No. 9 at p. 5) NEEA provided information pertaining to a unit that uses intake and exhaust air ducts. *Id.*

DOE notes that the use of intake and exhaust air ducts would be inconsistent with the definition of a PTAC and PTHP. PTAC and PTHP are equipment that are intended for mounting through the wall as opposed to using ductwork to bring in or exhaust air. *See* 10 CFR 431.92. Therefore, DOE has screened out this technology option.

In summary, DOE screened out four technology options based on the applicable criteria discussed previously. The screened-out technology options are presented below in Table IV–7.

TABLE IV–7—SCREENED OUT TECHNOLOGY OPTIONS

Screened technology option	Technological feasibility	Screening criteria (X = basis for screening out)			
		Practicability to manufacture, install, and service	Adverse impact on equipment utility	Adverse impacts on health and safety	Unique-pathway proprietary technologies
Scroll Compressors	X				
Heat Pipes	X				
Alternative Refrigerants	X				
Intake and Exhaust Ducts	X				

b. Other Technologies Not Considered in the Engineering Analysis

Typically, energy-saving technologies that pass the screening analysis are evaluated in the engineering analysis. However, in some cases technologies are not included in the analysis for reasons other than the screening criteria. These are discussed in the following paragraphs.

Technologies Previously Eliminated From the July 2015 Final Rule

In the July 2015 final rule, DOE identified several technology options that were not included in the engineering analysis because of three additional considerations: (1) efficiency benefits of the technologies were negligible; (2) data was not available to evaluate the energy efficiency characteristics of the technology; and/or (3) test procedure and EER and COP metrics did not measure the energy impact of the technology. 80 FR 43161, 43172; *see* 79 FR 55538, 55555–55556 (September 16, 2014). These technologies are listed below under each consideration:

(1) Efficiency benefits of the technologies were negligible:

• Re-circuiting heat exchanger coils;
• Rifled interior tube walls;

(2) Data was not available to evaluate the energy efficiency characteristics of the technology:

• Microchannel heat exchangers;

(3) Test procedure and EER and COP metrics did not measure the energy impact of the technology:

• Variable speed compressors;
• Complex control boards (fan motor controllers, digital ''energy management'' control interfaces, heat pump controllers);
• Corrosion protection;
• Hydrophobic material treatment of heat exchangers;
• Clutched motor fans; and
• TEVs.

In the December 2020 ECS RFI, DOE requested comment on its prior exclusion of these technologies and whether there have been changes that would warrant further consideration. 85 FR 82952, 82959.

In response, AHRI said they supported the DOE's conclusions regarding the additional technologies identified in development of the July 2015 final rule, but not included in the engineering analysis. (AHRI, No. 8 at p. 8).

DOE maintains its position expressed in the July 2015 final rule that re-circuiting heat exchanger coils and rifled interior tube walls are used in baseline products, so no additional energy savings would be expected from their use. 80 FR 43162, 43172 and 79 FR 55538, 55555. Regarding microchannel heat exchangers, NEEA stated that the technology can improve heat transfer efficiency by up to 40 percent compared to traditional fin and tube heat exchangers. (NEEA, No. 9 at p. 4) However, NEEA did not provide any information indicating efficiency improvement potential in terms of EER or COP for PTACs and PTHPs and DOE is not aware of any substantiated performance data for PTAC or PTHP operation with microchannels.

Any potential energy savings of complex controls boards, corrosion protection, hydrophobic material treatment of heat exchangers and clutched motor fans cannot be measured with the established energy efficiency metrics (EER and COP) because those technologies are associated with performance, which is not captured in the EER or COP metrics used for rating PTACs and PTHPs. Therefore, DOE is proposing to keep these previously eliminated technologies excluded from the engineering analysis.

Consideration of variable speed compressors and TEVs is presented under the next header.

Technology Options Benefiting Part-Load and Low Temperature Performance

As the current EER and COP metrics do not measure part-load performance and low temperature heating performance, DOE is proposing to exclude the following technologies from the engineering analysis:

- Variable speed condenser fan/motor;
- Variable speed indoor blower/motor;
- Variable speed compressors;
- TEVs
- EEVs
- Defrost control strategies
- Electric resistance boost control strategies
- Compressor cut-out controls

As discussed, DOE may consider adopting for PTACs and PTHPs a cooling-mode metric that integrates part-load performance and a heating metric that includes performance at low ambient temperatures in the ongoing test procedure rulemaking. 86 FR 28005, 28009–28011. If DOE amends the PTAC and PTHP test procedure to incorporate these changes, it will conduct any analysis for future standards rulemakings, if any, based on the amended test procedure. DOE is still evaluating potential amendments to the test procedure. At present, DOE is unable to consider energy savings from a part-load metric or low temperature heating performance.

DOE also considered any benefit that these technologies may provide for the existing full-load metrics (EER and COP), particularly variable-speed technology. DOE conducted a review of the CCD and has tentatively concluded that while an increased number of PTACs and PTHPs are employing variable-speed compressors and fans as compared to the market at the time of the 2015 rulemaking, the efficiency distributions of PTACs and PTHPs have not changed significantly. This suggests that the full-load efficiency benefit of these variable-speed technologies is minimal.

DOE is also excluding separate indoor and outdoor blower motors as a technology option from the engineering analysis because this technology option is already incorporated in most baseline models, and therefore, no additional energy savings would be expected from their use. NEEA stated that one manufacturer is using separate indoor and outdoor blower motors as a strategy to improve efficiency, while also reducing unit noise. (NEEA, No. 9 at p. 5) DOE's past and recent physical teardowns of PTACs and PTHPs suggest that this technology option is already incorporated in most baseline models and therefore little to no additional energy savings would result in consideration of this technology option.

c. Remaining Technologies

After reviewing each technology, DOE did not screen out the following technology options and considers them as design options in the engineering analysis. These technology options are the same as those retained in the July 2015 final rule:

(1) Higher Efficiency Compressors
(2) Higher Efficiency Fan Motors
(3) Increased Heat Exchanger Area
(4) Improved Air Flow and Fan Design

DOE has tentatively determined that these technology options are technologically feasible because they are being used or have previously been used in commercially available products or working prototypes and improve efficiency as determined by the DOE test procedure. For additional details on the technologies included in the engineering analysis, see chapter 4 of the July 2015 final rule TSD.

B. Engineering Analysis

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

1. Efficiency Analysis

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

In the July 2015 final rule, DOE adopted an efficiency-level approach combined with a cost-assessment approach to determine the cost-efficiency relationship. 80 FR 43162, 43173. Based on the technology options considered in section IV.A.3 of this document and a review of available efficiencies in the market, DOE has tentatively concluded that the available efficiencies on the market have not significantly changed since the 2015 rulemaking. DOE's review of current PTAC and PTHP designs also leads to the tentative conclusion that design options used to achieve higher EER and/or COP have not changed since 2015. Therefore, in this proposed determination, DOE utilized the same analysis as in the July 2015 final rule, but with updated costs to account for inflation and other effects.

The methodology used to perform the analysis and derive the cost-efficiency relationship is described in chapter 5 of the July 2015 final rule TSD.

2. Equipment Classes Analyzed

In the July 2015 final rule, DOE developed its engineering analysis for the six equipment classes associated with standard-size PTACs and PTHPs. 80 FR 43162, 43174–43177. DOE did not conduct an engineering analysis for non-standard size equipment classes because of their low and declining market share and because of a lack of adequate information to analyze these units. 80 FR 43162, 43174. To assess whether to develop an analysis for non-standard size equipment classes, DOE requested comment in the December 2020 ECS RFI as to whether the technology improvements discussed in IV.A.3 are applicable to both standard size and non-standard size units and if they have similar impacts on efficiency. 85 FR 82952, 82960. DOE also requested comment on whether it is necessary to individually analyze all or some of the available equipment classes. *Id.*

In response, AHRI commented that the non-standard size market was never large and has contracted over the years, and in a shrinking market new product development is unlikely as it is not economically justified for the manufacturers. (AHRI, No. 8 at p. 8) AHRI stated that there have been no significant technology improvements for these equipment classes to their knowledge. *Id.* AHRI said that DOE should employ best efforts to develop a robust and complete analysis and analyze all six standard-size equipment classes individually, but recognized this may not be possible. *Id.* AHRI stated that if DOE does not analyze all products, then the 9,000 and 12,000 Btu/h, nominal cooling capacities should be prioritized, followed by the 7,000 Btu/h and 15,000 Btu/h categories. *Id.*

In light of AHRI's comment regarding the non-standard size market contracting, and given the lack of market data pertaining to the non-standard size equipment classes, DOE has tentatively decided to not analyze amended standards for the non-standard size equipment classes. For the six standard size equipment classes, DOE has tentatively decided to use the analysis from the July 2015 final rule, in which DOE selected two cooling capacities for analysis: 9,000 Btu/h and 15,000 Btu/h. *See* 80 FR 43162, 43174. Inclusion of the 9,000 Btu/h category as in the July 2015 final rule is consistent with AHRI's suggestion to prioritize that category. DOE also retained the 15,000 Btu/h category to stay consistent with the analysis in the July 2015 final rule, in which DOE selected 15,000 Btu/h as a representative capacity in response to manufacturer comments stating that it is technically challenging to achieve high efficiency in 15,000 Btu/h models and the analysis should explicitly analyze the 15,000 Btu/h capacity. *See* 80 FR 43162, 43174.

Table IV–8 sets out the equipment classes analyzed in this rulemaking.

TABLE IV–8—EQUIPMENT CLASSES ANALYZED IN THIS RULEMAKING

Equipment class		
Equipment	Category	Cooling capacity
PTAC	Standard Size	<7,000 Btu/h. ≥7,000 Btu/h and ≤15,000 Btu/h. >15,000 Btu/h.
PTHP	Standard Size	<7,000 Btu/h. ≥7,000 Btu/h and ≤15,000 Btu/h. >15,000 Btu/h.

3. Baseline Efficiency Levels

DOE considered the current minimum energy conservation standards to establish the baseline efficiency levels for each standard size equipment class, using the 9,000 btu/h and 15,000 Btu/h cooling capacities as representative capacities for the standard size equipment classes. The baseline efficiency levels for the analyzed representative units are presented below in Table IV–9.

TABLE IV–9—BASELINE EFFICIENCY LEVELS

Equipment type	Equipment class	Baseline efficiency equation	Cooling capacity	Baseline efficiency level
PTAC	Standard Size	EER = 14.0 − (0.300 × Cap †/1000)	9,000 Btu/h 15,000 Btu/h	11.3 EER. 9.5 EER.
PTHP	Standard Size	EER = 14.0 − (0.300 × Cap †/1000) COP = 3.7 − (0.052 × Cap †)	9,000 Btu/h 15,000 Btu/h	11.3 EER. 3.2 COP. 9.5 EER. 2.9 COP.

