DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE–2020–BT–STD–0008]

RIN 1904–AF01

Energy Conservation Program: Energy Conservation Standards for Computer Room Air Conditioners and Air-Cooled, Three-Phase, Small Commercial Package Air Conditioning and Heating Equipment With a Cooling Capacity of Less Than 65,000 Btu/h

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

ACTION: Notification of data availability and request for information.

SUMMARY: The U.S. Department of Energy (DOE) is publishing an analysis of the energy savings potential of amended industry consensus standards for certain classes of computer room air conditioners (CRACs) and air-cooled, three-phase, small commercial package air conditioning and heating equipment with a cooling capacity of less than 65,000 Btu/h (air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment). As required under the Energy Policy and Conservation Act (EPCA), DOE has been triggered to act by changes to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1. DOE is also soliciting information regarding energy conservation standards for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment for which the industry consensus standards have not been amended, pursuant to EPCA's six-year-lookback review requirement. This notice of data availability (NODA) and request for information (RFI) solicits information from the public to help DOE determine whether more-stringent amended standards for CRACs or air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment would result in significant additional energy savings and whether such standards would be technologically feasible and economically justified. DOE welcomes written comments from the public on any subject within the scope of this document (including topics not specifically raised in this NODA/RFI), as well as the submission of data and other relevant information.

DATES: Written comments and information are requested and will be accepted on or before November 9, 2020.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *http://www.regulations.gov.* Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2020–BT–STD–0008 and/or RIN 1904–AF01, by any of the following methods:

1. *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
2. *Email: 2019ASHRAE2020STD0008@ee.doe.gov.* Include the docket number EERE–2020–BT–STD–0008 and/or RIN 1904–AF01 in the subject line of the message.
3. *Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE–5B, Energy Conservation Standards NODA and RFI for Certain Categories of Commercial Air-Conditioning and Heating Equipment, 1000 Independence Avenue SW, Washington, DC 20585–0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
4. *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 telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document (Public Participation).

Docket: The docket for this activity, which includes **Federal Register** notices, comments, and other supporting documents/materials, is available for review at *http://www.regulations.gov* (search EERE–2020–BT–STD–0008). All documents in the docket are listed in the *http://www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at: *https://www.regulations.gov/docket?D=EERE-2020-BT-STD-0008.* The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section V of this document for information on how to submit comments through *http://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Ms. Catherine Rivest and Mr. Antonio Bouza, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 586–7335. Email: *ApplianceStandardsQuestions@ee.doe.gov.*

Mr. Eric Stas, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC 20585. Telephone: (202) 586–5827. Email: *Eric.Stas@hq.doe.gov.*

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

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Introduction
A. Authority
B. Purpose of the Notice of Data Availability
C. Rulemaking Background
1. Computer Room Air Conditioners
2. Air-Cooled, Three-phase, Small Commercial Package AC and HP (<65 K) Equipment
II. Discussion of Changes in ASHRAE Standard 90.1–2019
A. Computer Room Air Conditioners
1. Methodology for Efficiency and Capacity Crosswalk Analyses
a. General
b. Increase in Return Air Dry-Bulb Temperature from 75 °F to 85 °F
c. Decrease in Entering Water Temperature for Water-Cooled CRACs
d. Changes in External Static Pressure Requirements for Upflow Ducted CRACs
e. Power Adder To Account for Pump and Heat Rejection Fan Power in NSenCOP Calculation for Water-Cooled and Glycol-Cooled CRACs
f. Calculating Overall Changes in Measured Efficiency and Capacity from Test Procedure Changes
2. Crosswalk Results
3. Discussion of Comments Received Regarding Amended Standards for CRACs
4. CRAC Standards Amended Under ASHRAE Standard 90.1–2019
B. Air-Cooled, Three-phase, Small Commercial Package AC and HP (<65 K) Equipment
1. Crosswalk Methodology and Results
III. Analysis of Standards Amended and Newly Established by ASHRAE Standard 90.1–2019
A. Annual Energy Use

1. Computer Room Air Conditioners
a. Equipment Classes and Analytical Scope
b. Efficiency Levels
c. Analysis Method and Annual Energy Use Results
2. Air-Cooled, Three-Phase, Small Commercial Package AC and HP (<65k) Equipment
a. Equipment Classes and Analytical Scope
b. Efficiency Levels
c. Annual Energy Use Results
B. Shipments
1. Computer Room Air Conditioners
2. Air-Cooled, Three-Phase, Small Commercial Package AC and HP (<65 K) Equipment
C. No-New-Standards-Case Efficiency Distribution
D. Other Analytical Inputs
1. Equipment Lifetime
2. Compliance Dates and Analysis Period
E. Estimates of Potential Energy Savings
F. Consideration of More-Stringent Energy Efficiency Levels
IV. Review Under Six-Year-Lookback Provisions: Requested Information
V. Public Participation
A. Submission of Comments
B. Issues on Which DOE Seeks Comment
VI. Approval of the Office of the Secretary

I. Introduction

A. Authority

The Energy Policy and Conservation Act, as amended (EPCA),[1] Public Law 94–163 (42 U.S.C. 6291–6317, as codified) among other things, authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. Title III, Part C[2] of EPCA (42 U.S.C. 6311–6317, as codified), added by Public Law 95–619, Title IV, § 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 CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment, which are categories of small, large, and very large commercial package air conditioning and heating equipment, which are the subjects of this document. (42 U.S.C. 6311(1)(B)–(D)).

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

Federal energy efficiency requirements for covered equipment established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6316(a) and (b); 42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption in limited circumstances for particular State laws or regulations, in accordance with the procedures and other provisions set forth under EPCA. (See 42 U.S.C. 6316(b)(2)(D)).

In EPCA, Congress initially set mandatory energy conservation standards for certain types of 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,[3] packaged terminal air conditioners (PTACs) and packaged terminal heat pumps (PTHPs), 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 at levels that generally corresponded to the levels in ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings,* as 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).

In acknowledgement of technological changes that yield energy efficiency benefits, Congress further directed DOE through EPCA to consider amending the existing Federal energy conservation standard for each type of covered equipment listed, each time ASHRAE amends Standard 90.1 with respect to such equipment. (42 U.S.C. 6313(a)(6)(A)) When triggered in this manner, DOE must undertake and publish an analysis of the energy savings potential of amended energy efficiency standards, and amend the Federal standards to establish a uniform national standard at the minimum level specified in the amended ASHRAE Standard 90.1, unless DOE determines that there is clear and convincing evidence to support a determination that a more-stringent standard 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)(i)–(ii)) If DOE decides to adopt as a uniform national standard the minimum efficiency levels specified in the amended ASHRAE Standard 90.1, DOE must establish such standard not later than 18 months after publication of the amended industry standard. (42 U.S.C. 6313(a)(6)(A)(ii)(I)) However, if DOE determines, supported by clear and convincing evidence, that a more-stringent uniform national standard would result in significant additional conservation of energy and is technologically feasible and economically justified, then DOE must establish such more-stringent uniform national standard not later than 30 months after publication of the amended ASHRAE Standard 90.1.[4] (42 U.S.C. 6313(a)(6)(A)(ii)(II) and (B)(i)).

In an update to 10 CFR part 430, subpart C, appendix A, ''Procedures, interpretations, and policies for consideration of new or revised energy conservation standards and test procedures for commercial/industrial equipment'' (the updated Process Rule),[5] DOE codified in its regulations its long-standing interpretation that the ASHRAE ''trigger'' is applicable only to those equipment classes for which ASHRAE Standard 90.1 has adopted an increase to the efficiency level as compared to the current Federal standard for that specific equipment

[1] All references to EPCA in this document refer to the statute as amended through America's Water Infrastructure Act of 2018, Public Law 115–270 (Oct. 23, 2018).

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

[3] EPCA defines *commercial package air-conditioning and heating equipment* as meaning air-cooled, water-cooled, evaporatively-cooled, or water source (not including ground water source) electrically operated, unitary central air conditioners and central air-conditioning heat pumps for commercial application. (42 U.S.C. 6311(8)(A)) Commercial package air-conditioning and heating equipment includes CRACs and air-cooled, three-phase small commercial package AC and HP (<65 K) equipment.

[4] In determining whether a more-stringent standard is economically justified, EPCA directs DOE to determine, after receiving views and comments from the public, whether the benefits of the proposed standard exceed the burdens of the proposed standard by, to the maximum extent practicable, considering the following:

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

(2) The savings in operating costs throughout the estimated average life of the product compared to any increases in the initial cost or maintenance expense;

(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)).

[5] The updated Process Rule is applicable to covered equipment and includes provisions specific to rulemakings related to ASHRAE equipment. 85 FR 8626, 8704, 8708, and 8711 (Feb. 14, 2020).

class. 85 FR 8626, 8644–8645 (Feb. 14, 2020). DOE's review in adopting amendments based on an action by ASHRAE to amend Standard 90.1 is strictly limited to the specific standards or test procedure amendment for the specific equipment for which ASHRAE has made a change (*i.e.,* determined down to the equipment class level). 85 FR 8626, 8708 (Feb. 14, 2020).

Although EPCA does not explicitly define the term ''amended'' in the context of what type of revision to ASHRAE Standard 90.1 would trigger DOE's obligation, DOE's longstanding interpretation has been that the statutory trigger is an amendment to the standard applicable to that equipment under ASHRAE Standard 90.1 that increases the energy efficiency level for that equipment. *See* 72 FR 10038, 10042 (March 7, 2007). In other words, if the revised ASHRAE Standard 90.1 leaves the energy efficiency level unchanged (or lowers the energy efficiency level), as compared to the energy efficiency level specified by the uniform national standard adopted pursuant to EPCA, regardless of the other amendments made to the ASHRAE Standard 90.1 requirement (*e.g.,* the inclusion of an additional metric), DOE has stated that it does not have the authority to conduct a rulemaking to consider a higher standard for that equipment pursuant to 42 U.S.C. 6313(a)(6)(A). *See* 74 FR 36312, 36313 (July 22, 2009) and 77 FR 28928, 28937 (May 16, 2012). If an amendment to ASHRAE Standard 90.1 changed the metric for the standard on which the Federal requirement was based, DOE would perform a crosswalk analysis to determine whether the amended metric under ASHRAE Standard 90.1 resulted in an energy efficiency level that was more stringent than the current DOE standard.

DOE notes that Congress adopted amendments to these provisions related to ASHRAE Standard 90.1 equipment under the American Energy Manufacturing Technical Corrections Act (Pub. L. 112–210 (Dec. 18, 2012); ''AEMTCA''). In relevant part, DOE is prompted to act whenever ASHRAE Standard 90.1 is amended with respect to ''the standard levels or design requirements applicable under that standard'' to any of the enumerated types of commercial air conditioning, heating, or water heating equipment covered under EPCA. (42 U.S.C. 6313(a)(6)(A)(i)).

In those situations where ASHRAE has not acted to amend the levels in ASHRAE Standard 90.1 for the covered equipment types enumerated in the statute, EPCA also provides for a 6-year-lookback to consider the potential for amending the uniform national standards. (42 U.S.C. 6313(a)(6)(C)) Specifically, pursuant to the amendments to EPCA under AEMTCA, DOE is required to conduct an evaluation of each class of covered equipment in ASHRAE Standard 90.1 ''every 6 years'' to determine whether the applicable energy conservation standards need to be amended. (42 U.S.C. 6313(a)(6)(C)(i)) DOE must publish either a notice of proposed rulemaking (NOPR) to propose amended standards or a notice of determination that existing standards do not need to be amended. (42 U.S.C. 6313(a)(6)(C)(i)(I)–(II)) In proposing new standards under the 6-year-lookback review, DOE must undertake the same considerations as if it were adopting a standard that is more stringent than an amendment to ASHRAE Standard 90.1. (42 U.S.C. 6313(a)(6)(C)(i)(II), 42 U.S.C. 6313(a)(6)(B)).