† Cap means cooling capacity in thousand Btu/h at 95°F outdoor dry-bulb temperature.

4. Maximum Available and Maximum Technologically Feasible Levels

As part of DOE's analysis, the maximum available efficiency level is the highest efficiency unit currently available on the market. DOE also considers the max-tech efficiency level, which it defines as the level that represents the theoretical maximum possible efficiency if all available design options are incorporated in a model. In many cases, the max-tech efficiency level is not commercially available because it is not economically feasible.

As mentioned earlier, the technology options that were screened in for this analysis are the same as those considered for the July 2015 final rule. In the July 2015 final rule, DOE determined the max-tech improvements in energy efficiency for PTACs and PTHPs in the engineering analysis using the design parameters that passed the screening analysis, a combination of the efficiency-level approach, and the reverse engineering analysis. 80 FR 43162, 43168.

Table IV–10 shows the max-tech efficiency levels presented in the December 2020 ECS RFI, which were those from the July 2015 Final rule and set to be 16.2 percent above the baseline, and the maximum-available efficiency levels based on the current market for each equipment class. 85 FR 82952, 82960–82961. DOE has test data to verify that one standard size PTHP unit belonging to the equipment class of cooling capacity greater than 7,000 Btu/h and less than 15,000 Btu/h, demonstrated a cooling efficiency at this ''max tech'' level. 79 FR 55538, 55558.

TABLE IV–10—MAX-TECH AND MAXIMUM-AVAILABLE EFFICIENCY LEVELS

Equipment class	Max-tech July 2015 final rule	Maximum-available current market
Standard Size PTAC <7,000 Btu/h	13.8 EER [a]	13.0 EER.
Standard Size PTAC ≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 16.3 − (0.354 × Cap [b])	EER = 15.8 − (0.308 × Cap [b]) [c].
Standard Size PTAC >15,000 Btu/h	11.0 EER	9.7 EER.
Standard Size PTHP <7,000 Btu/h	13.8 EER [a]	13.1 EER.
	3.8 COP [a]	4.0 COP.
Standard Size PTHP ≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 16.3 − (0.354 × Cap [b])	EER = 15.8 − (0.308 × Cap [b]) [c].
	COP = 4.3 − (0.073 × Cap [b])	COP = 4.6 − (0.075 × Cap [b]) [c].
Standard Size PTHP >15,000 Btu/h [3]	11.0 EER	N/A [d].
	3.2 COP	

[a] Based on Max Tech equation shown for Standard Size PTACs and PTHPs, ≥7,000 Btu/h and ≤15,000 Btu/h at a value of 7,000 Btu/h.
[b] Cap means cooling capacity in thousand Btu/h.
[c] Based on method of creating a linear fit between the two models in the CCD Database that were the highest absolute value above the baseline.
[d] Based on DOE's review of equipment currently available on the market, DOE did not identify any PTHP models with a cooling capacity greater than 15,000 Btu/h.

In the December 2020 ECS RFI, DOE sought input on whether these maximum available efficiency levels are appropriate as the max-tech for potential consideration as possible energy conservation standards for the equipment at issue—and if not, what efficiency levels should be considered max-tech. 85 FR 82952, 82961. DOE also requested feedback on what design options to incorporate at the max-tech efficiency level and whether there are any limitations on the use of certain combinations. *Id.* DOE also requested comment on whether certain design options may not be applicable to specific equipment classes. *Id.*

AHRI stated that based on their analysis per the AHRI Directory, the ranges of efficiencies available for PTACs and PTHPs are very limited and that there are no significant advances or changes in technology. (AHRI, No. 8 at p. 9) AHRI provided tables showing efficiency ranges of PTACs and PTHPs that it stated identifies several instances where the max tech identified in the July 2015 final rule is above the current market. *Id.* AHRI also stated that there are issues with implementing bent heat exchangers and improved air flow and fan design as concurrent design options, stating that bent heat exchangers may impose an additional pressure drop that the indoor fan must overcome, thus not improving EER of the equipment. (AHRI, No. 8 at p. 9) AHRI stated that if both bent heat exchangers and improved air flow and fan design are implemented as design options, DOE should account for the significant additional design, evaluation and testing that would be required to optimize the system to achieve the desired efficiency. *Id.* at 11. AHRI stated that in the 2015 rulemaking DOE did not account for this interaction, nor the cost associated to resolve it in the analysis. *Id.* AHRI also commented that higher efficiency compressors, particularly at smaller capacities, are still in development, and cautioned DOE to consider state and federal regulations impacting the equipment (such as requiring to use low-GWP refrigerants) accordingly so that new efficiency standards do not precede market developments. (AHRI No. 8 at pp. 11–12)

AHRI also commented that the efficiency ranges available for PTACs and PTHPs are limited, which is consistent with with DOE's findings based on its own market research. (AHRI No. 8 at p. 9) DOE was unable to identify significant advances since the July 2015 final rule, based on a review of the CCD. DOE is aware that in some instances, the max-tech levels identified in the July 2015 final rule are higher than the current maximum available efficiencies in the market per CCD and the AHRI directory—however, DOE has tentatively determined that the max-tech levels from 2015 are still suitable for this analysis because these levels were achieved by models that were commercially available. Since the screened in design options for this engineering analysis are the same as those considered in the July 2015 final rule and the available efficiencies have not significantly changed since the 2015 rulemaking, DOE sees no reason to revise the max-tech levels. Regarding the design interaction described by AHRI, DOE notes that the analysis presented in the July 2015 final rule did consider pressure drop impacts associated with bent heat exchangers. *See* 80 FR 43162, 43173. In its analysis, DOE considered at least three units that contained a bent heat exchanger. DOE based its analysis on the measured performance of these units (one of which performed at the max-tech efficiency level). The measured performance of these units includes the impact of additional pressure drop associated with the bent heat exchangers. *Id.* Regarding AHRI's comment on higher efficiency compressors, DOE is cognizant of the changing landscape of state and federal regulations, especially as they relate to alternate refrigerants and how they affect the development of higher efficiency compressors. As discussed in Section IV.A.4.a of this document, DOE has tentatively decided to keep alternate refrigerants as a screened-out technology.

The CA IOUs stated that they identified 30 PTHP models that meet or exceed the heating max-tech COP level from DOE's 2015 final rule TSD and encouraged DOE to investigate the technologies used in these products to improve their efficiencies and update the engineering analysis accordingly. (CA IOUs, No. 7 at p. 2)

DOE is aware that there are PTHP models on the market that exceed the max-tech COP levels in the July 2015 final rule. DOE notes that a PTHP's EER and COP are related and cannot be independently analyzed, therefore the COP max-tech levels in the July 2015 final rule were developed by correlating the COP associated with each efficiency level with the efficiency level's EER based on COP and EER ratings from the AHRI database. 80 FR 43162, 43175. DOE then established a representative curve based on this data to obtain a relationship for COP in terms of EER and used this relationship to select COP values corresponding to each efficiency level. *Id.* Therefore, the COP max-tech values correspond to the max-tech EER values. DOE is aware that these COP max-tech values may not align with the highest COP values currently available in the market, but DOE considers them to be more representative of a max-tech unit at the highest EER.

In summary, because the design options retained for this rulemaking are the same as those considered for the July 2015 final rule, and a review of the CCD suggests that that the available efficiencies have not significantly changed since the 2015 rulemaking, DOE is proposing to maintain the same max-tech levels for this rulemaking.

5. Incremental Efficiency Levels

DOE analyzed several incremental efficiency levels between the baseline and max-tech levels and obtained incremental cost data at each of these levels. DOE considered five efficiency levels beyond the baseline efficiency level up to the max-tech level for each equipment class. These levels are 2.2%, 6.2%, 10.2%, 14.2% and 16.2% more efficient than the amended PTAC and PTHP standards that became effective on July 21, 2015 and are the same incremental efficiency levels evaluated in the July 2015 final rule. These levels are presented in Table IV–11.

TABLE IV–11—INCREMENTAL EFFICIENCY LEVELS FOR STANDARD SIZE PTACS AND PTHPS

Equipment type	Cooling capacity	Efficiency levels (percentages relative to 2015 ECS)					
		Baseline *	EL1, 2.2%	EL2, 6.2%	EL3, 10.2%	EL4, 14.2%	EL5, 16.2% (max-tech)
PTAC	All, EER	14.0 − (0.300 × Cap †).	14.4 − (0.312 × Cap †).	14.9 − (0.324 × Cap †).	15.5 − (0.336 × Cap †).	16.0 − (0.348 × Cap †).	16.3 − (0.354 × Cap †)
	9,000 Btu/h.	11.3 EER	11.5 EER	12.0 EER	12.4 EER	12.9 EER	13.1 EER
	15,000 Btu/h.	9.5 EER	9.7 EER	10.0 EER	10.4 EER	10.8 EER	11.0 EER
PTHP	All, EER	14.0 − (0.300 × Cap †).	14.4 − (0.312 × Cap †).	14.9 − (0.324 × Cap †).	15.5 − (0.336 × Cap †).	16.0 − (0.348 × Cap †).	16.3 − (0.354 × Cap †)
	All, COP	3.7 − (0.052 × Cap †).	3.8 − (0.058 × Cap †).	4.0 − (0.064 × Cap †).	4.1 − (0.068 × Cap †).	4.2 − (0.070 × Cap †).	4.3 − (0.073 × Cap †)
	9,000 Btu/h.	11.3 EER	11.5 EER	12.0 EER	12.4 EER	12.9 EER	13.1 EER
		3.2 COP	3.3 COP	3.4 COP	3.5 COP	3.6 COP	3.6 COP
	15,000 Btu/h.	9.5 EER	9.7 EER	10.0 EER	10.4 EER	10.8 EER	11.0 EER
		2.9 COP	2.9 COP	3.0 COP	3.1 COP	3.2 COP	3.2 COP

* This level represents the current Federal minimum standards for PTAC and PTHP equipment.
† Cap means cooling capacity in thousand Btu/h at 95°F outdoor dry-bulb temperature.

In response to the December 2020 ECS RFI, AHRI commented that in the July 2015 rulemaking DOE assumed that PTACs and PTHPs are fundamentally the same and should be able to meet the same efficiency levels with the same technology options. (AHRI, No. 8 at p. 10) AHRI asserted that this is not the case and there are certain intrinsic characteristics which allow PTHPs to operate more efficiently than PTACs. *Id.* AHRI stated that if the construction between a given PTAC and PTHP is essentially the same (*i.e.,* same coils, refrigerant circuiting, components, etc.), and differs only by the presence of a reversing valve, then for a given design target superheat at the compressor inlet, there is an opportunity for the PTHP to operate the evaporator at a lower outlet superheat, thereby allowing for more evaporative capacity for a tradeoff of little to no more total power input. *Id.* AHRI stated this allows PTHPs to operate at higher EER than a similar PTAC. *Id.* at 11.

DOE's review of CCD listings of standard size PTACs and PTHPs with cooling capacities greater than 7,000 btu/h and less than 15,000 btu/h indicates that the cooling efficiency distributions of the two classes are comparable. This suggests that using the same incremental efficiency levels are appropriate for PTACs and PTHPs. DOE notes that AHRI did not recommend a distinction between the PTAC and PTHP incremental efficiency levels and considers it a clarification. As such, DOE proposes to maintain the same incremental efficiency levels for PTACs and PTHPs in this rulemaking.

6. Cost Analysis

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

- *Physical teardowns:* Under this approach, DOE physically dismantles a commercially available product, component-by-component, to develop a detailed bill of materials for the product.
- *Catalog teardowns:* In lieu of physically deconstructing a product, DOE identifies each component using parts diagrams (available from manufacturer websites or appliance repair websites, for example) to develop the bill of materials for the product.
- *Price surveys:* If neither a physical nor catalog teardown is feasible (for example, for tightly integrated products such as fluorescent lamps, which are infeasible to disassemble and for which parts diagrams are unavailable) or cost-prohibitive and otherwise impractical (*e.g.* large commercial boilers), DOE conducts price surveys using publicly available pricing data published on major online retailer websites and/or by soliciting prices from distributors and other commercial channels.

In the July 2015 final rule, DOE performed a cost analysis that involved testing and then conducting physical teardowns on several test units to develop a manufacturing cost model and to evaluate key design features (*e.g.,* improved heat exchangers, compressors, fans/fan motors). 80 FR 43162, 43176. The design options being considered in this rulemaking are the same as in the

2015 rulemaking. Furthermore, DOE's review of CCD and comments received from AHRI, suggest that the efficiency distributions for available PTACs and PTHPs have not changed compared to the 2015 rulemaking. Therefore, DOE considers that the cost analysis conducted for the July 2015 final rule is still relevant for this rulemaking. Details of the cost-efficiency analysis conducted for the July 2015 final rule can be found in chapter 5 of the July 2015 final rule TSD. Because of the time that has passed since the July 2015 final rule, DOE adjusted the cost analysis for inflation and other market effects. To adjust the cost analysis, DOE used industry specific producer price index (''PPI'') data published by the Bureau of Labor Statistics (''BLS''). The PPI measures the average change over time in the selling prices from the perspective of the seller. DOE evaluated the change in PPI from the year 2013 (used in the previous rulemaking) to year 2021 (current rulemaking), and used the percent increase to scale the manufacturer production costs (''MPCs'') from the previous rulemaking.

7. Cost-Efficiency Results

The results of the engineering analysis are reported as a set of cost-efficiency data (or ''curves'') in the form of MPC (in dollars) versus EER, which form the basis for other analyses in the NOPD. DOE created cost-efficiency curves for the two representative cooling capacities within the two standard-size equipment classes of PTACs and PTHPs, as discussed in section IV.B.2 previously. DOE developed the incremental cost-efficiency results shown in Table IV–12 for each representative cooling capacity. These cost results are incremented from a baseline efficiency level equivalent to the current federal minimum standards.

TABLE IV–12—INCREMENTAL MANUFACTURING PRODUCTION COSTS (MPC) FOR STANDARD SIZE PTACS AND PTHPS

Equipment type	Cooling capacity	Efficiency levels					
		Baseline *	EL1	EL2	EL3	EL4	EL5
PTAC	9,000 Btu/h	$0.00	$5.22	$15.36	$26.32	$38.11	$44.31
	15,000 Btu/h	0.00	5.00	18.71	36.37	58.00	70.30
PTHP	9,000 Btu/h	0.00	5.22	15.36	26.32	38.11	44.31
	15,000 Btu/h	0.00	5.00	18.71	36.37	58.00	70.30

* This level represents the current federal minimum standards for PTAC and PTHP equipment.

In the December 2020 ECS RFI, DOE requested information on how it could conduct the cost-efficiency analyses for PTHPs greater than 15,000 Btu/h, for which there are no models on the market and for which DOE does not have data. 85 FR 82952, 82961.

In response, AHRI noted that they had identified six model listings for PTACs with cooling capacities greater than 15,000 Btu/h and that it would be reasonable to expect a PTHP of similar size to be slightly more efficient, based on reasoning discussed earlier. (AHRI, No. 8 at p. 12) For heating, AHRI stated that it is reasonable to consider the efficiency of PTHP with cooling capacity greater than 15,000 Btu/h to be equivalent to PTHP with cooling capacity equal to 15,000 Btu/h. *Id.*

For this analysis, DOE considered the cooling efficiency of PTHP greater than 15,000 Btu/h to be equivalent to PTACs greater than 15,000 Btu/h. As discussed earlier in Section IV.B.5, the overall cooling efficiency distributions of standard size PTACs and PTHPs with cooling capacities greater than 7,000 Btu/h and less than 15,000 Btu/h are very similar, suggesting that using an equivalent cooling efficiency for PTHP greater than 15,000 btu/h to that of PTACs greater than 15,000 Btu/h is appropriate.

To account for manufacturers' non-production costs and profit margin, DOE applied a non-production cost multiplier (the manufacturer markup) to the MPC. The resulting manufacturer selling price (''MSP'') is the price at which the manufacturer distributes a unit into commerce. In the December 2020 ECS RFI, DOE requested comment on whether a manufacturer markup of 1.27, as used in July 2015 final rule, is appropriate for PTACs and PTHPs. 85 FR 82952, 82961. DOE did not receive any comments pertaining to this, and therefore DOE retained the manufacturer markup of 1.27 for this analysis.

C. Markups Analysis

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

In the July 2015 final rule, DOE identified four distribution channels for PTACs and PTHPs to describe how the equipment passes from the manufacturer to the consumer. 80 FR 43162, 43177. The four distribution channels are listed:

The first distribution channel is only used in the new construction market, and it represents sales directly from a manufacturer to the end use customer through a national account.

Manufacturer → National Account → End user

The second distribution channel represents replacement markets, where a manufacturer sells to a wholesaler, who sells to a mechanical contractor, who in turn sells to the end user.

Manufacturer → Wholesaler → Mechanical Contractor → End user

The third distribution channel, which is used in both new construction and replacement markets, the manufacturer sells the equipment to a wholesaler, who in turn sells it to a mechanical contractor, who in turn sells its to a general contractor, who sells it to the end user.

Manufacturer → Wholesaler → Mechanical Contractor → General Contractor→ End user

Finally, in the fourth distribution channel, which is also used in both the new construction and replacement markets, a manufacturer sells to a wholesaler, who in turn sells directly to the end user.

Manufacturer → Wholesaler → End User

80 FR 43162, 43177.

In the December 2020 ECS RFI, DOE requested information on the existence of any distribution channels other than these four distribution channels identified in the July 2015 Final Rule and also requested data on the fraction of PTAC and PTHP sales that go through each of the four identified distribution channels as well as the fraction of sales through any other identified channels. 85 FR 82952, 82962.

AHRI commented that DOE's assumption that no replacements are made through direct sales from the manufacturer to the customer was incorrect in the July 2015 final rule. (AHRI, No. 8 at p. 12) AHRI stated that certain national accounts purchase replacements through direct sales. *Id.* DOE did not receive any comments about the fraction of PTAC and PTHP sales through each distribution channel.

DOE did not find any data to indicate the magnitude of PTAC/PTHP replacement sales through national accounts and AHRI did not provide any estimates of the national account replacement channel. However, DOE understands that while certain PTAC and PTHP owners may purchase replacement units through a national accounts channel, DOE does not expect the replacement volume to be very large. Thus, DOE believes that this channel is likely to be a minimal part of the market and has not added it to the analysis.

In summary, DOE considered the four distribution channels shown in Table IV–13 and estimated percentages of the total sales in the new construction and replacement markets for each of the four distribution channels as listed in Table IV–14.

TABLE IV–3—DISTRIBUTION CHANNELS FOR PTAC AND PTHP EQUIPMENT

Channel 1	Channel 2	Channel 3	Channel 4
Manufacturer (through national accounts)	Manufacturer	Manufacturer	Manufacturer.
	Wholesaler	Wholesaler	Wholesaler.
		Mechanical Contractor	Mechanical Contractor.
			General Contractor.
Consumer	Consumer	Consumer	Consumer.

TABLE IV–14—SHARE OF MARKET BY DISTRIBUTION CHANNEL FOR PTAC AND PTHP EQUIPMENT

Distribution channel	New construction (percent)	Replacement (percent)
Wholesaler-Consumer	30	15
Wholesaler-Mech Contractor-Consumer	0	25
Wholesaler-Mech Contractor-General Contractor-Consumer	38	60
National Account	32	0
Total	100	100

DOE updated the sources used in the July 2015 final rule to derive markups for each step of the distribution channels with the following data sources: (1) the 2017 Annual Wholesale Trade Survey,[27] to develop wholesaler markups; (2) the Air Conditioning Contractors of America's (''ACCA'') ''2005 Financial Analysis for the HVACR Contracting Industry'' [28] and 2017 U.S. Census Bureau economic data [29] to develop mechanical contractor markups; and (3) 2017 U.S. Census Bureau economic data for the commercial and institutional building construction industry to develop general contractor markups.[30] The overall markup is the product of all the markups (baseline or incremental markups) for the different steps within a distribution channel. Replacement channels include sales taxes, which were calculated based on State sales tax data reported by the Sales Tax Clearinghouse.

Chapter 6 of the NOPD TSD provides details on DOE's development of the markups.