The 6-year-lookback review is a separate statutory review obligation, as differentiated from the obligation triggered by an ASHRAE Standard 90.1 amendment, as previously discussed. ASHRAE not acting to amend Standard 90.1 is tantamount to a decision that the existing standard remain in place. 85 FR 8626, 8708 (Feb. 14, 2020). Thus, when undertaking a review as required by 42 U.S.C. 6313(a)(6)(C), DOE would need to find clear and convincing evidence, as defined in the Process Rule, to issue a standard more stringent than the existing standard for the equipment at issue. *Id.* In those instances where DOE makes a determination that the standards for the equipment in question do not need to be amended, the statute requires the Department to revisit that decision within three years to either make a new determination or propose amended standards. (42 U.S.C. 6313(a)(6)(C)(iii)(II)).

On October 24, 2019, ASHRAE officially released for distribution and made public ASHRAE Standard 90.1–2019. As discussed in the following sections, DOE has preliminarily determined that the amendments to ASHRAE Standard 90.1 have triggered DOE's obligations under 42 U.S.C. 6313(a)(6), for certain equipment classed of CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

As a preliminary step in the process of reviewing the changes to ASHRAE Standard 90.1, EPCA directs DOE to publish in the **Federal Register** for public comment an analysis of the energy savings potential of amended standards within 180 days after ASHRAE Standard 90.1 is amended with respect to any of the covered equipment specified under 42 U.S.C. 6313(a). (42 U.S.C. 6313(a)(6)(A)) This notice of data availability (NODA) presents the analysis of the energy savings potential of the amended energy efficiency standards in ASHRAE Standard 90.1–2019, as required under 42 U.S.C. 6313(a)(6)(A)(i).

Although not compelled to do so by the statute, DOE may decide in appropriate cases to simultaneously conduct an ASHRAE trigger rulemaking (*i.e.,* for those equipment classes for which ASHRAE set a higher standard) and a 6-year-lookback rulemaking (*i.e.,* for those equipment classes where ASHRAE left levels unchanged or set a lower standard) so as to address all classes of an equipment category at the same time. 85 FR 8626, 8645 (Feb. 14, 2020). For CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment, DOE is also evaluating possible amendments to the standards for those equipment classes for which the stringency of standards was not changed by ASHRAE Standard 90.1, consistent with its obligations under EPCA.

For all classes of CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment (including both the classes for which ASHRAE did and did not increase the stringency of energy efficiency levels applicable under ASHRAE Standard 90.1), DOE seeks data and information that could enable the agency to determine whether a more-stringent standard: (1) Would not result in significant additional savings of energy; (2) is not technologically feasible; (3) is not economically justified; or (4) any combination of the foregoing. If for the triggered equipment classes, standard levels more stringent than the amended ASHRAE levels do not meet the statutory criteria, DOE would adopt the amended ASHRAE Standard 90.1 levels. If for the non-triggered equipment classes, standard levels more stringent than the current Federal standards do not meet the statutory criteria, DOE would determine the standards do not need to be amended.

B. Purpose of the Notice of Data Availability

As explained previously, DOE is publishing this NODA as a preliminary step pursuant to EPCA's requirements for DOE to consider amended standards for certain categories of commercial equipment covered by ASHRAE Standard 90.1, whenever ASHRAE amends its standard to increase the energy efficiency level for an equipment class within a given equipment category. Specifically, this NODA presents for public comment DOE's analysis of the potential energy savings for amended national energy conservation standards for the equipment classes of commercial equipment for which amended efficiency levels are contained within ASHRAE Standard 90.1–2019. DOE describes these analyses and preliminary conclusions and seeks input from interested parties, including the submission of data and other relevant information. Specifically, DOE seeks comment on the potential energy savings for amended national energy conservation standards for these categories of commercial equipment based on: (1) The amended efficiency levels contained within ASHRAE Standard 90.1–2019 and (2) more-stringent efficiency levels. DOE is also taking the opportunity to consider the potential for more-stringent standards for the other equipment classes within the subject equipment categories (*i.e.,* classes for which energy efficiency levels in ASHRAE Standard 90.1–2019 were not increased, and, therefore, for which DOE was not triggered) under EPCA's 6-year-lookback authority, so as to conduct a thorough review for the entire equipment category of CRACs and the entire equipment category of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

DOE carefully examined the changes for equipment in ASHRAE Standard 90.1 in order to thoroughly evaluate the amendments in ASHRAE Standard 90.1–2019, thereby permitting DOE to determine what action, if any, is required under its statutory mandate. Section II of this NODA contains DOE's evaluation of the amendments in ASHRAE Standard 90.1–2019. For equipment classes preliminarily determined to have increased efficiency levels or changes in design requirements in ASHRAE Standard 90.1–2019, DOE subjected that equipment to further analysis as discussed in section III of this NODA. Section IV requests comment for those equipment classes for which efficiency levels and design requirements have not been increased or changed in ASHRAE Standard 90.1–2019, but are undergoing review under EPCA's 6-year-lookback authority.

In summary, the energy savings analysis presented in this NODA is a preliminary step required under 42 U.S.C. 6313(a)(6)(A)(i). DOE is also treating it as an opportunity to gather information regarding its obligations under 42 U.S.C. 6313(a)(6)(C). After review of the public comments on this NODA, DOE will either establish amended uniform national standards for the subject equipment at the minimum level specified in ASHRAE Standard 90.1–2019, or where supported by clear and convincing evidence, consider more-stringent efficiency levels that would be expected to result in significant additional conservation of energy and are technologically feasible and economically justified. If DOE determines it appropriate to conduct such a rulemaking under the statute, DOE will address the anti-backsliding provision,[6] and if DOE determines it appropriate to conduct a rulemaking to establish more-stringent efficiency levels, DOE will also address the general rulemaking requirements applicable under 42 U.S.C. 6313(a)(6)(B), such as, the criteria for making a determination of economic justification as to whether the benefits of the proposed standard exceed the burden of the proposed standard,[7] and the prohibition on making unavailable existing products with performance characteristics generally available in the United States.[8]

C. Rulemaking Background

EPCA defines ''commercial package air conditioning and heating equipment'' as air-cooled, water-cooled, evaporatively-cooled, or water source (not including ground water source) electrically operated, unitary central air conditioners and central air conditioning heat pumps for commercial application. (42 U.S.C. 6311(8)(A); 10 CFR 431.92) EPCA further divides ''commercial package air conditioning and heating equipment'' based on cooling capacity (*i.e.,* small, large, and very large categories). (42 U.S.C. 6311(8)(B)–(D); 10 CFR 431.92) ''Small commercial package air conditioning and heating equipment'' means equipment rated below 135,000 Btu per hour (cooling capacity). (42 U.S.C. 6311(8)(B); 10 CFR 431.92) ''Large commercial package air conditioning and heating equipment'' means equipment rated: (i) At or above 135,000 Btu per hour; and (ii) below 240,000 Btu per hour (cooling capacity). (42 U.S.C. 6311(8)(C); 10 CFR 431.92) ''Very large commercial package air conditioning and heating equipment'' means equipment rated: (i) At or above 240,000 Btu per hour; and (ii) below 760,000 Btu per hour (cooling capacity). (42 U.S.C. 6311(8)(D); 10 CFR 431.92) DOE generally refers to these broad classifications as ''equipment types.''

1. Computer Room Air Conditioners

Pursuant to its authority under EPCA (42 U.S.C. 6313(a)(6)(A)) and in response to updates to ASHRAE Standard 90.1, DOE has established additional categories of equipment that meet the EPCA definition of ''commercial package air conditioning and heating equipment,'' but which EPCA did not expressly identify. These equipment categories include CRACs (*see* 10 CFR 431.92 and 10 CFR 431.97). Within these additional equipment categories, further distinctions are made at the equipment class level based on capacity and other equipment attributes.

DOE's current energy conservation standards for 30 equipment classes of CRACs are codified at 10 CFR 431.97. DOE defines ''computer room air conditioner'' as a commercial package air-conditioning and heating equipment (packaged or split) that is: Used in computer rooms, data processing rooms, or other information technology cooling applications; rated for sensible coefficient of performance (SCOP) and tested in accordance with 10 CFR 431.96, and is not a covered product under 42 U.S.C. 6291(1)–(2) and 42 U.S.C. 6292. A computer room air conditioner may be provided with, or have as available options, an integrated humidifier, temperature, and/or humidity control of the supplied air, and reheating function. 10 CFR 431.92.

DOE's regulations include test procedures and energy conservation standards that apply to the current CRAC equipment classes that are differentiated by condensing system

[6] The anti-backsliding provision mandates that the Secretary may not prescribe any amended standard that either increases the maximum allowable energy use or decreases the minimum required energy efficiency of a covered product. (42 U.S.C. 6313 (a)(6)(B)(iii)(I))

[7] In deciding whether a potential standard's benefits outweigh its burdens, DOE must consider to the maximum extent practicable, the following seven factors:

(1) The economic impact on manufacturers and consumers of the product 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 product utility or performance of the product likely to result from the standard;

(5) The impact of any lessening of competition, as determined in writing by the Attorney General, 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)(I)–(VII)).

[8] The Secretary may not prescribe an amended standard if interested persons have established by a preponderance of evidence that the amended standard would likely result in unavailability in the United States of any covered product type (or class) of performance characteristics (including reliability, features, capacities, sizes, and volumes) that are substantially the same as those generally available in the U.S. at the time of the Secretary's finding. (42 U.S.C. 6313(a)(6)(B)(iii)(II)).

type (air-cooled, water-cooled, water-cooled with fluid economizer, glycol-cooled, or glycol-cooled with fluid economizer), net sensible cooling capacity (NSCC) (less than 65,000 Btu/h, greater than or equal to 65,000 Btu/h and less than 240,000 Btu/h, or greater than or equal to 240,000 Btu/h and less than 760,000 Btu/h), and direction of conditioned air over the cooling coil (upflow or downflow). 10 CFR 431.96 and 10 CFR 431.97, respectively.

DOE's test procedure for CRACs, set forth at 10 CFR 431.96, currently incorporates by reference American National Standards Institute (ANSI)/ASHRAE Standard 127–2007 (ANSI/ASHRAE 127–2007), ''*Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners,*'' (omit section 5.11), with additional provisions indicated in 10 CFR 431.96(c) and (e). The energy efficiency metric is sensible coefficient of performance (SCOP) for all CRAC equipment classes. ASHRAE Standard 90.1–2016, which was published on October 26, 2016, updated its test procedure reference for CRACs from ANSI/ASHRAE 127–2007 to AHRI Standard 1360–2016, ''*Performance Rating of Computer and Data Processing Room Air Conditioners*'' (AHRI 1360–2016), which in turn references ANSI/ASHRAE Standard 127–2012, ''*Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners*'' (ANSI/ASHRAE 127–2012). Subsequently, ASHRAE Standard 90.1–2019, which was published on October 24, 2019, further updated its test procedure reference for CRACs to AHRI Standard 1360–2017, ''*Performance Rating of Computer and Data Processing Room Air Conditioners*'' (AHRI 1360–2017), which also references ANSI/ASHRAE 127–2012. The energy efficiency metric for CRACs in AHRI 1360–2016 and AHRI 1360–2017 is net sensible coefficient of performance (NSenCOP).