D. Energy Use Analysis

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

In the July 2015 final rule, DOE adjusted the UECs that were used in the October 2008 final rule to account for the different efficiency levels and equipment classes. 80 FR 43162, 43178; *see* 73 FR 58772. DOE began with the cooling UECs for PTACs and the cooling and heating UECs for PTHPs from the October 2008 final rule. Where identical efficiency levels and cooling capacities were available, DOE used the cooling and heating UEC directly from the October 2008 final rule. For additional efficiency levels, DOE scaled the cooling UECs based on interpolations between EERs and scaled the heating UECs based on interpolations of COPs, both at a constant cooling capacity. For additional cooling capacities, DOE scaled the UECs based on interpolations between cooling capacities and a constant EER. Once DOE determined the UECs by EL and product class, DOE adjusted the base-year UEC to account

[27] U.S. Census Bureau. *2017 Annual Wholesale Trade Report, NAICS 4236: Household Appliances and Electrical and Electronic Goods Merchant Wholesalers.* 2017. Washington, DC *www.census.gov/wholesale/index.html.*

[28] ''2005 Financial Analysis for the HVACR Contracting Industry,'' Air Conditioning Contractors of America. 2005.

[29] ''Plumbing, Heating, and Air-Conditioning Contractors. Sector 23: 238220. Construction: Industry Series, Preliminary Detailed Statistics for Establishments, 2017,'' U.S. Census Bureau. 2017. Available at: *www.census.gov/data/tables/2017/econ/economic-census/naics-sector-23.html.*

[30] ''2017 Economic Census, Construction Industry Series and Wholesale Trade Subject Series,'' U.S. Census Bureau. Available online at *www.census.gov/data/tables/2017/econ/economic-census/naics-sector-23.html.*

for changes in climate between 2008 and 2013 based on a typical meteorological year (''TMY'') hourly weather data set (referred to as TMY2) and an updated data set (referred to as TMY 3). 80 FR 43162, 43178.

In the December 2020 ECS RFI, DOE requested comment on the approach used in the July 2015 final rule to develop UECs along with a request for comment on the approach to measure energy use of make-up air PTACs and PTHPs. 85 FR 82952, 82962.

AHRI commented that it has concerns regarding the approach used to develop UECs in the energy use analysis for the July 2015 final rule. AHRI stated that DOE should account for the following changes in ASHRAE Standard 90.1 at a minimum: (1) section 6.3.2g mandates that the system be controlled by a manual changeover or dual set point thermostat, (2) section 6.3.2h applicable to PTHPs with auxiliary internal electric resistance heaters, mandates that controls must be provided to prevent supplemental heater operation when the heating load can be met by the heat pump alone, and (3) section 6.4.3.1 requires thermostatic controls to include off-hour controls, automatic shutdown and setback controls. (AHRI, No. 8 at p. 13).

AHRI also commented that the 2008 analysis assumed that PTACs and PTHPs would be used to cool the lobby and lounge space of a small hotel and that this space is typically not conditioned by PTACs/PTHPs. *Id.* AHRI also commented that the UECs were higher in the July 2015 final rule than in the September 2014 Notice of Data Availability and does not understand how the UECs at identical efficiency levels could increase in that time period. (AHRI, No. 8 at p. 14).

Regarding make-up air units, AHRI stated that DOE should focus on making the changes to the energy use analysis mentioned above before it expends resources on a small market segment. (AHRI, No. 8 at p. 14) NEEA suggested that DOE include the ability to provide ventilation and make-up air to a space and measure the energy use associated with cooling, heating, and dehumidifying ventilation air. (NEEA, No. 9 at p. 5)

NEEA also suggested that DOE's energy use analysis should capture a range of operating conditions for PTACs and PTHPs. (NEEA, No. 9 at p. 6) NEEA suggested that DOE model the energy use in lodging applications as well as residential care and multifamily buildings. *Id.*

In response to the comments from AHRI and NEEA, DOE updated its energy use analysis for this NOPD. To develop UECs, DOE began with the cooling and heating loads from the new construction 2004 vintage, small hotel commercial reference building prototype.[31] While more recent prototypes are available that reflect more current building codes, DOE notes that its energy use analysis is meant to represent the energy use in the current stock of buildings that use PTACs and PTHPs and the 2004 prototype is more reflective of the stock than a newer prototype.[32] This prototype is a four floor, rectangular building with 35 guest rooms, each of which uses a PTAC for cooling and heating. The cooling and heating loads were developed in EnergyPlus[33] using TMY3 weather data along with the default assumptions for building envelope, ventilation, occupancy schedule, cooling and heating thermostat set points, and square footage. A detailed description of the small hotel commercial reference building can be found on the DOE commercial reference building website.[34] The UECs were developed only using the guestroom load profiles and the PTHP UECs use the heat-pump to meet the heating loads. DOE notes that it provided an explanation for the higher UECs in the July 2015 final rule, as DOE added a multiplier to account for the change in weather data (the 2008 analysis was run using TMY2 and in 2015 TMY3 data was available), which led to higher UECs. 80 FR 43162, 43178–9.

DOE understands NEEA's suggestion to model variability by building type, however, DOE notes that small hotels make up the large majority of PTAC and PTHP shipments (approximately 80 percent) and the internal loads of residential care guestrooms and apartments in multifamily buildings that would use a PTAC or PTHP should not be significantly different than those of small hotel guestrooms, therefore DOE only modeled the energy use in small hotels. DOE also notes that the building cooling and heating loads include ventilation, therefore the UEC includes the energy required to cool, heat, and dehumidify outside air.

Of the 35 hotel rooms in the small hotel commercial reference building prototype, 20 have a design day size below 10,000 Btu/h and the others have design day sizes above 20,000 Btu/h. The largest standard size PTACs and PTHPs in CCD[35] are less than 17,000 Btu/h, therefore, DOE did not consider the small hotel guestroom loads with design days over 20,000 Btu/h. To create full load cooling and heating hours, for each climate zone DOE took the sum of the cooling and heating loads from the 20 guestrooms with a design day size below 10,000 Btu/h and divided them by the sum of the design day capacities for the same hotel guestrooms. DOE then took the full-load cooling and heating hours and multiplied them by the full-load cooling and heating power for each efficiency level. The full-load cooling power was derived by dividing the representative cooling capacity of either 9,000 Btu/h or 15,000 Btu/h by the EERs of the representative efficiency levels. The heating power for PTHPs was derived by converting the 9,000 Btu/h and 15,000 Btu/h capacities into Watts, and dividing them by the representative COPs.

DOE created UECs for each of the 16 International Energy Conservation Code (''IECC'') Climate Zones in the U.S. by simulating the small hotel prototype in one representative city for each climate zone. DOE used county level population data from the U.S. Census Bureau[36] along with a Pacific Northwest Laboratory report,[37] which assigned a climate zone to each county in the U.S. to develop population weighting factors for each climate zone. Next, DOE used the county level population data and climate zones to determine the weighted average UEC for each Census Division, with Census Division 9 split into two, California and the remaining states of Census Division 9 (Washington, Oregon, Hawaii, and Alaska). The resulting UECs represent the average small hotel guestroom cooling and heating energy use for each Census Division (with Census Division 9 split into two regions as explained previously).

DOE made further adjustments to each UEC for each climate zone to better account for the field energy use of PTACs and PTHPs. The Energy Information Administration's (''EIA'') National Energy Modeling System (''NEMS''), which is used to develop the Annual Energy Outlook (''AEO''),

[31] *www.energy.gov/eere/buildings/new-construction-commercial-reference-buildings.*

[32] In Commercial Buildings Energy Consumption Survey (''CBECS'') 2018, 80% of lodging buildings that use an individual room air conditioner were constructed prior to the year 2000.

[33] *www.energy.gov/eere/buildings/downloads/energyplus-0.*

[34] *www.energy.gov/eere/downloads/reference-buildings-building-type-small-hotel.*

[35] Available at: *www.regulations.doe.gov/certification-data/CCMS–4-Air_Conditioners_and_Heat_Pumps_-_Package_Terminal.html#q=Product_Group_s%3A%22Air%20Conditioners%20and%20Heat%20Pumps%20-%20Package%20Terminal%22* (last accessed, 3/25/2022).

[36] Available at: *www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html#par_textimage_70769902.*

[37] Available at: *www.energy.gov/sites/prod/files/2015/10/f27/ba_climate_region_guide_7.3.pdf.*

develops a time series of scaling factors that capture the improvements of building envelopes in new and existing buildings over time.[38] These building shell scalars are multiplied by the UEC to demonstrate the reduction in cooling and heating energy use by improved building envelopes by census division and building type between the year of construction of the small hotel commercial reference building (2004) and the compliance year (2026). DOE applied the scalars for the lodging building type to the UECs developed using the cooling and heating loads from the small hotel commercial reference building. DOE calculated the improvement between 2004, the year of the small hotel reference building, and 2026, the compliance year, using the new construction time series to create a new construction UEC and the existing building time series to create an existing building UEC in 2026. DOE weighted the results using shipments projections to new construction (12%) and existing buildings (88%) to create a weighted average UEC in 2026.

Chapter 7 of the NOPD TSD provides details on DOE's energy use analysis for PTACs and PTHPs.

E. Life-Cycle Cost and Payback Period Analysis

DOE conducted LCC and PBP analyses to evaluate the economic impacts on individual consumers of potential energy conservation standards for PTACs and PTHPs. The effect of new or amended energy conservation standards on individual consumers usually involves a reduction in operating cost and an increase in purchase cost. DOE used the following two metrics to measure consumer impacts:

• The LCC is the total consumer expense of an appliance or product over the life of that product, consisting of total installed cost (manufacturer selling price, distribution chain markups, sales tax, and installation costs) plus operating costs (expenses for energy use, maintenance, and repair). To compute the operating costs, DOE discounts future operating costs to the time of purchase and sums them over the lifetime of the product.

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

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

For each considered efficiency level in each product class, DOE calculated the LCC and PBP for PTACs and PTHPs used in small hotel guestrooms. As stated previously, DOE developed a sample of small hotel guestroom PTAC and PTHP UECs by census division based on the DOE small hotel reference building. For each census division, DOE determined the average energy consumption for a PTAC or PTHP in a small hotel guestroom and the appropriate electricity price. By developing a sample of UECs by census division, the analysis captured the variability in energy consumption and energy prices associated with the use of PTACs and PTHPs.

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

The computer model DOE used to calculate the LCC and PBP relies on a Monte Carlo simulation to incorporate uncertainty and variability into the analysis. The Monte Carlo simulations randomly sample input values from the probability distributions and PTAC and PTHP user samples. The model calculated the LCC and PBP for products at each efficiency level for 10,000 scenarios per simulation run. The analytical results include a distribution of 10,000 data points showing the range of LCC savings for a given efficiency level relative to the no-new-standards case efficiency distribution. In performing an iteration of the Monte Carlo simulation for a given PTAC or PTHP owner, product efficiency is chosen based on its probability. If the chosen product efficiency is greater than or equal to the efficiency of the standard level under consideration, the LCC and PBP calculation reveals that the PTAC or PTHP owner is not impacted by the standard level. By accounting for PTAC or PTHP owners who already purchase more-efficient products, DOE avoids overstating the potential benefits from increasing product efficiency.

DOE calculated the LCC and PBP for all consumers of PTACs and PTHPs as if each were to purchase a new product in the expected year of required compliance with new or amended standards. Any amended standards would apply to PTACs and PTHPs manufactured 3 years after the date on which any new or amended standard is published. (42 U.S.C. 6313(a)(6)(C)(iv)(I)) For purposes of its analysis, DOE used 2026 as the first year of compliance with any amended standards for PTACs and PTHPs.

Table IV–15 summarizes the approach and data DOE used to derive inputs to the LCC and PBP calculations. The subsections that follow provide further discussion. Details of the spreadsheet model, and of all the inputs to the LCC and PBP analyses, are contained in chapter 8 of the NOPD TSD and its appendices.

TABLE IV–15—SUMMARY OF INPUTS AND METHODS FOR THE LCC AND PBP ANALYSIS *

Inputs	Source/method
Product Cost	Derived by multiplying MPCs by manufacturer, contractor, and distributor markups and sales tax, as appropriate. A constant price trend was used to project product costs.
Installation Costs	Baseline installation cost determined with data from RS Means for the 2015 final rule, updated to 2021 dollars. Assumed no change with efficiency level.

[38] Available at: *www.eia.gov/analysis/studies/buildings/buildingshell/.*

TABLE IV–15—SUMMARY OF INPUTS AND METHODS FOR THE LCC AND PBP ANALYSIS *—Continued

Inputs	Source/method
Annual Energy Use	The total full-load cooling and heating hours multiplied by the full load cooling and heating power at each efficiency level. Variability: Based on the 16 IECC climate zones and representative cities from the DOE commercial reference building then mapped to census divisions (with census division 9 split into California and the rest of the census division).
Energy Prices	Electricity: Based on Edison Electric Institute data of average and marginal prices. Variability: Regional energy prices by census division, with census division 9 separated into California and the rest of the census division.
Energy Price Trends	Based on AEO 2022 price projections.
Repair and Maintenance Costs.	Maintenance costs do not change by efficiency level. The materials portion of repair costs changes by efficiency level; the labor costs are constant and based on RS Means. Values from 2015 final rule were converted to 2021 dollars.
Product Lifetime	Average: 8 years.
Discount Rates	Commercial Discount rates for lodging, healthcare, and small office. The approach involves estimating the cost of capital of companies that purchase PTAC and PTHP equipment.
Compliance Date	2026.

* References for the data sources mentioned in this table are provided in the sections following the table or in chapter 8 of the NOPD TSD.

1. PTAC and PTHP Equipment Cost

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

In the July 2015 final rule, DOE used a constant price trend to project the equipment prices in the compliance year. 80 FR 43162, 43179. DOE maintained this approach in this NOPD and used a constant trend for equipment prices between 2021 (the year for which MPCs were developed) and 2026. The constant trend is based on a historical time series of the deflated PPI for all other miscellaneous refrigeration and air conditioning equipment between 1990 and 2021.[39] The deflated PPI does not indicate a long term upward or downward trend, therefore DOE maintained a constant price trend for PTACs and PTHPs.

2. Installation Cost

Installation cost includes labor, overhead, and any miscellaneous materials and parts needed to install the product. DOE used the installation costs developed from the 2015 final rule[40] and converted them to 2021 dollars using the GDP implicit price deflator[41] to estimate the labor costs associated with baseline installation cost for PTACs and PTHPs. As representative efficiency levels for PTACs and PTHPs in this analysis are single-stage, packaged units that fit into a wall sleeve, DOE found no evidence that installation costs would be impacted with increased efficiency levels.

3. Annual Energy Consumption

For each census division, DOE determined the energy consumption for a PTAC or PTHP in a small hotel guestroom at different efficiency levels using the approach described previously in section IV.D of this document.

4. Energy Prices

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

DOE derived electricity prices in 2021 using data from Edison Electric Institute (''EEI'') Typical Bills and Average Rates reports.[42] Based upon comprehensive, industry-wide surveys, this semi-annual report presents typical monthly electric bills and average kilowatt-hour costs to the customer as charged by investor-owned utilities. For the commercial sector, DOE calculated electricity prices using the methodology described in Coughlin and Beraki (2019).[43]

DOE's methodology allows electricity prices to vary by sector, region, and season. In the analysis, variability in electricity prices is chosen to be consistent with the way the consumer economic and energy use characteristics are defined in the LCC analysis. For PTACs and PTHPs, DOE developed UECs by census division for each equipment class and efficiency level for the summer (May to September) and winter (October to April) seasons. The average summer and winter electricity price for large commercial buildings was used to measure the baseline energy cost. The summer and winter marginal prices for large commercial buildings, using a marginal load factor of 0.5 were used to measure the operating cost savings from higher efficiency PTACs and PTHPs. See chapter 8 of the final rule TSD for details.

To estimate energy prices in future years, DOE multiplied the 2021 energy prices by the projection of annual average price changes for each of the nine census divisions from the Reference case in *AEO 2022,* which has an end year of 2050.[44] To estimate price trends after 2050, DOE kept the energy price constant at the 2050 value.

5. Maintenance and Repair Costs

Repair costs are associated with repairing or replacing PTAC and PTHP components that have failed in an appliance; maintenance costs are associated with maintaining the operation of the PTAC or PTHP. Typically, small incremental increases

[39] Available at: *www.bls.gov/ppi/.*

[40] *See* Chapter 8 of the 2015 Final Rule Technical Support Documents (Available at: *www.regulations.gov/document/EERE-2012-BT-STD-0029-0040*).

[41] *https://fred.stlouisfed.org/series/GDPDEF.*

[42] Available at: *https://netforum.eei.org/eweb/DynamicPage.aspx?WebCode=COEPub Search&pager=12.*

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

[44] EIA. *Annual Energy Outlook 2022 with Projections to 2050.* Washington, DC. Available at *www.eia.gov/forecasts/aeo/* (last accessed May 5, 2022).

in product efficiency produce no changes in maintenance costs compared to baseline efficiency products. Repair costs consist of the cost of labor to perform the repair as well as the cost of materials to replace the component that has failed. DOE assumes that the labor costs stay constant and the material costs will increase proportionally with the incremental increase of the MPC. In the July 2015 final rule, DOE used the material and labor costs associated with repair of equipment components covered and not covered by a standard manufacturer warranty. 80 FR 43162, 43180. Based on a report of component failure probability and warranty terms, and on component material and labor costs from RS Means data,[45] DOE determined the expected value of the total cost of a repair and annualized it to determine the annual repair cost. DOE scaled by cooling capacity and MSP to determine repair costs for the equipment classes and considered efficiency levels. *Id.* For this NOPD, DOE updated the labor portion of the annualized repair cost using the GDP implicit price deflator[46] and updated the material portion of baseline products by the PPI for Air-conditioning, refrigeration, and forced air heating equipment manufacturing.[47] The material portion of the repair cost for higher efficiency components was scaled with the MSPs.

DOE requested comment on its approach to modeling repair costs in the December 2020 RFI. 85 FR 82952, 82963. AHRI commented that DOE should ensure that out-of-warranty costs are used to measure repairs that occur after the warranty has expired and that costs are much higher after the warranty period. (AHRI, No. 8 at p. 15).

In response, DOE notes that the methodology used in the July 2015 final rule considered the cost of repairs after the warranty period. 80 FR 43162, 43180. The current annualized repair costs reflect the cost of a repair after the warranty, therefore DOE did not make any further updates to the repair costs.

6. Product Lifetime

For PTACs and PTHPs, DOE used the same lifetime estimates from July 2015 final rule. *See* 80 FR 43162, 43180. DOE requested comment on this approach to equipment lifetime in the December 2020 ECS RFI. 85 FR 82952, 82963

AHRI commented that DOE has no justification to increase equipment lifetimes for any PTAC or PTHP application. AHRI suggested that DOE should focus on time to replacement, rather than time to failure and that a distribution with a mean lifetime of 5 years should be used in the analysis. (AHRI, No. 8 at pp. 16–17) The CA IOUs encouraged DOE to revisit its lifetime assumptions from the July 2015 final rule and requested that DOE determine if PTACs or PTHPs that are removed from lodging applications before they fail are sold in secondary markets. (CA IOUs, No. 7 at pp. 3–4) ASAP expressed concern that the assumption that PTAC or PTHP's lifetime in lodging applications is aligned with hotel renovation cycles may underestimate the average lifetime of a PTAC or PTHP. (ASAP, No. 6 at p. 2)

In response, DOE maintained the same lifetime assumptions as in the July 2015 final rule. DOE has not been provided, nor has it identified, any data to suggest that the average PTAC time to replacement is shorter than that of the typical hotel renovation cycle. In response to comments from AHRI, CA IOUs and ASAP, DOE notes that while the average lifetime is assumed to be eight years, the distribution allows for a range of lifetimes up to 16 years. Given that DOE used a lifetime distribution, the analysis captures segments of the market which replace prior to the 7-year renovation cycle and after the 7-year renovation cycle. Finally, DOE's lifetime assumption with a mean of 8 years falls between the various stakeholder comments and considering no additional data were identified to support a shorter or longer life, DOE is maintaining the same lifetime assumptions as in the July 2015 final rule.

Regarding the comment from the CA IOUs on the secondary market for PTACs and PTHPs, DOE was unable to find any data sources that provide the total size of the secondary market. Furthermore, DOE understands that secondary market sales are often composed of units that fail early on in their lifetimes and go through a refurbishment and certification process, as opposed to older units that are directly resold to users after a renovation. Therefore, DOE did not include secondary market sales in this NOPD.

7. Discount Rates

DOE's method views the purchase of a higher efficiency appliance as an investment that yields a stream of energy cost savings. DOE derived the discount rates for the LCC analysis by estimating the cost of capital for companies or public entities that purchase PTACs and PTHPs. For private firms, the weighted average cost of capital (''WACC'') is commonly used to estimate the present value of cash flows to be derived from a typical company project or investment. Most companies use both debt and equity capital to fund investments, so their cost of capital is the weighted average of the cost to the firm of equity and debt financing, as estimated from financial data for publicly traded firms in the sectors that purchase PTACs and PTHPs.[48] As discount rates can differ across industries, DOE estimates separate discount rate distributions for a number of aggregate sectors with which elements of the LCC building sample can be associated.