The energy conservation standards for CRACs were most recently amended through the final rule for energy conservation standards and test procedures for certain commercial HVAC and water heating equipment published in the **Federal Register** on May 16, 2012 (May 2012 final rule). 77 FR 28928. The May 2012 final rule established separate equipment classes for CRACs and adopted energy conservation standards that generally correspond to the levels in the 2010 revision of ASHRAE Standard 90.1 for most of the equipment classes.

DOE published a Notice of Data Availability and Request for Information (NODA/RFI) in response to the amendments to the industry consensus standard contained in ASHRAE Standard 90.1–2016 in the **Federal Register** on September 11, 2019 (the September 2019 NODA/RFI). 84 FR 48006. In the September 2019 NODA/RFI, DOE explained its methodology and assumptions to compare the current Federal standards for CRACs (in terms of SCOP) to the levels in ASHRAE Standard 90.1–2016 (in terms of NSenCOP) and requested comment on its methodology and results. (The document also addressed changes related to dedicated outdoor air systems (DOASes).) DOE received a number of comments from interested parties in response to the September 2019 NODA/RFI. Table I–1 lists the commenters relevant to CRACs, along with each commenter's abbreviated name used throughout this NODA/RFI. Discussion of the relevant comments, and DOE's responses, are provided in the appropriate sections of this document. Several other comments received in response to the September 2019 NODA/RFI pertain only to DOASes and will be addressed in a separate notice.[9]

TABLE I–1—INTERESTED PARTIES PROVIDING COMMENT ON CRACS IN RESPONSE TO THE SEPTEMBER 2019 NODA/RFI

Name	Abbreviation	Type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	IR.
Pacific Gas and Electric Company, Southern California Gas Company, San Diego Gas and Electric, and Southern California Edison.	California Investor-Owned Utilities (CA IOUs).	U.
Trane	Trane	M.
Pano Koutrouvelis	Koutrouvelis	I.

EA: Efficiency/Environmental Advocate; IR: Industry Representative; M: Manufacturer; U: Utility; and I: Individual.

As noted previously, on October 24, 2019, ASHRAE officially released for distribution and made public ASHRAE Standard 90.1–2019. ASHRAE Standard 90.1–2019 revised the efficiency levels for certain commercial equipment, including certain classes of CRACs (as discussed in the following section). ASHRAE Standard 90.1–2019 either maintained or increased the stringency of the efficiency levels applicable to CRAC in ASHRAE Standard 90.1–2016, and as such, addressing the amendments for CRACs in ASHRAE Standard 90.1–2019 will also address DOE's obligations for CRACs resulting from the 2016 update to ASHRAE Standard 90.1 (*i.e.,* ASHRAE Standard 90.1–2016).

2. Air-Cooled, Three-Phase, Small Commercial Package AC and HP (<65 K) Equipment

The energy conservation standards for air-cooled, three-phase, small commercial package air conditioning and heating equipment were most recently amended through the final rule for energy conservation standards and test procedures for certain commercial HVAC and water heating equipment published in the **Federal Register** on July 17, 2015 (July 2015 final rule). 80 FR 42614. The July 2015 final rule adopted energy conservation standards that correspond to the levels in the 2013 revision of ASHRAE Standard 90.1 for air-cooled, three-phase, small commercial package air conditioners (single package) and heat pumps (single package and split system). The July 2015 final rule also determined that standards for air-cooled, three-phase, small commercial package air conditioners (split system) did not need to be amended. DOE's current energy conservation standards for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment are codified at 10 CFR 431.97.

The current DOE test procedure at 10 CFR 431.96 for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment incorporates by reference ANSI/AHRI Standard 210/240–2008, ''Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment,'' approved by

[9] As noted, the September 2019 NODA/RFI addressed both CRACs and DOASes and is available under docket number EERE–2017–BT–STD–0017. As this NODA/RFI addresses only CRACs, it has been assigned a separate docket number (*i.e.,* EERE–2020–BT–STD–0008). Subsequent rulemaking activity regarding DOASes will continue to rely on the docket number for the September 2019 NODA/RFI.

ANSI on October 27, 2011 and updated by addendum 1 in June 2011 and addendum 2 in March 2012 (ANSI/AHRI 210/240–2008).[10]

As noted previously, on October 24, 2019, ASHRAE officially released for distribution and made public ASHRAE Standard 90.1–2019. ASHRAE Standard 90.1–2019 revised the efficiency levels for certain commercial equipment, including certain classes of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment (as discussed in the following section).

II. Discussion of Changes in ASHRAE Standard 90.1–2019

Before beginning an analysis of the potential energy savings that would result from adopting a uniform national standard as specified by ASHRAE Standard 90.1–2019 or more-stringent uniform national standards, DOE must first determine whether the ASHRAE Standard 90.1–2019 standard levels actually represent an increase in efficiency above the current Federal standard levels or whether ASHRAE Standard 90.1–2019 adopted new design requirements, thereby triggering DOE action.

This section contains a discussion of: (1) Each equipment class for which the ASHRAE Standard 90.1–2019 efficiency levels differ from the current Federal minimum efficiency levels[11] (2) newly added equipment classes in ASHRAE Standard 90.1, and (3) DOE's preliminary conclusion regarding the appropriate action to take with respect to these equipment classes. DOE is also examining the other equipment classes for the triggered equipment categories under its 6-year-lookback authority. (42 U.S.C. 6313(a)(6)(C))

As noted in section I.C of this document, ASHRAE adopted efficiency levels for all CRAC equipment classes denominated in terms of NSenCOP in the 2016 and 2019 versions of Standard 90.1 (measured per AHRI 1360–2016 and AHRI 1360–2017, respectively), whereas DOE's current standards are denominated in terms of SCOP (measured per ANSI/ASHRAE 127–2007). For this NODA, DOE's analysis focuses on whether DOE has been triggered by ASHRAE Standard 90.1–2019 updates to minimum efficiency levels for CRACs and whether more-stringent standards are warranted; DOE will separately consider whether to adopt the NSenCOP metric for all CRAC equipment classes as part of the ongoing test procedure rulemaking. As discussed in detail in section II.A of this NODA, DOE has conducted a crosswalk analysis of the ASHRAE Standard 90.1–2019 standard levels (in terms of NSenCOP) and the corresponding current Federal energy conservation standards (in terms of SCOP) to compare the stringencies. DOE has tentatively determined that the updates in ASHRAE Standard 90.1–2019 increased the stringency of efficiency levels for 48 equipment classes and maintained equivalent levels for six equipment classes of CRACs relative to the current Federal standard.[12] In addition, ASHRAE Standard 90.1–2019 includes efficiency levels for 18 classes of horizontal-flow[13] CRACs and 48 classes of ceiling-mounted CRACs which are not currently subject to Federal standards.

Current Federal standards for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment are in terms of seasonal energy efficiency ratio (SEER) and heating seasonal performance factor (HSPF) as measured by the current DOE test procedure which incorporates by reference the ANSI/AHRI 210/240–2008. 10 CFR 431.96, Table 1. ASHRAE Standard 90.1–2019 adopts new energy efficiency levels and new metrics for all equipment classes of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment. Beginning January 1, 2023, the metrics for this equipment under ASHRAE Standard 90.1–2019 are SEER2 and HSPF2, as measured by AHRI 210/240–2023, ''Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment'' (published in May 2020).[14] [15] AHRI 210/240–2023 aligns test methods and ratings to be consistent with DOE's test procedure for single-phase central at conditioners at Appendix M1 to 10 CFR part 430, subpart B. The year 2023 was chosen as the version year to align compliance to AHRI 210/240–2023 with Appendix M1.

On October 2, 2018, DOE published in the **Federal Register** a request for information on its test procedure (and certification and enforcement requirements) for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment. 83 FR 49501 (October 2018 TP RFI). The October 2018 TP RFI notes that air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment is essentially identical to its single-phase residential counterparts, is manufactured on the same production lines, and is physically identical to their corresponding single-phase central air conditioner and heat pump models (with the exception of the electrical systems and compressors). 83 FR 49501, 49504 (Oct. 2, 2018).

In order to determine whether the 2023 efficiency levels in ASHRAE Standard 90.1–2019 represent an increase in efficiency, DOE has developed a preliminary crosswalk for translating SEER to SEER2 and HSPF to HSPF2 based on the metric translations between SEER to SEER2 and HSPF to HSPF2 developed for single-phase products (see section II.B.1 of this document for details). DOE has tentatively determined that the levels in ASHRAE Standard 90.1–2019 for this equipment category are more stringent for two equipment classes, equivalent for two equipment classes, and less stringent for six equipment classes relative to the current Federal standard.

Table II–1 and Table II–2 show the equipment classes and efficiency levels for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment provided in ASHRAE Standard 90.1–2019 and the current Federal energy conservation standards. Table II–1 and Table II–2 also display the corresponding existing Federal equipment classes for clarity and indicate whether the updated levels in ASHRAE Standard 90.1–2019 trigger DOE's evaluation as required under EPCA (*i.e.,* whether the update results in a standard level more stringent than the current Federal level), and, therefore, whether analysis of potential energy savings from amended Federal standards is warranted. The remainder of this section explains DOE's methodology for evaluating the updated levels in ASHRAE Standard 90.1–2019 and addresses comments received regarding CRAC efficiency levels and associated analyses discussed in the September 2019 NODA/RFI.

[10] DOE notes that the Federal test procedure omits the use of section 6.5 of ANSI/AHRI Standard 210/240–2008. 10 CFR 431.96, Table 1.

[11] ASHRAE Standard 90.1–2019 did not change any of the design requirements associated with the minimum efficiency tables for the commercial heating, air conditioning, and water heating equipment covered by EPCA, so this potential category of change is not discussed in this section.

[12] ASHRAE 90.1–2019 added separate classes for ''air cooled with fluid economizer'' CRACs. This change resulted in nine new ''air cooled with fluid economizer'' equipment classes being added and made subject to Federal standards.

[13] ''Horizontal flow'' refers to the direction of airflow of the unit.

[14] Levels effective prior to January 1, 2023 are unchanged from ASHRAE Standard 90.1–2016.

[15] Prior to ASHRAE Standard 90.1–2019, ''space-constrained'' classes were referred to as ''through-the-wall.''