In this analysis, DOE estimated the cost of capital of companies that purchase PTAC and PTHP equipment. DOE used the same types of companies that were used in the July 2015 final rule, large hotel/motel chains, independent hotel/motel, assisted living/health care, and small office. 80 FR 43162, 43181. More details regarding the DOE's estimates of discount rates can be found in Chapter 8 of the NOPD TSD.

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

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

To estimate the energy efficiency distribution of PTACs and PTHPs for 2026, DOE used model counts from CCD[49] and applied a growth rate of 1 EER every 35 years, which was used in the July 2015 final rule and is based on a growth trend in the absence of standards developed in the 2004 commercial unitary air conditioner advanced notice of proposed rulemaking (''2004 ANOPR'').[50]

[45] RS Means Company, Inc. ''RSMeans Facilities Maintenance & Repair Cost Data,'' 2013.

[46] *https://fred.stlouisfed.org/series/GDPDEF.*

[47] *www.bls.gov/ppi/.*

[48] Modigliani, F. and M.H. Miller. The Cost of Capital, Corporations Finance and the Theory of Investment. American Economic Review. 1958. 48(3): pp. 261–297.

[49] *www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A** (last accessed: March 9, 2022).

[50] *See* Chapter 10 of DOE's technical support document underlying DOE's July 29, 2004 ANOPR. (Available at: *www.regulations.gov/document/EERE-2006-STD-0103-0078*).

80 FR 43162, 43183. The estimated market shares for the no-new-standards case for PTACs and PTHPs are shown in Table IV–16 of this document. DOE notes that there are currently units in CCD that are at the baseline efficiency level, but given the small difference between the baseline and EL 1, the growth rate of 1 EER every 35 years leads to no products at the baseline in 2026. See chapter 8 of the NOPD TSD for further information on the derivation of the efficiency distributions.

TABLE IV–16—MARKET SHARES FOR THE NO-NEW-STANDARDS CASE

Equipment type	Cooling capacity	Market share by EL					
		Baseline *	EL1	EL2	EL3	EL4	EL5
PTAC	9,000 Btu/h	0%	44%	29%	11%	6%	10%
	15,000 Btu/h	0	0	52	34	14	0
PTHP	9,000 Btu/h	0	44	21	16	10	9
	15,000 Btu/h	0	0	41	40	20	0

9. Payback Period Analysis

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

The inputs to the PBP calculation for each efficiency level are the change in total installed cost of the PTACs and PTHPs and the change in the first-year annual operating expenditures relative to the baseline. The PBP calculation uses the same inputs as the LCC analysis, except that discount rates are not needed.

F. Shipments Analysis

DOE uses projections of annual shipments to calculate the national impacts of potential amended or new energy conservation standards on energy use, NPV, and future manufacturer cash flows.[51] The shipments model takes an accounting approach in tracking market shares of each equipment class and the vintage of units in the stock. Stock accounting uses product 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.

In the July 2015 final rule, DOE developed shipment projections based on historical data and an analysis of key market drivers for this equipment. 80 FR 43162, 43182. Historical shipments were used to build up an equipment stock and also to calibrate the shipments model. DOE separately calculated shipments intended for new construction and replacement applications. The sum of new construction and replacement shipments was the total shipments. *Id.*

New construction shipments were calculated using projected floor space of healthcare, lodging, and small office buildings from *AEO 2014* and historical PTAC and PTHP saturation in new buildings, which was estimated by dividing historical new shipments by new construction floor space. 80 FR 43162, 43182. Replacement shipments were equal to the number of units that fail in a given year. The failures were based on a retirement function in the form of a Weibull distribution with inputs based on lifetime values from the LCC analysis to estimate the number of units of a given age that fail in each year. *Id.*

In the December 2020 RFI, DOE requested the most recent annual sales data but did not receive any comments or data on recent sales in response to the RFI. 85 FR 82952, 82963.

In this NOPD, DOE updated the previous shipments model using the new construction floor space projections from *AEO 2022* for healthcare, lodging, and small offices. DOE maintained the same saturation for new buildings to estimate the new shipments and the same distribution of shipments by equipment class that were used in the previous analysis.

For further information on the shipments analysis, see chapter 9 of the NOPD TSD.

G. National Impact Analysis

The NIA assesses the 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.[52] ("Consumer" in this context refers to consumers of the PTACs and PTHPs being regulated.) DOE calculates the NES and NPV for the potential standard levels considered based on projections of annual product shipments, along with the annual energy consumption and total installed cost data from the energy use and LCC analyses. For the present analysis, DOE projected the energy savings, operating cost savings, product costs, and NPV of consumer benefits over the lifetime of PTACs and PTHPs sold from 2026 through 2055.

DOE evaluates the effects 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 PTAC and PTHP 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 PTAC and PTHP class if DOE adopted new or amended standards at specific energy efficiency levels (*i.e.,* the ELs or standards cases) for that class. For the standards cases, DOE considers how a given standard would likely affect the market shares of PTACs and PTHPs with efficiencies greater than the standard.

DOE uses a spreadsheet model to calculate the energy savings and the national consumer costs and savings from each EL. Interested parties can review DOE's analyses by changing various input quantities within the spreadsheet. The NIA spreadsheet model uses typical values (as opposed to probability distributions) as inputs.

Table IV–17 summarizes the inputs and methods DOE used for the NIA

[51] 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.

[52] The NIA accounts for impacts in the 50 states and Washington, DC.

analysis for the NOPD. Discussion of these inputs and methods follows the table. See chapter 10 of the NOPD TSD for details.

TABLE IV–17—SUMMARY OF INPUTS AND METHODS FOR THE NATIONAL IMPACT ANALYSIS

Inputs	Method
Shipments	Annual shipments from shipments model.
Modeled Compliance Date of Standard	2026.
Efficiency Trends	No-new-standards case—1 EER every 35 years. Standards cases—1 EER every 35 years.
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. Future product prices are constant.
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	The materials portion of annual repair costs scale with MPCs, maintenance costs do not change by EL.
Energy Prices	*AEO 2022* projections (to 2050) and constant 2050 value through 2075.
Energy Site-to-Primary and FFC Conversion	A time-series conversion factor based on *AEO 2022.*
Discount Rate	3 percent and 7 percent.
Present Year	2021.

1. Equipment Efficiency Trends

A key component of the NIA is the trend in energy efficiency projected for the no-new-standards case and each of the standards cases. Section IV.E.8 of this document describes how DOE developed an energy efficiency distribution for the no-new-standards case (which yields a shipment-weighted average efficiency) for each of the considered product classes for the year of anticipated compliance with an amended or new standard.

For the standards cases, DOE used a ‘‘roll-up’’ scenario to establish the shipment-weighted efficiency for the year that standards are assumed to become effective (2026). In this scenario, the market shares of products in the no-new-standards case that do not meet the standard under consideration would ‘‘roll up’’ to meet the new standard level, and the market share of products above the standard would remain unchanged.

To develop no-new-standards case and standards case efficiency trends after 2026, DOE used the same approach as in the July 2015 final rule, which grows the efficiency trend at a rate of 1 EER every 35 years for all product classes. 80 FR 43162, 43183.

2. National Energy Savings

The NES analysis involves a comparison of national energy consumption of the considered products between each potential standards case (EL) and the case with no new or amended energy conservation standards. DOE calculated the national energy consumption by multiplying the number of units (stock) of each product (by vintage or age) by the unit energy consumption (also by vintage). DOE calculated annual NES based on the difference in national energy consumption for the no-new-standards case and for each higher efficiency standard case. DOE estimated energy consumption and savings based on site energy and converted the electricity consumption and savings to primary energy (*i.e.,* the energy consumed by power plants to generate site electricity) using annual conversion factors derived from *AEO 2022.* Cumulative energy savings are the sum of the NES for each year over the timeframe of the analysis.

Use of higher-efficiency products is occasionally associated with a direct rebound effect, which refers to an increase in utilization of the product due to the increase in efficiency. For PTAC/PTHP, DOE did not consider any rebound as the entities using the equipment are typically not the ones paying the energy costs.

In 2011, in response to the recommendations of a committee on ‘‘Point-of-Use and Full-Fuel-Cycle Measurement Approaches to Energy Efficiency Standards’’ appointed by the National Academy of Sciences, DOE announced its intention to use FFC measures of energy use and greenhouse gas and other emissions in the NIA and emissions analyses included in future energy conservation standards rulemakings. 76 FR 51281 (Aug. 18, 2011). After evaluating the approaches discussed in the August 18, 2011 notice, DOE published a statement of amended policy in which DOE explained its determination that EIA's National Energy Modeling System (‘‘NEMS’’) is the most appropriate tool for its FFC analysis and its intention to use NEMS for that purpose. 77 FR 49701 (Aug. 17, 2012). NEMS is a public domain, multi-sector, partial equilibrium model of the U.S. energy sector [53] that EIA uses to prepare its AEO. The FFC factors incorporate losses in production, and delivery in the case of natural gas, (including fugitive emissions) and additional energy used to produce and deliver the various fuels used by power plants. The approach used for deriving FFC measures of energy use and emissions is described in appendix 10B of the NOPD TSD.

3. Net Present Value Analysis

The inputs for determining the NPV of the total costs and benefits experienced by consumers are: (1) total annual installed cost, (2) total annual operating costs (energy costs and repair and maintenance costs), and (3) a discount factor to calculate the present value of costs and savings. DOE calculates net savings each year as the difference between the no-new-standards case and each standards case in terms of total savings in operating costs versus total increases in installed costs. DOE calculates operating cost savings over the lifetime of each product shipped during the projection period.

As discussed in section IV.E.1 of this document, DOE assumed a constant price trend for PTACs and PTHPs. DOE applied the same constant price trend to project prices for each PTAC and PTHP class at each considered efficiency level.

The operating cost savings are energy cost savings, which are calculated using the estimated energy savings in each year and the projected price of the appropriate form of energy, and repair costs, which remain constant through

[53] For more information on NEMS, refer to *The National Energy Modeling System: An Overview 2009,* DOE/EIA–0581(2009), October 2009. Available at *www.eia.gov/analysis/pdfpages/0581(2009)index.php* (last accessed 4/15/2022).

the analysis period. To estimate energy prices in future years, DOE multiplied the average regional energy prices by the projection of annual national-average commercial electricity price changes in the Reference case from *AEO 2022,* which has an end year of 2050. To estimate price trends after 2050, DOE kept the 2050 value constant through 2075.