TABLE II–1—ENERGY EFFICIENCY LEVELS FOR CRACS IN ASHRAE STANDARD 90.1–2019, AND THE CORRESPONDING FEDERAL ENERGY CONSERVATION STANDARDS

ASHRAE standard 90.1–2019 equipment class [1]	Current federal equipment class [1]	Energy efficiency levels in ASHRAE standard 90.1–2019 [2]	Federal energy conservation standards [2]	DOE triggered by ASHRAE standard 90.1–2019 amendment?
CRAC, Air-Cooled, <80,000 Btu/h, Downflow	CRAC, Air-Cooled, <65,000 Btu/h, Downflow	2.70 NSenCOP	2.20 SCOP	Yes.
CRAC, Air-Cooled, <65,000 Btu/h, Horizontal-flow.	N/A	2.65 NSenCOP	N/A	Yes.[3]
CRAC, Air-Cooled, <80,000 Btu/h, Upflow Ducted.	CRAC, Air-Cooled, <65,000 Btu/h, Upflow	2.67 NSenCOP	2.09 SCOP	Yes.
CRAC, Air-Cooled, <65,000 Btu/h, Upflow Non-Ducted.	CRAC, Air-Cooled, <65,000 Btu/h, Upflow	2.16 NSenCOP	2.09 SCOP	Yes.
CRAC, Air-Cooled, ≥80,000 and <295,000 Btu/h, Downflow.	CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Downflow.	2.58 NSenCOP	2.10 SCOP	Yes.
CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Horizontal-flow.	N/A	2.55 NSenCOP	N/A	Yes.[3]
CRAC, Air-Cooled, ≥80,000 and <295,000 Btu/h, Upflow Ducted.	CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	2.55 NSenCOP	1.99 SCOP	No.[4]
CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Upflow Non-Ducted.	CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	2.04 NSenCOP	1.99 SCOP	Yes.
CRAC, Air-Cooled, ≥295,000 Btu/h, Downflow	CRAC, Air-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Downflow.	2.36 NSenCOP	1.90 SCOP	Yes.
CRAC, Air-Cooled, ≥240,000 Btu/h, Horizontal-flow.	N/A	2.47 NSenCOP	N/A	Yes.[3]
CRAC, Air-Cooled, ≥295,000 Btu/h, Upflow Ducted.	CRAC, Air-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	2.33 NSenCOP	1.79 SCOP	Yes.
CRAC, Air-Cooled, ≥240,000 Btu/h, Upflow Non-ducted.	CRAC, Air-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	1.89 NSenCOP	1.79 SCOP	Yes.
CRAC, Air-Cooled with fluid economizer, <80,000 Btu/h, Downflow.	CRAC, Air-Cooled, <65,000 Btu/h, Downflow	2.70 NSenCOP	2.20 SCOP	Yes.[5]
CRAC, Air-Cooled with fluid economizer, <65,000 Btu/h, Horizontal-flow.	N/A	2.65 NSenCOP	N/A	Yes.[3]
CRAC, Air-Cooled with fluid economizer, <80,000 Btu/h, Upflow Ducted.	CRAC, Air-Cooled, <65,000 Btu/h, Upflow	2.67 NSenCOP	2.09 SCOP	Yes.[5]
CRAC, Air-Cooled with fluid economizer, <65,000 Btu/h, Upflow Non-Ducted.	CRAC, Air-Cooled, <65,000 Btu/h, Upflow	2.09 NSenCOP	2.09 SCOP	No.[4]
CRAC, Air-Cooled with fluid economizer, ≥80,000 and <295,000 Btu/h, Downflow.	CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Downflow.	2.58 NSenCOP	2.10 SCOP	Yes.[5]
CRAC, Air-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Horizontal-flow.	N/A	2.55 NSenCOP	N/A	Yes.[3]
CRAC, Air-Cooled with fluid economizer, ≥80,000 and <295,000 Btu/h, Upflow Ducted.	CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	2.55 NSenCOP	1.99 SCOP	No.[4]
CRAC, Air-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow Non-Ducted.	CRAC, Air-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	1.99 NSenCOP	1.99 SCOP	No.[4]
CRAC, Air-Cooled with fluid economizer, ≥295,000 Btu/h, Downflow.	CRAC, Air-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Downflow.	2.36 NSenCOP	1.90 SCOP	Yes.[5]
CRAC, Air-Cooled with fluid economizer, ≥240,000 Btu/h, Horizontal-flow.	N/A	2.47 NSenCOP	N/A	Yes.[3]
CRAC, Air-Cooled with fluid economizer, ≥295,000 Btu/h, Upflow Ducted.	CRAC, Air-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	2.33 NSenCOP	1.79 SCOP	Yes.[5]
CRAC, Air-Cooled with fluid economizer, ≥240,000 Btu/h, Upflow Non-ducted.	CRAC, Air-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	1.81 NSenCOP	1.79 SCOP	Yes.[5]
CRAC, Water-Cooled, <80,000 Btu/h, Downflow.	CRAC, Water-Cooled, <65,000 Btu/h, Downflow.	2.82 NSenCOP	2.60 SCOP	Yes.
CRAC, Water-Cooled, <65,000 Btu/h, Horizontal-flow.	N/A	2.79 NSenCOP	N/A	Yes.[3]
CRAC, Water-Cooled, <80,000 Btu/h, Upflow Ducted.	CRAC, Water-Cooled, <65,000 Btu/h, Upflow	2.79 NSenCOP	2.49 SCOP	Yes.
CRAC, Water-Cooled, <65,000 Btu/h, Upflow Non-ducted.	CRAC, Water-Cooled, <65,000 Btu/h, Upflow	2.43 NSenCOP	2.49 SCOP	Yes.
CRAC, Water-Cooled, ≥80,000 and <295,000 Btu/h, Downflow.	CRAC, Water-Cooled, ≥65,000 and <240,000 Btu/h, Downflow.	2.73 NSenCOP	2.50 SCOP	Yes.
CRAC, Water-Cooled, ≥65,000 and <240,000 Btu/h, Horizontal-flow.	N/A	2.68 NSenCOP	N/A	Yes.[3]
CRAC, Water-Cooled, ≥80,000 and <295,000 Btu/h, Upflow Ducted.	CRAC, Water-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	2.70 NSenCOP	2.39 SCOP	No.[4]
CRAC, Water-Cooled, ≥65,000 and <240,000 Btu/h, Upflow Non-ducted.	CRAC, Water-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	2.32 NSenCOP	2.39 SCOP	Yes.
CRAC, Water-Cooled, ≥295,000 Btu/h, Downflow.	CRAC, Water-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Downflow.	2.67 NSenCOP	2.40 SCOP	Yes.
CRAC, Water-Cooled, ≥240,000 Btu/h, Horizontal-flow.	N/A	2.60 NSenCOP	N/A	Yes.[3]
CRAC, Water-Cooled, ≥295,000 Btu/h, Upflow Ducted.	CRAC, Water-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	2.64 NSenCOP	2.29 SCOP	Yes.
CRAC, Water-Cooled, ≥240,000 Btu/h, Upflow Non-ducted.	CRAC, Water-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	2.20 NSenCOP	2.29 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, <80,000 Btu/h, Downflow.	CRAC, Water-Cooled with fluid economizer, <65,000 Btu/h, Downflow.	2.77 NSenCOP	2.55 SCOP	Yes.

TABLE II–1—ENERGY EFFICIENCY LEVELS FOR CRACS IN ASHRAE STANDARD 90.1–2019, AND THE CORRESPONDING FEDERAL ENERGY CONSERVATION STANDARDS—Continued

ASHRAE standard 90.1–2019 equipment class [1]	Current federal equipment class [1]	Energy efficiency levels in ASHRAE standard 90.1–2019 [2]	Federal energy conservation standards [2]	DOE triggered by ASHRAE standard 90.1–2019 amendment?
CRAC, Water-Cooled with fluid economizer, <65,000 Btu/h, Horizontal-flow.	N/A	2.71 NSenCOP	N/A	Yes.[3]
CRAC, Water-Cooled with fluid economizer, <80,000 Btu/h, Upflow Ducted.	CRAC, Water-Cooled with fluid economizer, <65,000 Btu/h, Upflow.	2.74 NSenCOP	2.44 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, <65,000 Btu/h, Upflow Non-ducted.	CRAC, Water-Cooled with fluid economizer, <65,000 Btu/h, Upflow.	2.35 NSenCOP	2.44 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, ≥80,000 and <295,000 Btu/h, Downflow.	CRAC, Water-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Downflow.	2.68 NSenCOP	2.45 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Horizontal-flow.	N/A	2.60 NSenCOP	N/A	Yes.[3]
CRAC, Water-Cooled with fluid economizer, ≥80,000 and <295,000 Btu/h, Upflow Ducted.	CRAC, Water-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow.	2.65 NSenCOP	2.34 SCOP	No.[4]
CRAC, Water-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow Non-ducted.	CRAC, Water-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow.	2.24 NSenCOP	2.34 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, ≥295,000 Btu/h, Downflow.	CRAC, Water-Cooled with fluid economizer, ≥240,000 Btu/h and <760,000 Btu/h, Downflow.	2.61 NSenCOP	2.35 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, ≥240,000 Btu/h, Horizontal-flow.	N/A	2.54 NSenCOP	N/A	Yes.[3]
CRAC, Water-Cooled with fluid economizer, ≥295,000 Btu/h, Upflow Ducted.	CRAC, Water-Cooled with fluid economizer, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	2.58 NSenCOP	2.24 SCOP	Yes.
CRAC, Water-Cooled with fluid economizer, ≥240,000 Btu/h, Upflow Non-ducted.	CRAC, Water-Cooled with fluid economizer, ≥240,000 Btu/h and <760,000 Btu/h, Upflow.	2.12 NSenCOP	2.24 SCOP	Yes.
CRAC, Glycol-Cooled, <80,000 Btu/h, Downflow.	CRAC, Glycol-Cooled, <65,000 Btu/h, Downflow.	2.56 NSenCOP	2.50 SCOP	Yes.
CRAC, Glycol-Cooled, <65,000 Btu/h, Horizontal-flow.	N/A	2.48 NSenCOP	N/A	Yes.[3]
CRAC, Glycol-Cooled, <80,000 Btu/h, Upflow Ducted.	CRAC, Glycol-Cooled, <65,000 Btu/h, Upflow Ducted.	2.53 NSenCOP	2.39 SCOP	Yes.
CRAC, Glycol-Cooled, <65,000 Btu/h, Upflow Non-ducted.	CRAC, Glycol-Cooled, <65,000 Btu/h, Upflow Non-ducted.	2.08 NSenCOP	2.39 SCOP	Yes.
CRAC, Glycol-Cooled, ≥80,000 and <295,000 Btu/h, Downflow.	CRAC, Glycol-Cooled, ≥65,000 and <240,000 Btu/h, Downflow.	2.24 NSenCOP	2.15 SCOP	Yes.
CRAC, Glycol-Cooled, ≥65,000 and <240,000 Btu/h, Horizontal-flow.	N/A	2.18 NSenCOP	N/A	Yes.[3]
CRAC, Glycol-Cooled, ≥80,000 and <295,000 Btu/h, Upflow Ducted.	CRAC, Glycol-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	2.21 NSenCOP	2.04 SCOP	Yes.
CRAC, Glycol-Cooled, ≥65,000 and <240,000 Btu/h, Upflow Non-ducted.	CRAC, Glycol-Cooled, ≥65,000 and <240,000 Btu/h, Upflow.	1.90 NSenCOP	2.04 SCOP	Yes.
CRAC, Glycol-Cooled, ≥295,000 Btu/h, Downflow.	CRAC, Glycol-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Downflow.	2.21 NSenCOP	2.10 SCOP	Yes.
CRAC, Glycol-Cooled, ≥240,000 Btu/h, Horizontal-flow.	N/A	2.18 NSenCOP	N/A	Yes.[3]
CRAC, Glycol-Cooled, ≥295,000 Btu/h, Upflow Ducted.	CRAC, Glycol-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow Ducted.	2.18 NSenCOP	1.99 SCOP	Yes.
CRAC, Glycol-Cooled, ≥240,000 Btu/h, Upflow Non-ducted.	CRAC, Glycol-Cooled, ≥240,000 Btu/h and <760,000 Btu/h, Upflow Non-ducted.	1.81 NSenCOP	1.99 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, <80,000 Btu/h, Downflow.	CRAC, Glycol-Cooled with fluid economizer, <65,000 Btu/h, Downflow.	2.51 NSenCOP	2.45 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, <65,000 Btu/h, Horizontal-flow.	N/A	2.44 NSenCOP	N/A	Yes.[3]
CRAC, Glycol-Cooled with fluid economizer, <80,000 Btu/h, Upflow Ducted.	CRAC, Glycol-Cooled with fluid economizer, <65,000 Btu/h, Upflow Ducted.	2.48 NSenCOP	2.34 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, <65,000 Btu/h, Upflow Non-ducted.	CRAC, Glycol-Cooled with fluid economizer, <65,000 Btu/h, Upflow Non-ducted.	2.00 NSenCOP	2.34 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, ≥80,000 and <295,000 Btu/h, Downflow.	CRAC, Glycol-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Downflow.	2.19 NSenCOP	2.10 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Horizontal-flow.	N/A	2.10 NSenCOP	N/A	Yes.[3]
CRAC, Glycol-Cooled with fluid economizer, ≥80,000 and <295,000 Btu/h, Upflow Ducted.	CRAC, Glycol-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow.	2.16 NSenCOP	1.99 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow Non-ducted.	CRAC, Glycol-Cooled with fluid economizer, ≥65,000 and <240,000 Btu/h, Upflow.	1.82 NSenCOP	1.99 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, ≥295,000 Btu/h, Downflow.	CRAC, Glycol-Cooled with fluid economizer, ≥240,000 Btu/h and <760,000 Btu/h, Downflow.	2.15 NSenCOP	2.05 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, ≥240,000 Btu/h, Horizontal-flow.	N/A	2.10 NSenCOP	N/A	Yes.[3]