In calculating the NPV, DOE multiplies the net savings in future years by a discount factor to determine their present value. For this NOPD, DOE estimated the NPV of consumer benefits using both a 3-percent and a 7-percent real discount rate. DOE uses these discount rates in accordance with guidance provided by the Office of Management and Budget (''OMB'') to Federal agencies on the development of regulatory analysis.[54] The discount rates for the determination of NPV are in contrast to the discount rates used in the LCC analysis, which are designed to reflect a consumer's perspective. The 7-percent real value is an estimate of the average before-tax rate of return to private capital in the U.S. economy. The 3-percent real value represents the ''social rate of time preference,'' which is the rate at which society discounts future consumption flows to their present value.

V. Analytical Results and Conclusions

The following section addresses the results from DOE's analyses with respect to the considered energy conservation standards for PTACs and PTHPs. It addresses the ELs examined by DOE and the projected impacts of each of these levels. Additional details regarding DOE's analyses are contained in the NOPD TSD supporting this document.

A. Economic Impacts on PTAC and PTHP Consumers

DOE analyzed the cost effectiveness (*i.e.,* the savings in operating costs throughout the estimated average life of PTACs and PTHPs) compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the PTACs and PTHPs, which are likely to result from the imposition of a standard at an EL by considering the LCC and PBP at each EL. These analyses are discussed in the following sections.

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

Table V–1 through Table V–4 show the LCC and PBP results for the ELs considered in this analysis. The simple payback is measured relative to the efficiency distribution in the no-new-standards case in the compliance year (see section IV.E.8 of this document). Because some consumers purchase products with higher efficiency in the no-new-standards case, the average savings are less than the difference between the average LCC of the baseline product and the average LCC at each EL. The savings refer only to consumers who are affected by a standard at a given EL. Those who already purchase a product 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.

TABLE V–1—AVERAGE LCC AND PBP RESULTS BY EFFICIENCY LEVEL FOR STANDARD SIZE PTACS WITH A COOLING CAPACITY OF 9,000 Btu/h

Efficiency level	LCC savings (2021$)	Simple payback period (years)
EL 1	$0.00	N/A
EL 2	1.92	5.6
EL 3	−0.47	6.0
EL 4	−5.60	6.5
EL 5	−8.70	6.8

TABLE V–2—AVERAGE LCC AND PBP RESULTS BY EFFICIENCY LEVEL FOR STANDARD SIZE PTACS WITH A COOLING CAPACITY OF 15,000 Btu/h

Efficiency level	LCC savings (2021$)	Simple payback period (years)
EL 1	$0.00	N/A
EL 2	0.00	N/A
EL 3	6.39	4.1
EL 4	−1.77	4.9
EL 5	−8.68	5.3

[54] United States Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. Section E. Available at *www.federalregister.gov/documents/2003/10/09/03-25606/circular-a-4-regulatory-analysis* (last accessed April 15, 2022).

TABLE V–3—AVERAGE LCC AND PBP RESULTS BY EFFICIENCY LEVEL FOR STANDARD SIZE PTHPS WITH A COOLING CAPACITY OF 9,000 Btu/h

Efficiency level	LCC savings (2021$)	Simple payback period (years)
EL 1	$0.00	N/A
EL 2	2.42	5.3
EL 3	0.72	5.7
EL 4	−3.75	6.2
EL 5	−6.48	6.4

TABLE V–4—AVERAGE LCC AND PBP RESULTS BY EFFICIENCY LEVEL FOR STANDARD SIZE PTHPS WITH A COOLING CAPACITY OF 15,000 Btu/h

Efficiency level	LCC savings (2021$)	Simple payback period (years)
EL 1	$0.00	N/A
EL 2	0.00	N/A
EL 3	7.27	4.0
EL 4	−0.66	4.7
EL 5	−7.07	5.1

B. 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. Significance of Energy Savings

To estimate the energy savings attributable to potential amended standards for PTACs and PTHPs, DOE compared their energy consumption under the no-new-standards case to their anticipated energy consumption under each EL. The savings are measured over the entire lifetime of products purchased in the 30-year period that begins in the year of anticipated compliance with amended standards (2026–2055). Table V–5 presents DOE's projections of the NES for each EL considered for PTACs and PTHPs. The savings were calculated using the approach described in section IV.G of this document.

TABLE V–5—CUMULATIVE NATIONAL ENERGY SAVINGS FOR PTACS AND PTHPS; 30 YEARS OF SHIPMENTS

[2026–2055]

	Efficiency level (quads)				
	1	2	3	4	5
Primary energy	0.000	0.002	0.014	0.045	0.068
FFC energy	0.000	0.002	0.015	0.047	0.071

OMB Circular A–4 [55] requires agencies to present analytical results, including separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs. Circular A–4 also directs agencies to consider the variability of key elements underlying the estimates of benefits and costs. For this proposed determination, DOE undertook a sensitivity analysis using 9 years, rather than 30 years, of product shipments. The choice of a 9-year period is a proxy for the timeline in EPCA for the review of certain energy conservation standards and potential revision of and compliance with such revised standards.[56] The review timeframe established in EPCA is generally not synchronized with the product lifetime, product manufacturing cycles, or other factors specific to PTACs and PTHPs. Thus, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology. The NES sensitivity analysis results based on a 9-year analytical period are presented in Table V–6. The impacts are counted over the lifetime of PTACs and PTHPs purchased in 2026 to 2034.

[55] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. Available at *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed April 15, 2022).

[56] Section 325(m) of EPCA requires DOE to review its standards at least once every 6 years, and requires, for certain products, a 3-year period after any new standard is promulgated before compliance is required, except that in no case may any new standards be required within 6 years of the compliance date of the previous standards. If DOE makes a determination that amended standards are not needed, it must conduct a subsequent review within three years following such a determination. As DOE is evaluating the need to amend the standards, the sensitivity analysis is based on the review timeframe associated with amended standards. While adding a 6-year review to the 3-year compliance period adds up to 9 years, DOE notes that it may undertake reviews at any time within the 6-year period and that the 3-year compliance date may yield to the 6-year backstop. A 9-year analysis period may not be appropriate given the variability that occurs in the timing of standards reviews and the fact that for some products, the compliance period is 5 years rather than 3 years.

TABLE V–6—CUMULATIVE NATIONAL ENERGY SAVINGS FOR PTACS AND PTHPS; 9 YEARS OF SHIPMENTS
[2026–2034]

	Efficiency level (quads)				
	1	2	3	4	5
Primary energy	0.000	0.002	0.011	0.023	0.029
FFC energy	0.000	0.002	0.011	0.023	0.030

a. 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 an amended standard at each of the representative ELs considered for PTACs and PTHPs. In accordance with OMB's guidelines on regulatory analysis,[57] DOE calculated NPV using both a 7-percent and a 3-percent real discount rate. Table V–7 shows the consumer NPV results with impacts counted over the lifetime of products purchased in 2026–2055.

TABLE V–7—CUMULATIVE NET PRESENT VALUE OF CONSUMER BENEFITS FOR PTACS AND PTHPS; 30 YEARS OF SHIPMENTS
[2026–2055]

Discount rate	Trial standard level (billion 2021$)				
	1	2	3	4	5
3 percent	0.000	−0.004	−0.043	−0.167	−0.268
7 percent	0.000	−0.004	−0.035	−0.116	−0.174

The NPV results based on the aforementioned 9-year analytical period are presented in Table V–8. The impacts are counted over the lifetime of PTACs and PTHPs purchased in 2026–2034. As mentioned previously, such results are presented for informational purposes only and are not indicative of any change in DOE's analytical methodology or decision criteria.

TABLE V–8—CUMULATIVE NET PRESENT VALUE OF CONSUMER BENEFITS FOR PTACS AND PTHPS; 9 YEARS OF SHIPMENTS
[2026–2034]

Discount rate	Trial standard level (billion 2021$)				
	1	2	3	4	5
3 percent	0.000	−0.004	−0.033	−0.088	−0.124
7 percent	0.000	−0.004	−0.029	−0.073	−0.102

C. Proposed Determination

EPCA specifies that for any commercial and industrial equipment addressed under 42 U.S.C. 6313(a)(6)(A)(i), including PTACs and PTHPS, DOE may prescribe an energy conservation standard more stringent than the level for such equipment in ASHRAE Standard 90.1 only if "clear and convincing evidence" shows that a more-stringent standard would result in significant additional conservation of energy and is technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(C)(i); 42 U.S.C. 6313(a)(6)(A)(ii)(II)) The "clear and convincing" evidentiary threshold applies both when DOE is triggered by ASHRAE action and when DOE conducts a six-year-lookback rulemaking, with the latter being the basis for the current proceeding.

Because an analysis of potential cost-effectiveness and energy savings first require an evaluation of the relevant technology, DOE first discusses the technological feasibility of amended standards. DOE then evaluates the energy savings potential and whether potential amended standards are economically justified.

1. Technological Feasibility

EPCA mandates that DOE consider whether amended energy conservation standards for PTACs and PTHPs would be technologically feasible. (42 U.S.C. 6313(a)(6)(A)(ii)(II))

DOE considers technologies incorporated in commercially available products or in working prototypes to be technologically feasible. Per the technology options discussed in section IV.A.3 of this document, DOE has tentatively determined, based on clear and convincing evidence, that amended energy conservation standards for PTACs and PTHPs would be technologically feasible.

2. Significant Conservation of Energy

EPCA also mandates that DOE consider whether amended energy conservation standards for PTACs and PTHPS would result in result in significant additional conservation of energy. (42 U.S.C. 6313(a)(6)(A)(ii)(II))

In the present case, DOE estimates that amended standards for PTACs and PTHPs would result in energy savings of

[57] U.S. Office of Management and Budget. *Circular A–4: Regulatory Analysis.* September 17, 2003. Available at *obamawhitehouse.archives.gov/omb/circulars_a004_a-4/* (last accessed April 15, 2022).

0.002 quads at EL 2, 0.013 quads at EL 3, 0.014 quads at EL 4, and 0.062 quads at EL 5 (the max-tech level) over a 30-year analysis period (2026–2055). However, as discussed in the following section DOE lacks the clear and convincing evidence necessary to determine that amended standards for PTACs and PTHPs would be economically justified.

3. Economic Justification

In determining whether a standard is economically justified, the Secretary must determine whether the benefits of the standard exceed its burdens, considering to the greatest extent practicable the seven statutory factors discussed previously (see section II.A of this document). (42 U.S.C. 6313(a)(6)(A)(ii)(II); 42 U.S.C. 6313(a)(6)(B)(ii)(I)–(VII))

One of those seven factors is the savings in operating costs throughout the estimated average life of the product in the type (or class) compared to any increase in the price, initial charges, or maintenance expenses of the products that are likely to result from the standard. (42 U.S.C. 6313(a)(6)(B)(ii)(II)) This factor is typically assessed using the LCC and PBP analysis, as well as the NPV.