TABLE II–1—ENERGY EFFICIENCY LEVELS FOR CRACS IN ASHRAE STANDARD 90.1–2019, AND THE CORRESPONDING FEDERAL ENERGY CONSERVATION STANDARDS—Continued

ASHRAE standard 90.1–2019 equipment class [1]	Current federal equipment class [1]	Energy efficiency levels in ASHRAE standard 90.1–2019 [2]	Federal energy conservation standards [2]	DOE triggered by ASHRAE standard 90.1–2019 amendment?
CRAC, Glycol-Cooled with fluid economizer, ≥295,000 Btu/h, Upflow Ducted.	CRAC, Glycol-Cooled with fluid economizer, ≥240,000 Btu/h and <760,000 Btu/h, Upflow Ducted.	2.12 NSenCOP	1.94 SCOP	Yes.
CRAC, Glycol-Cooled with fluid economizer, ≥240,000 Btu/h, Upflow Non-ducted.	CRAC, Glycol-Cooled with fluid economizer, ≥240,000 Btu/h and <760,000 Btu/h, Upflow Non-ducted.	1.73 NSenCOP	1.94 SCOP	Yes.
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser, Ducted, <29,000 Btu/h.	N/A	2.05 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.02 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser, Ducted, ≥65,000 Btu/h.	N/A	1.92 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser, Non-ducted, <29,000 Btu/h.	N/A	2.08 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.05 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser, Non-ducted, ≥65,000 Btu/h.	N/A	1.94 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser with fluid economizer, Ducted, <29,000 Btu/h.	N/A	2.01 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser with fluid economizer, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.97 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser with fluid economizer, Ducted, ≥65,000 Btu/h.	N/A	1.87 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser with fluid economizer, Non-ducted, <29,000 Btu/h.	N/A	2.04 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser with fluid economizer, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.00 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with free air discharge condenser with fluid economizer, Non-ducted, ≥65,000 Btu/h.	N/A	1.89 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser, Ducted, <29,000 Btu/h.	N/A	1.86 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.83 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser, Ducted, ≥65,000 Btu/h.	N/A	1.73 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser, Non-ducted, <29,000 Btu/h.	N/A	1.89 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.86 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser, Non-ducted, ≥65,000 Btu/h.	N/A	1.75 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser with fluid economizer, Ducted, <29,000 Btu/h.	N/A	1.82 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser with fluid economizer, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.78 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser with fluid economizer, Ducted, ≥65,000 Btu/h.	N/A	1.68 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser with fluid economizer, Non-ducted, <29,000 Btu/h.	N/A	1.85 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Air-cooled with ducted condenser with fluid economizer, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.81 NSenCOP	N/A	Yes.[6]

TABLE II–1—ENERGY EFFICIENCY LEVELS FOR CRACS IN ASHRAE STANDARD 90.1–2019, AND THE CORRESPONDING FEDERAL ENERGY CONSERVATION STANDARDS—Continued

ASHRAE standard 90.1–2019 equipment class [1]	Current federal equipment class [1]	Energy efficiency levels in ASHRAE standard 90.1–2019 [2]	Federal energy conservation standards [2]	DOE triggered by ASHRAE standard 90.1–2019 amendment?
Ceiling-mounted CRAC, Air-cooled with ducted condenser with fluid economizer, Non-ducted, ≥65,000 Btu/h.	N/A	1.70 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled, Ducted, <29,000 Btu/h.	N/A	2.38 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.28 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled, Ducted, ≥65,000 Btu/h.	N/A	2.18 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled, Non-ducted, <29,000 Btu/h.	N/A	2.41 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.31 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled, Non-ducted, ≥65,000 Btu/h.	N/A	2.20 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled with fluid economizer, Ducted, <29,000 Btu/h.	N/A	2.33 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled with fluid economizer, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.23 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled with fluid economizer, Ducted, ≥65,000 Btu/h.	N/A	2.13 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled with fluid economizer, Non-ducted, <29,000 Btu/h.	N/A	2.36 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled with fluid economizer, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	2.26 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Water-cooled with fluid economizer, Non-ducted, ≥65,000 Btu/h.	N/A	2.16 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled, Ducted, <29,000 Btu/h.	N/A	1.97 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.93 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled, Ducted, ≥65,000 Btu/h.	N/A	1.78 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled, Non-ducted, <29,000 Btu/h.	N/A	2.00 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.98 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled, Non-ducted, ≥65,000 Btu/h.	N/A	1.81 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled with fluid economizer, Ducted, <29,000 Btu/h.	N/A	1.92 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled with fluid economizer, Ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.88 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled with fluid economizer, Ducted, ≥65,000 Btu/h.	N/A	1.73 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled with fluid economizer, Non-ducted, <29,000 Btu/h.	N/A	1.95 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled with fluid economizer, Non-ducted, ≥29,000 Btu/h and <65,000 Btu/h.	N/A	1.93 NSenCOP	N/A	Yes.[6]
Ceiling-mounted CRAC, Glycol-cooled with fluid economizer, Non-ducted, ≥65,000 Btu/h.	N/A	1.76 NSenCOP	N/A	Yes.[6]

[1] Note that equipment classes specified in ASHRAE Standard 90.1–2019 do not necessarily correspond to the equipment classes defined in DOE's regulations. Capacity ranges in ASHRAE Standard 90.1–2019 are specified in terms of NSCC, as measured according to AHRI 1360–2017. Capacity ranges in Federal equipment classes are specified in terms of NSCC, as measured according to ANSI/ASHRAE 127–2007. As discussed in section II.A.1 of this document, for certain equipment classes, AHRI 1360–2017 results in increased NSCC measurements as compared to the NSCC measured in accordance with ANSI/ASHRAE 127–2007. Therefore, some CRACs would switch classes (*i.e.,* move into a higher capacity equipment class) if the equipment class boundaries are not changed accordingly. Consequently, DOE performed a "capacity crosswalk" analysis to translate the capacity boundaries for certain equipment classes.

[2] For CRACs, ASHRAE Standard 90.1–2019 adopted efficiency levels in terms of NSenCOP based on test procedures in AHRI 1360–2017, while DOE's current standards are in terms of SCOP based on the test procedures in ANSI/ASHRAE 127–2007. DOE performed a crosswalk analysis to compare the stringency of the ASHRAE Standard 90.1–2019 efficiency levels with the current Federal standards. See section II.A of this NODA for further discussion on the crosswalk analysis performed for CRACs.

[3] Horizontal-flow CRACs are new equipment classes included in ASHRAE Standard 90.1–2016 and ASHRAE Standard 90.1–2019 (and not subject to current Federal standards), but DOE does not have any data to indicate the market share of horizontal-flow units. In the absence of data regarding market share and efficiency distribution, DOE is unable to estimate potential savings for horizontal-flow equipment classes.

[4] The preliminary CRAC crosswalk analysis indicates that there is no difference in stringency of efficiency levels for this class between ASHRAE Standard 90.1–2019 and the current Federal standard.

[5] Air-cooled CRACs with fluid economizers are new equipment classes included in ASHRAE Standard 90.1–2019 and are currently subject to the Federal standard for air-cooled CRACs. DOE does not have data regarding market share for air-cooled CRACs with fluid economizers. Although DOE is unable to disaggregate the estimated potential savings for these equipment classes, energy savings for these equipment classes are included in the savings presented for air-cooled CRACs.

[6] Ceiling-mounted CRACs are new equipment classes in ASHRAE Standard 90.1–2019 (and not subject to current Federal standards), and DOE does not have any data to indicate the market share of ceiling-mounted units. In the absence of data regarding market share and efficiency distribution, DOE is unable to estimate potential savings for ceiling-mounted equipment classes.

TABLE II–2—ENERGY EFFICIENCY LEVELS FOR AIR-COOLED, THREE-PHASE, SMALL COMMERCIAL PACKAGE AC AND HP (<65 K) IN ASHRAE STANDARD 90.1–2019, AND THE CORRESPONDING FEDERAL ENERGY CONSERVATION STANDARDS

ASHRAE standard 90.1–2019 equipment class	Current federal equipment class	Energy efficiency levels in ASHRAE standard 90.1–2019	Federal energy conservation standards [1]	DOE triggered by ASHRAE standard 90.1–2019 amendment?
Air-cooled Air Conditioner, Three-Phase, Single-Package, <65,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Single-Package, <65,000 Btu/h.	14.0 SEER before 1/1/2023, 13.4 SEER2 after 1/1/2023.	14.0 SEER	No.
Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	13.0 SEER before 1/1/2023, 13.4 SEER2 after 1/1/2023.	13.0 SEER	Yes.
Air-cooled Heat Pump, Three-phase, Single-Package, <65,000 Btu/h.	Air-cooled Heat Pump, three-phase, Single-Package, <65,000 Btu/h.	14.0 SEER/8.0 HSPF before 1/1/2023, 13.4 SEER2/6.7 HSPF2 after 1/1/2023.	14.0 SEER, 8.0 HSPF.	No.
Air-cooled Heat Pump, Three-phase, Split-System, <65,000 Btu/h.	Air-cooled Heat Pump, three-phase, Split-System, <65,000 Btu/h.	14.0 SEER/8.2 HSPF before 1/1/2023, 14.3 SEER2/7.5 HSPF2 after 1/1/2023.	14.0 SEER, 8.2 HSPF.	Yes.
Space-Constrained, Air-cooled Air Conditioner, Three-Phase, Single-Package, ≤30,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Single-Package, <65,000 Btu/h.	12.0 SEER before 1/1/2023, 11.7 SEER2 after 1/1/2023.	14.0 SEER [2]	No.
Space-Constrained, Air-cooled Air Conditioner, Three-Phase, Split-System, ≤30,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	12.0 SEER before 1/1/2023, 11.7 SEER2 after 1/1/2023.	13.0 SEER [2]	No.
Space-Constrained, Air-cooled Heat Pump, Three-Phase, Single-Package, ≤30,000 Btu/h.	Air-cooled Heat Pump, three-phase, Single-Package, <65,000 Btu/h.	12.0 SEER/7.4 HSPF before 1/1/2023, 11.7 SEER2/6.3 HSPF2 after 1/1/2023.	14.0 SEER,[2] 8.0 HSPF [2].	No.
Space-Constrained, Air-cooled Heat Pump, Three-Phase, Split-System, ≤30,000 Btu/h.	Air-cooled Heat Pump, three-phase, Split-System, <65,000 Btu/h.	12.0 SEER/7.4 HSPF before 1/1/2023, 11.7 SEER2/6.3 HSPF2 after 1/1/2023.	14.0 SEER,[2] 8.2 HSPF [2].	No.
Small-Duct, High-Velocity, Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	12.0 SEER before 1/1/2023, 12.0 SEER2 after 1/1/2023.	13.0 SEER [2]	No.
Small-Duct, High-Velocity, Air-cooled Heat Pump, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Heat Pump, three-phase, Split-System, <65,000 Btu/h.	12.0 SEER/7.2 HSPF before 1/1/2023, 12.0 SEER2/6.1 HSPF2 after 1/1/2023.	14.0 SEER,[2] 8.2 HSPF [2].	No.

[1] ASHRAE Standard 90.1–2019 adopts levels in terms of SEER2 and HSPF2 effective on 1/1/2023, as measured by AHRI 210/240–2023, while Federal standards are in terms of SEER and HSPF. DOE performed a preliminary crosswalk analysis to determine whether the ASHRAE Standard 90.1–2019 levels due to take effect on 1/1/2023 represent an increase in stringency relative to the current Federal standards.
[2] Although ASHRAE Standard 90.1–2019 specifies separate standard levels for three-phase space-constrained and small-duct, high-velocity equipment, the Federal standards for these equipment classes are the same as other types of small commercial package air-conditioning and heating equipment.

A. Computer Room Air Conditioners

DOE currently prescribes energy conservation standards for 30 equipment classes of CRACs at 10 CFR 431.97. The current CRAC equipment classes are differentiated by condensing system type (air-cooled, water-cooled, water-cooled with fluid economizer, glycol-cooled, or glycol-cooled with fluid economizer), NSCC (less than 65,000 Btu/h, greater than or equal to 65,000 Btu/h and less than 240,000 Btu/h, or greater than or equal to 240,000 Btu/h and less than 760,000 Btu/h), and direction of conditioned air over the cooling coil (upflow or downflow). Federal standards established in 10 CFR 431.97 are specified in terms of SCOP, based on rating conditions in ANSI/ASHRAE 127–2007. 10 CFR 431.96(b)(2).

As discussed in the September 2019 NODA/RFI, ASHRAE Standard 90.1–2016 established new equipment classes for CRACs. 84 FR 48006, 48013 (Sept. 11, 2019). ASHRAE Standard 90.1–2016 added efficiency levels for horizontal-flow CRAC equipment classes, disaggregated the upflow CRAC equipment classes into upflow ducted and upflow non-ducted equipment classes, and established different sets of efficiency levels for upflow ducted and upflow non-ducted equipment classes based on the corresponding rating conditions specified in AHRI 1360–2016. In contrast, DOE currently specifies the same set of standards at 10 CFR 431.97 for all covered upflow CRACs, regardless of ducting configuration.

ASHRAE Standard 90.1–2019 maintains the equipment class structure for floor-mounted CRACs as established in ASHRAE Standard 90.1–2016. ASHRAE Standard 90.1–2019 amended the efficiency levels in ASHRAE Standard 90.1–2016 for all but three of those equipment classes. ASHRAE Standard 90.1–2019 also added classes for air-cooled CRACs with fluid economizers and a new table with new efficiency levels for ceiling-mounted CRAC equipment classes. The equipment in horizontal-flow and ceiling-mounted classes is not currently subject to Federal standards set forth in 10 CFR 431.97, although DOE issued a draft guidance document on October 7, 2015 to clarify that horizontal-flow and ceiling-mounted CRACs are covered equipment and are required to be tested under the current DOE test procedure for purposes of making representations of energy consumption. (Docket No. EERE–2014–BT–GUID–0022, No. 3, pp. 1–2) In contrast, upflow and downflow air-cooled CRACs with fluid economizers are currently subject to the Federal standards in 10 CFR 431.97 for air-cooled equipment classes.

DOE considered whether there were any increases in stringency in the ASHRAE Standard 90.1–2019 levels for CRAC classes covered by DOE standards, thus triggering DOE obligations under EPCA. As with the assessment of ASHRAE Standard 90.1–2016, for CRACs, this assessment has been complicated because the current standards established in 10 CFR 431.97 are specified in terms of SCOP and based on the rating conditions in ANSI/

ASHRAE 127–2007, while the efficiency levels for CRACs set forth in ASHRAE Standard 90.1–2019 are specified in terms of NSenCOP and based on rating conditions in AHRI 1360–2017. While EPCA does not expressly state how DOE is to consider a change to an ASHRAE efficiency metric, DOE is guided by the criteria established under EPCA for the evaluation of amendments to the test procedures referenced in ASHRAE Standard 90.1. For ASHRAE equipment under 42 U.S.C. 6313(a)(6)(A)(i), EPCA directs that if the applicable test procedure referenced in ASHRAE Standard 90.1 is amended, DOE must amend the Federal test procedure to be consistent with the amended industry test procedure, unless DOE makes a determination, supported by clear and convincing evidence, that to do so would result in a test procedure that is not reasonably designed to provide results representative of use during an average use cycle, or is unduly burdensome to conduct. (42 U.S.C. 6314(a)(4)(B)) In evaluating an update to an industry test procedure referenced in ASHRAE Standard 90.1, DOE must also consider any potential impact on the measured energy efficiency as compared to the current Federal test procedure and in the context of the current Federal standard. (42 U.S.C. 6314(a)(4)(C) and 42 U.S.C. 6293(e))

As discussed in section II.A.1 of this document, the rating conditions in AHRI 1360–2016 and AHRI 1360–2017 differ from those specified in ANSI/ASHRAE 127–2007 (the industry standard referenced in the current DOE test procedure for CRACs) for most CRAC equipment classes. As part of the analysis for the September 2019 NODA/RFI, DOE conducted a crosswalk analysis for the classes affected by rating condition changes to determine whether the ASHRAE Standard 90.1–2016 levels in terms of NSenCOP and determined according to AHRI 1360–2016 are more stringent than DOE's current standards in terms of SCOP and determined according to ANSI/ASHRAE 127–2007. 84 FR 48006, 48014–48022 (Sept. 11, 2019). Because the rating conditions specified in AHRI 1360–2017 and AHRI 1360–2016 are the same for the classes covered by the crosswalk (upflow ducted, upflow non-ducted, and downflow), the same crosswalk as described in the September 2019 NODA/RFI can be used to compare DOE's current SCOP-based CRAC standards to the NSenCOP values in ASHRAE Standard 90.1–2019 (determined according to AHRI 1360–2017), in order to perform the current analysis required by EPCA. Section II.A.1 of this document includes a detailed discussion of the differences in rating conditions between DOE's current test procedure for CRACs (which references ANSI/ASHRAE 127–2007), AHRI 1360–2016, and AHRI 1360–2017.

The crosswalk allows DOE to determine whether any of the levels specified in the updated ASHRAE Standard 90.1 are more stringent than the current DOE standards; any such levels would be considered ''amended'' for the purpose of the evaluation required by EPCA. To the extent that the crosswalk identifies amended standards (*i.e.,* ASHRAE Standard 90.1 levels more stringent than the Federal standards), the crosswalk also allows DOE to conduct an analysis of the energy savings potential of amended standards, also as required by EPCA. (42 U.S.C. 6313(a)(6)(A)(i)) Additionally, in order to make the required determination of whether adoption of a uniform national standard more stringent than the amended ASHRAE Standard 90.1 level is technologically feasible and economically justified (42 U.S.C. 6313(a)(6)(A)(ii)), DOE must understand the relationship between the current Federal standard and the corresponding ASHRAE Standard 90.1 efficiency level. Finally, for any standard that DOE does not make more stringent because the Federal standard is already more stringent than the ASHRAE Standard 90.1 level and where more-stringent levels are not justified (under the 6-year-lookback), DOE must express these levels in terms of the new efficiency metric so as to be consistent with the relevant industry test procedure (42 U.S.C. 6314(a)(4)).

1. Methodology for Efficiency and Capacity Crosswalk Analyses

a. General

DOE performed an efficiency crosswalk analysis to compare the stringency of the current Federal standards (represented in terms of SCOP based on the current DOE test procedure) for CRACs to the stringency of the efficiency levels for this equipment in ASHRAE Standard 90.1–2019 (represented in terms of NSenCOP and based on AHRI 1360–2017). The rating conditions for upflow ducted, upflow non-ducted, and downflow equipment classes specified in AHRI 1360–2017 are the same as in AHRI 1360–2016, so for these classes, the same crosswalk can relate SCOP levels measured according to ANSI/ASHRAE 127–2007 to NSenCOP levels measured according to either the 2016 or 2017 editions of AHRI 1360. Therefore, the crosswalk methodology and resulting ''crosswalked'' levels of the current Federal standards used in this NODA/RFI are the same as those presented in the September 2019 NODA/RFI (*i.e.,* the methodology and resulting levels used to compare the current Federal standards to the levels in ASHRAE Standard 90.1–2016; *see* 84 FR 48006, 48014–48019 (Sept. 11, 2019)). Because ASHRAE Standard 90.1–2019 added classes for air-cooled CRACs with fluid economizers, DOE also presents in this NODA/RFI crosswalked levels for the 9 air-cooled with fluid economizer classes currently being made subject to Federal standards. However, the crosswalk results for these classes are the same as the results for corresponding classes for air-cooled CRACs without fluid economizers, because: (1) These classes are subject to the same current Federal standards as air-cooled CRACs without fluid economizers; and (2) per AHRI 1360–2017, air-cooled units with fluid economizers are not tested differently than units without fluid economizers.

DOE received several comments in response to the September 2019 NODA/RFI addressing DOE's crosswalk methodology. AHRI stated that it agrees with DOE's crosswalk methodology and analysis, with only slight discrepancies in some of the percentages. However, AHRI also stated that the efficiency levels in ASHRAE 90.1–2019, which were developed by AHRI and DOE, resolve the shortcomings that AHRI stated were in the crosswalk presented in the September 2019 NODA/RFI. (AHRI, No. 7 at p. 4) [16] The CA IOUs commented that they support DOE's crosswalk analysis. (CA IOUs, No. 6 at p. 2) Similarly, Trane commented that it generally agrees with the high-level methodology in DOE's crosswalk analysis. (Trane, No. 5 at p. 1) Trane also commented that cooling capacity alone must be compared when determining if backsliding has occurred, as opposed to what minimum SCOP requirement was previously required for that individual unit. Trane further stated that CRACs can achieve higher cooling capacities with smaller box sizes and less power input at the test conditions specified in AHRI 1360 as compared to DOE's current test procedure. (Trane, No. 5 at p. 2) In response to Trane, while the measured NSCC will be higher for models in certain equipment classes when tested

[16] DOE identifies comments received in response to the September 2019 NODA/RFI and placed in Docket No. Docket EERE–2017–BT–STD–0017 by the commenter, the number of the comment document as listed in the docket maintained at *http://www.regulations.gov,* and the page number of that document where the comment appears (for example: AHRI, No. 7 at p. 4).

to AHRI 1360–2016 or AHRI 1360–2017 as compared to when tested to ANSI/ASHRAE 127–2007, DOE specifies minimum standards in terms of energy efficiency, not cooling capacity. Therefore, DOE's analysis to determine if the ASHRAE Standard 90.1 levels constitute backsliding must compare the stringency of the current Federal SCOP standards to the NSenCOP levels in ASHRAE Standard 90.1. As discussed later in this section, DOE also performed a ''capacity crosswalk'' analysis to translate the capacity boundaries for certain equipment classes, because some CRACs would switch classes (*i.e.,* move into a higher capacity equipment class) if the equipment class boundaries are not changed accordingly. Such switching of classes has the potential to subject existing CRACs to lower standards (which could raise concerns vis-à-vis EPCA's anti-backsliding provision at 42 U.S.C. 6313(a)(6)(B)(iii)(I)). Based on these comments, for this NODA/RFI, DOE did not make any changes to the methodology of the efficiency or capacity crosswalks presented in the September 2019 NODA/RFI.