DOE conducted an LCC analysis to estimate the net costs/benefits to users from increased efficiency in the considered PTACs and PTHPs (See results in Table V–1 to Table V–4). DOE then aggregated the results from the LCC analysis to estimate the NPV of the total costs and benefits experienced by the Nation (See results in Table V–7 and Table V–8). As noted, the inputs for determining the NPV are: (1) total annual installed cost, (2) total annual operating costs (energy costs and repair and maintenance costs), and (3) a discount factor to calculate the present value of costs and savings. A summary of the analytical results can be found in Table V–9.

TABLE V–9—SUMMARY OF ANALYTICAL RESULTS OF PTAC AND PTHP EQUIPMENT

Category	EL 1	EL 2	EL 3	EL 4	EL 5
Cumulative National FFC Energy Savings (quads)					
	0.000	0.002	0.015	0.047	0.071
NPV of Consumer Costs and Benefits * * * (2021$ billion)					
3% discount rate	0.000	−0.004	−0.043	−0.167	−0.268
7% discount rate	0.000	−0.004	−0.035	−0.116	−0.174
Consumer Mean LCC Savings 2021$					
Standard Size PTACs—9,000 Btu/h	0.00	1.92	−0.47	−5.60	−8.70
Standard Size PTACs—15,000 Btu/h	0.00	0.00	6.39	−1.77	−8.68
Standard Size PTHPs—9,000 Btu/h	0.00	2.42	0.72	−3.75	−6.48
Standard Size PTHPs—15,000 Btu/h	0.00	0.00	7.27	−0.66	−7.07
Consumer Mean Payback Period					
Standard Size PTACs—9,000 Btu/h	N/A	5.6	6.0	6.5	6.8
Standard Size PTACs—15,000 Btu/h	N/A	N/A	4.1	4.9	5.3
Standard Size PTHPs—9,000 Btu/h	N/A	5.3	5.7	6.2	6.4
Standard Size PTHPs—15,000 Btu/h	N/A	N/A	4.0	4.7	5.1

DOE estimates that amended standards for PTACs and PTHPs would result in NPV of $0.000 at EL 1, of −$0.004 billion at a 3 percent discount rate and −$0.004 billion at a 7 percent discount rate at EL 2, of −$0.043 billion at a 3 percent discount rate and −$0.035 billion at a 7 percent discount rate at EL 3, of −$0.167 billion at a 3 percent discount rate and −$0.116 billion at a 7 percent discount rate at EL 4, and of −$0.268 billion at a 3 percent discount rate and −$0.174 billion at a 7 percent discount rate at EL 5. Based on the NPV being zero at EL 1 and negative at each higher EL, DOE's analysis indicates that consumers are unlikely to experience a net economic benefit from any efficiency level above the current baseline. Consequently, DOE has tentatively determined that it lacks clear and convincing evidence that amended energy conservation standards would be economically justified.

4. Summary

Having considered the factors that would serve as the justification for an amended standard, including national energy savings, DOE has tentatively found based on its analysis that the benefits of amended standards would not outweigh the estimated net economic burden to consumers. Therefore, DOE is proposing to determine that the energy conservation standards for PTACs and PTHP do not need to be amended, having initially determined that it lacks "clear and convincing" evidence that amended standards would be economically justified. DOE will consider and respond to all comments received on this proposed determination in issuing any final determination.

VI. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866 and 13563

Executive Order ("E.O.") 12866, "Regulatory Planning and Review," as supplemented and reaffirmed by E.O. 13563, "Improving Regulation and Regulatory Review, 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, to: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in the Office of Management and Budget (''OMB'') has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this proposed regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit ''significant regulatory actions'' to OIRA for review. OIRA has determined that this proposed regulatory action does not constitute a ''significant regulatory action'' under section 3(f) of E.O. 12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (''IRFA'') for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by E.O. 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 67 FR 53461 (Aug. 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website (*www.energy.gov/gc/office-general-counsel*).

DOE reviewed this proposed determination under the provisions of the Regulatory Flexibility Act and the policies and procedures published on February 19, 2003. DOE has tentatively determined that current standards for PTACs and PTHPs do not need to be amended. Because DOE is proposing not to amend standards for PTACs and PTHPs, if adopted, this determination would not amend any energy conservation standards. On the basis of the foregoing, DOE certifies that the proposed determination, if adopted, would have no significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared an IRFA for this proposed determination. DOE will transmit this certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act

This proposed determination, which proposes to determine that amended energy conservation standards for PTACs and PTHPs are unneeded under the applicable statutory criteria, would impose no new informational or recordkeeping requirements. Accordingly, OMB clearance is not required under the Paperwork Reduction Act. (44 U.S.C. 3501 *et seq.*)

D. Review Under the National Environmental Policy Act of 1969

DOE is analyzing this proposed action in accordance with the National Environmental Policy Act of 1969 (''NEPA'') and DOE's NEPA implementing regulations (10 CFR part 1021). DOE's regulations include a categorical exclusion for actions which are interpretations or rulings with respect to existing regulations. 10 CFR part 1021, subpart D, appendix A4. DOE anticipates that this action qualifies for categorical exclusion A4 because it is an interpretation or ruling in regard to an existing regulation and otherwise meets the requirements for application of a categorical exclusion. *See* 10 CFR 1021.410. DOE will complete its NEPA review before issuing the final action.

E. Review Under Executive Order 13132

E.O. 13132, ''Federalism,'' 64 FR 43255 (Aug. 10, 1999), imposes certain requirements on Federal agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The E.O. requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The E.O. also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed determination and has tentatively determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the equipment that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6316 (b); 42 U.S.C. 6297) Therefore, no further action is required by E.O. 13132.

F. Review Under Executive Order 12988

With respect to the review of existing regulations and the promulgation of new regulations, section 3(a) of E.O. 12988, ''Civil Justice Reform,'' imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. 61 FR 4729 (Feb. 7, 1996). Regarding the review required by section 3(a), section 3(b) of E.O. 12988 specifically requires that executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of E.O. 12988 requires executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, this proposed determination meets the relevant standards of E.O. 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (''UMRA'') requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect them. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820. DOE's policy statement is also available at *www.energy.gov/sites/prod/files/gcprod/documents/umra_97.pdf.*

DOE examined this proposed determination according to UMRA and its statement of policy and determined that the proposed determination does not contain a Federal intergovernmental mandate, nor is it expected to require expenditures of $100 million or more in any one year by State, local, and Tribal governments, in the aggregate, or by the private sector. As a result, the analytical requirements of UMRA do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed determination would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

Pursuant to E.O. 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights,'' 53 FR 8859 (Mar. 15, 1988), DOE has determined that this proposed determination would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under the Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for Federal agencies to review most disseminations of information to the public under information quality guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M–19–15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf.* DOE has reviewed this NOPD under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

E.O. 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to the OIRA at OMB, a Statement of Energy Effects for any proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgates or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under E.O. 12866, or any successor E.O.; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy, or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This proposed determination, which does not propose to amend energy conservation standards for PTACs and PTHPs, is not a significant regulatory action under E.O. 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as such by the Administrator at OIRA. Accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under the Information Quality Bulletin for Peer Review

On December 16, 2004, OMB, in consultation with the Office of Science and Technology Policy (''OSTP''), issued its Final Information Quality Bulletin for Peer Review (''the Bulletin''). 70 FR 2664 (Jan. 14, 2005). The Bulletin establishes that certain scientific information shall be peer reviewed by qualified specialists before it is disseminated by the Federal Government, including influential scientific information related to agency regulatory actions. The purpose of the bulletin is to enhance the quality and credibility of the Government's scientific information. Under the Bulletin, the energy conservation standards rulemaking analyses are ''influential scientific information,'' which the Bulletin defines as ''scientific information the agency reasonably can determine will have, or does have, a clear and substantial impact on important public policies or private sector decisions.'' *Id.* at 70 FR 2667.

In response to OMB's Bulletin, DOE conducted formal peer reviews of the energy conservation standards development process and the analyses that are typically used and has prepared Peer Review report pertaining to the energy conservation standards rulemaking analyses.[58] Generation of this report involved a rigorous, formal, and documented evaluation using objective criteria and qualified and independent reviewers to make a judgment as to the technical/scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of programs and/or projects. Because available data, models, and technological understanding have changed since 2007, DOE has engaged with the National Academy of Sciences to review DOE's analytical methodologies to ascertain whether modifications are needed to improve the Department's analyses.

[58] ''Energy Conservation Standards Rulemaking Peer Review Report.'' 2007. Available at *www.energy.gov/eere/buildings/downloads/energy-conservation-standards-rulemaking-peer-review-report-0* (last accessed April 15, 2022).

DOE is in the process of evaluating the resulting report.[59]

VII. Public Participation

A. Participation in the Webinar

The time and date of the webinar are listed in the **DATES** section at the beginning of this document. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website: *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=46&action=viewcurrent.* Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements for Distribution

Any person who has an interest in the topics addressed in this NOPD, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Such persons may submit requests to speak to *ApplianceStandardsQuestions@ee.doe.gov.* Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this proposed determination and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

C. Conduct of the Webinar

DOE will designate a DOE official to preside at the webinar/public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the webinar/public meeting. There shall not be discussion of proprietary information, costs or prices, market share, or other commercial matters regulated by U.S. anti-trust laws. After the webinar/public meeting and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the proposed determination.

The webinar will be conducted in an informal, conference style. DOE will present a general overview of the topics addressed in this rulemaking, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this proposed determination. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this proposed determination. The official conducting the webinar/public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the webinar/public meeting.

A transcript of the webinar/public meeting will be included in the docket, which can be viewed as described in the *Docket* section at the beginning of this NOPD. In addition, any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

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

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

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

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

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

Submitting comments via email, hand delivery/courier, or postal mail. Comments and documents submitted via email, hand delivery/courier, or postal mail also will be posted to *www.regulations.gov.* If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information in a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments. Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit

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

printed copies. No 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 to *PTACHP2019STD0035@ee.doe.gov* 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).

VIII. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notification of proposed determination and request for comment.

Signing Authority

This document of the Department of Energy was signed on June 15, 2022, by Kelly J. Speakes-Backman, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE **Federal Register** Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on June 15, 2022.

Treena V. Garrett,

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

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