For the efficiency crosswalk, DOE analyzed the CRAC equipment classes in ASHRAE Standard 90.1–2019 that are currently subject to Federal standards (*i.e.,* all upflow and downflow classes).[17] ASHRAE Standard 90.1–2019 includes separate sets of efficiency levels for upflow ducted and upflow non-ducted CRACs to reflect the differences in rating conditions for upflow ducted and upflow non-ducted units in AHRI 1360–2017 (*e.g.,* return air temperature and external static pressure (ESP)). The current Federal test procedure does not specify different rating conditions for upflow ducted as compared to upflow non-ducted CRACs, and DOE's current standards set forth in 10 CFR 431.97 do not differentiate between upflow ducted and upflow non-ducted CRACs. For the purpose of the efficiency crosswalk analysis, DOE converted the single set of current Federal SCOP standards for all upflow CRACs to sets of ''crosswalked'' NSenCOP levels for both the upflow ducted and upflow non-ducted classes included in ASHRAE Standard 90.1–2019.

Similarly, DOE's current standards set forth in 10 CFR 431.97 do not distinguish between air-cooled CRACs with and without fluid economizers, whereas ASHRAE Standard 90.1–2019 includes separate sets of efficiency levels for air-cooled CRACs with and without fluid economizers. Therefore, DOE converted the single set of current Federal standards for air-cooled classes in terms of SCOP to crosswalked standards in terms of NSenCOP for air-cooled classes both with and without fluid economizers. However, there is no difference between the rating conditions for air-cooled CRACs with and without fluid economizers in AHRI 1360–2017 so the crosswalk results are identical for these classes.

As explained previously, the levels for CRACs as updated in ASHRAE Standard 90.1–2019 rely on a different metric (NSenCOP) and test procedure (AHRI 1360–2017) than the metric and test procedure required under the Federal standards (SCOP and ANSI/ASHRAE 127–2007, respectively). AHRI 1360–2017 and ANSI/ASHRAE 127–2007 specify different rating conditions, which are listed in Table II–3.[18] AHRI 1360–2016 specifies the same rating conditions for these classes as AHRI 1360–2017.

TABLE II–3—DIFFERENCES IN RATING CONDITIONS BETWEEN DOE'S CURRENT TEST PROCEDURE AND AHRI STANDARD 1360–2017

Test parameter	Affected equipment categories	Current DOE test procedure (ANSI/ASHRAE 127–2007)		AHRI 1360–2017	
Return air dry-bulb temperature (RAT)	Upflow ducted and downflow	75 °F dry-bulb temperature		85 °F dry-bulb temperature.	
Entering water temperature (EWT)	Water-cooled	86 °F		83 °F	
ESP (varies with NSCC)	Upflow ducted	<20 kW	0.8 in H_2O	<65 kBtu/h	0.3 in H_2O.
		≥20 kW	1.0 in H_2O	≥65 kBtu/h and <240 kBtu/h.	0.4 in H_2O.
				≥240 kBtu/h and <760 kBtu/h.	0.5 in H_2O.
Adder for heat rejection fan and pump power (add to total power consumption).	Water-cooled and glycol-cooled	No added power consumption for heat rejection fan and pump.		5 percent of NSCC for water-cooled CRACs. 7.5 percent of NSCC for glycol-cooled CRACs.	

[17] ASHRAE Standard 90.1–2019 includes efficiency levels for horizontal-flow and ceiling-mounted classes of CRACs. DOE does not currently prescribe standards for horizontal-flow or ceiling-mounted classes, so these classes were not included in the crosswalk analysis.

[18] Pursuant to EPCA, DOE is conducting a separate evaluation of its current test procedure as compared to AHRI 1360–2017. (42 U.S.C. 6314(a)(4)(B)).

Additionally, in ASHRAE Standard 90.1–2019 (which references AHRI 1360–2017 as the test procedure for CRACs), the capacity boundaries for downflow and upflow-ducted CRAC equipment classes are increased relative to the boundaries of analogous classes in the current Federal standards (which references ANSI/ASHRAE 127–2007 for the test procedure). The capacity values that bound the CRAC equipment classes are in terms of NSCC. For certain equipment classes, NSCC values determined according to AHRI 1360–2017 are higher than the NSCC values determined according to ANSI/ASHRAE 127–2007 because of differences in the specified rating conditions. Because the test procedure in ASHRAE Standard 90.1–2019 results in an increased NSCC value for certain equipment classes, as compared to the NSCC measured in accordance with the current Federal test procedure requirement, some CRACs would switch classes (*i.e.,* move into a higher capacity equipment class) if the equipment class boundaries are not changed accordingly.[19]

As the equipment class capacity increases for upflow or downflow CRAC classes, the stringency of both the ASHRAE Standard 90.1 efficiency level and the current Federal standard decreases. As a result, class switching would subject some CRAC models to an efficiency level under ASHRAE Standard 90.1–2019 that is less stringent than the standard level that is applicable to that model under the current Federal requirements. Such result would be impermissible under EPCA's anti-backsliding provision at 42 U.S.C. 6313(a)(6)(B)(iii)(I).

To provide for an appropriate comparison between current Federal efficiency standards and the efficiency levels in ASHRAE Standard 90.1–2019, address potential backsliding, and evaluate the capacity boundaries in ASHRAE Standard 90.1–2019, a capacity crosswalk was conducted to adjust the NSCC boundaries that separate equipment classes in the Federal efficiency standards to account for the expected increase in measured NSCC values for affected equipment classes (*i.e.,* equipment classes with test procedure changes that increase NSCC). The capacity crosswalk calculated necessary increases in the capacity boundaries of affected equipment classes to prevent this equipment class switching issue and avoid potential backsliding that would occur if capacity boundaries were not adjusted.

Both the efficiency and capacity crosswalk analyses have a similar structure and the data for both analyses came from several of the same sources. The crosswalk analyses were informed by numerous sources, including public manufacturer literature, manufacturer performance data obtained through non-disclosure agreements (NDAs), results from DOE's testing of two CRAC units, and DOE's Compliance Certification Database for CRACs. DOE analyzed each test procedure change independently and used the available data to determine an aggregated percentage by which that change impacted efficiency (SCOP) and/or NSCC. Updated SCOP levels and NSCC equipment class boundaries were calculated for each class (as applicable) by combining the percentage changes for every test procedure change applicable to that class.

The following sub-sections describe the approaches used to analyze the impacts on the measured efficiency and capacity of each difference in rating conditions between DOE's current test procedure and AHRI 1360–2017. As discussed previously, the crosswalk analysis methodology described in the following sub-sections is the same as presented in the September 2019 NODA/RFI. No additional data sources were added to the analysis.

b. Increase in Return Air Dry-Bulb Temperature From 75 °F to 85 °F

ANSI/ASHRAE 127–2007, which is referenced by DOE's current test procedure, specifies a return air dry-bulb temperature (RAT) of 75 °F for testing all CRACs. AHRI 1360–2017 specifies an RAT of 85 °F for upflow ducted and downflow CRACs, but specifies an RAT for upflow non-ducted units of 75 °F. SCOP and NSCC both increase with increasing RAT for two reasons. First, a higher RAT increases the cooling that must be done for the air to approach its dew point temperature (*i.e.,* the temperature at which water vapor will condense if there is any additional cooling). Second, a higher RAT will tend to raise the evaporating temperature of the refrigerant, which in turn raises the temperature of fin and tube surfaces in contact with the air—the resulting reduction in the portion of the heat exchanger surface that is below the air's dew point temperature reduces the potential for water vapor to condense on these surfaces. This is seen in product specifications which show that the sensible heat ratio[20] is consistently higher at a RAT of 85 °F than at 75 °F. Because SCOP is calculated with NSCC, an increase in the fraction of total cooling capacity that is sensible cooling rather than latent cooling also inherently increases SCOP.

To analyze the impacts of increasing RAT for upflow ducted and downflow CRACs on SCOP and NSCC, DOE gathered data from three separate sources and aggregated the results for each crosswalk analysis. First, DOE used product specifications for several CRAC models that provide SCOP and NSCC ratings for RATs ranging from 75 °F to 95 °F. Second, DOE analyzed manufacturer performance data obtained under NDAs that showed the performance impact of individual test condition changes, including the increase in RAT. Third, DOE used results from testing two CRAC units: one air-cooled upflow ducted and one air-cooled downflow unit. DOE combined the results of these sources to find the aggregated increases in SCOP and NSCC due to the increase in RAT. The increase in SCOP due to the change in RAT was found to be approximately 19 percent, and the increase in capacity was found to be approximately 22 percent.

c. Decrease in Entering Water Temperature for Water-Cooled CRACs

ANSI/ASHRAE 127–2007, which is referenced by DOE's current test procedure, specifies an entering water temperature (EWT) of 86 °F for water-cooled CRACs, while AHRI 1360–2017 specifies an entering water temperature of 83 °F. A decrease in the EWT for water-cooled CRACs increases the temperature difference between the water and hot refrigerant in the condenser coil, thus increasing cooling capacity and decreasing compressor power. To analyze the impact of this decrease in EWT on SCOP and NSCC, DOE analyzed manufacturer data obtained through NDAs and a publicly-available presentation from a major CRAC manufacturer and calculated an SCOP increase of approximately 2 percent and an NSCC increase of approximately 1 percent.

d. Changes in External Static Pressure Requirements for Upflow Ducted CRACs

For upflow ducted CRACs, AHRI 1360–2017 specifies lower ESP requirements than ANSI/ASHRAE 127–

[19] This difference in capacity values might shift the boundaries between statutorily defined categories (*i.e.,* small, large and very large commercial package air conditioning and heating equipment), but would not impact which equipment is within scope of DOE's authority under these statutorily defined categories (*i.e.,* DOE has authority to regulate all small, large, and very large commercial package air conditioning and heating equipment).

[20] "Sensible heat ratio" is the ratio of sensible cooling capacity to the total cooling capacity. The total cooling capacity includes both sensible cooling capacity (cooling associated with reduction in temperature) and latent cooling capacity (cooling associated with dehumidification).

2007, which is referenced in DOE's current test procedure. The ESP requirements in all CRAC industry test standards vary with NSCC; however, the capacity bins (*i.e.,* capacity ranges over which each ESP requirement applies) in ANSI/ASHRAE 127–2007 are different from AHRI 1360–2017. Testing with a lower ESP decreases the indoor fan power input without a corresponding decrease in cooling capacity, thus increasing the measured efficiency. Additionally, the reduction in fan heat entering the indoor air stream that results from lower fan power also slightly increases NSCC.

To determine the impacts on measured SCOP and NSCC of the changes in ESP requirements between DOE's current test procedure and AHRI 1360–2017, DOE aggregated data from its analysis of fan power consumption changes, manufacturer data obtained through NDAs, and results from DOE testing. More details on each of these sources are included in the following paragraphs. The impact of changes in ESP requirements on SCOP and NSCC was calculated separately for each capacity range specified in AHRI 1360–2017 (*i.e.,* <65 kBtu/h, 65–240 kBtu/h, and ≥240 kBtu/h).

DOE conducted an analysis to estimate the change in fan power consumption due to the changes in ESP requirements using performance data and product specifications for 77 upflow CRAC models with certified SCOP ratings at or near the current applicable SCOP standard level in DOE's Compliance Certification Database. Using the certified SCOP and NSCC values, DOE determined each model's total power consumption for operation at the rating conditions specified in DOE's current test procedure. DOE then used fan performance data for each model to estimate the change in indoor fan power that would result from the lower ESP requirements in AHRI 1360–2017, and modified the total power consumption for each model by the calculated value. For several models, detailed fan performance data were not available, so DOE used fan performance data for comparable air conditioning units with similar cooling capacity, fan drive, and fan motor horsepower.

DOE also received manufacturer data (obtained through NDAs) showing the impact on efficiency and NSCC of the change in ESP requirements. Additionally, DOE conducted tests on an upflow-ducted CRAC at ESPs of 1 in. H_2O and 0.4 in. H_2O (the applicable ESP requirements specified in ANSI/ASHRAE 127–2007 and AHRI 1360–2017, respectively), and included the results of those tests in this analysis.

For each of the three capacity ranges for which ESP requirements are specified in AHRI AHRI 1360–2017, Table II–4 shows the approximate aggregated percentage increases in SCOP and NSCC associated with the decreased ESP requirements specified in AHRI 1360–2017 for upflow ducted units. As discussed previously, AHRI 1360–2016 specifies the same rating conditions for upflow ducted classes as AHRI 1360–2017.

TABLE II–4—PERCENTAGE INCREASE IN SCOP AND NSCC FROM DECREASES IN EXTERNAL STATIC PRESSURE REQUIREMENTS FOR UPFLOW DUCTED UNITS BETWEEN DOE'S CURRENT TEST PROCEDURE AND AHRI STANDARD 1360–2017

Net sensible cooling capacity range (kBtu/h) *		ESP requirements in DOE's current test procedure (ANSI/ASHRAE 127–2007) (in H_2O)	ESP requirements in AHRI 1360–2017 (in H_2O)	Approx. average percentage increase in SCOP	Approx. average percentage increase in NSCC
<65		0.8	0.3	7	2
≥65 to <240	** ≥65 to <68.2	0.8	0.4	*** 8	*** 2
	** ≥68.2 to <240	1			
≥240 to <760		1	0.5	6	2

* These boundaries are consistent with the boundaries in ANSI/ASHRAE 127–2007, AHRI 1360–2016, and AHRI 1360–2017, and do not reflect the expected capacity increases for upflow-ducted and downflow equipment classes at the AHRI 1360–2016 and AHRI 1360–2017 test conditions.

** 68.2 kBtu/h is equivalent to 20 kW, which is the capacity value that separates ESP requirements in ANSI/ASHRAE 127–2007, which is referenced in DOE's current test procedure.

*** This average percentage increase is an average across upflow ducted CRACs with net sensible cooling capacity ≥65 and <240 kBtu/h, including models with capacity <20 kW and ≥20 kW. DOE's Compliance Certification Database shows that most of the upflow CRACs with a net sensible cooling capacity ≥65 kBtu/h and <240 kBtu/h have a net sensible cooling capacity ≥20 kW.

As discussed in section II.A.1.a of this document, NSCC values determined according to ANSI/ASHRAE 127–2007 are lower than NSCC values determined according to AHRI 1360–2017 for certain CRAC classes, including upflow-ducted classes. The increase in NSCC also impacts the ESP requirements for upflow-ducted units in AHRI 1360–2017 because these requirements are specified based on NSCC. Differences in ESP requirements impact the stringency of the test. For the efficiency and capacity crosswalk analyses in this NODA, DOE used the adjusted capacity boundaries for upflow ducted classes presented in Table II–5 (as discussed in section II.A.1.f of this document) to specify the applicable ESP requirement in AHRI 1360–2017 (rather than using the capacity boundaries specified in AHRI 1360–2017) so that all CRACs within an equipment class would be subject to the same ESP requirement. The same methodology was used in the crosswalk analysis discussed in the September 2019 NODA/RFI.

e. Power Adder To Account for Pump and Heat Rejection Fan Power in NSenCOP Calculation for Water-Cooled and Glycol-Cooled CRACs

Energy consumption for heat rejection components for air-cooled CRACs (*i.e.,* condenser fan motor(s)) is measured in the industry test standards for CRACs; however, energy consumption for heat rejection components for water-cooled and glycol-cooled CRACs is not measured because these components (*i.e.,* water/glycol pump, dry cooler/cooling tower fan(s)) are not considered to be part of the CRAC unit. ANSI/ASHRAE 127–2007, which is referenced in DOE's current test procedure, does not include any factor in the calculation of SCOP to account for the power consumption of heat rejection components for water-cooled and glycol-cooled CRACs. In contrast, AHRI 1360–2017 specifies to increase the measured total power input for CRACs to account for the power consumption of fluid pumps and heat rejection fans. Specifically, Notes 2 and 3 to Table 3 of AHRI 1360–2017 specify to add a percentage of the measured NSCC (5 percent for water-cooled CRACs and 7.5 percent for glycol-cooled CRACs) in kW to the total power input used to calculate NSenCOP. DOE calculated the impact of these additions on SCOP using Equation 1:

$$SCOP_1 = \frac{SCOP}{1 + (x * SCOP)}$$

Equation 1

Where, *x* is equal to 5 percent for water-cooled CRACs and 7.5 percent for glycol-cooled CRACs, and $SCOP_1$ is the SCOP value adjusted for the energy consumption of heat rejection pumps and fans.

f. Calculating Overall Changes in Measured Efficiency and Capacity From Test Procedure Changes

Different combinations of the test procedure changes between DOE's current test procedure and AHRI 1360–2017 affect each of the CRAC equipment classes considered in the crosswalk analyses. To combine the impact on SCOP of the changes to rating conditions (*i.e.,* increase in RAT, decrease in condenser EWT for water-cooled units, and decrease of the ESP requirements for upflow ducted units), DOE multiplied together the calculated adjustment factors representing the measurement changes corresponding to each individual rating condition change, as applicable, as shown in Equation 2. These adjustment factors are equal to 100 percent plus the calculated percent change in measured efficiency.

To account for the impact of the adder for heat rejection pump and fan power for water-cooled and glycol-cooled units, DOE used Equation 3. Hence, DOE determined crosswalked NSenCOP levels corresponding to the current Federal SCOP standards for each CRAC equipment class using the following two equations.

$$NSenCOP_1 = SCOP * (1 + x_1) * (1 + x_2) * (1 + x_3)$$

Equation 2

$$NSenCOP = \frac{NSenCOP_1}{1 + (x_4 * NSenCOP_1)}$$

Equation 3

In these equations, $NSenCOP_1$ refers to a partially-crosswalked NSenCOP level that incorporates the impacts of changes in RAT, condenser EWT, and indoor fan ESP (as applicable), but not the impact of adding the heat rejection pump and fan power; x_1, x_2, and x_3 represent the percentage change in SCOP due to changes in RAT, condenser EWT, and indoor fan ESP requirements, respectively; and x_4 is equal to 5 percent for water-cooled equipment classes and 7.5 percent for glycol-cooled equipment classes. For air-cooled classes, x_4 is equal to 0 percent; therefore, for these classes, NSenCOP is equal to $NSenCOP_1$.

To combine the impact on NSCC of the changes to rating conditions, DOE used a methodology similar to that used for determining the impact on SCOP. To determine adjusted NSCC equipment class boundaries, DOE multiplied together the calculated adjustment factors representing the measurement changes corresponding to each individual rating condition change, as applicable, as shown in Equation 4. These adjustment factors are equal to 100 percent plus the calculated percent change in measured NSCC. In this equation, *Boundary* refers to the original NSCC boundaries (*i.e.,* 65,000 Btu/h, 240,000 Btu/h, or 760,000 Btu/h as determined according to ANSI/ASHRAE 127–2007), $Boundary_1$ refers to the updated NSCC boundaries as determined according to AHRI 1360–2017, and y_1, y_2, and y_3 represent the percentage changes in NSCC due to changes in RAT, condenser EWT, and indoor fan ESP requirements, respectively.

$$Boundary_1 = Boundary * (1 + y_1) * (1 + y_2) * (1 + y_3)$$

Equation 4

As mentioned previously, ASHRAE Standard 90.1–2019 includes adjusted equipment class capacity boundaries for only upflow-ducted and downflow equipment classes. The adjusted class ranges for these categories are <80,000 Btu/h, ≥80,000 Btu/h and <295,000 Btu/h, and ≥295,000 Btu/h. In previous versions of ASHRAE Standard 90.1, these ranges are <65,000 Btu/h, ≥65,000 Btu/h and <240,000 Btu/h, and ≥240,000 Btu/h. The capacity range boundaries for upflow non-ducted classes were left unchanged at 65,000 Btu/h and 240,000 Btu/h in ASHRAE Standard 90.1–2019. DOE's capacity crosswalk analysis indicates that the primary driver for increasing NSCC is increasing RAT. The increases in RAT in AHRI 1360–2017, as compared to ANSI/ASHRAE 127–2007, only apply to upflow ducted and downflow equipment classes. Based on the analysis performed for this document, DOE found that all the equipment class boundaries in ASHRAE Standard 90.1–2019, which are in increments of 5,000 Btu/h, are within 1.4 percent of the boundaries calculated from DOE's capacity crosswalk. As such, to more closely align DOE's analysis with ASHRAE Standard 90.1–2019, DOE has used the equipment class boundaries in ASHRAE Standard 90.1–2019 as the preliminary adjusted boundaries for the crosswalk analysis. Use of the equipment class boundaries from ASHRAE Standard 90.1–2019 allows for an appropriate comparison between the energy efficiency levels and equipment classes specified in ASHRAE Standard 90.1 and those in the current DOE standards, while addressing the backsliding potential discussed previously.

ASHRAE Standard 90.1–2019 does not include an upper capacity limit for coverage of CRACs. DOE's current standards are applicable only to CRACs with an NSCC less than 760,000 Btu/h, which is consistent with the statutory limits on DOE's authority.[21] 10 CFR 431.97(e). In order to account for all equipment currently subject to the Federal standards, DOE adjusted the 760,000 Btu/h equipment class boundary for certain equipment classes as part of its capacity crosswalk analysis. This adjustment to the upper boundary of the equipment classes applies only for downflow and upflow-ducted classes (the classes for which the RAT increase applies). Consistent with the adjustments made in ASHRAE Standard 90.1–2019, DOE averaged the cross-walked capacity results across the affected equipment classes, and rounded to the nearest 5,000 Btu/h. Following this approach, DOE has used 930,000 Btu/h as the adjusted upper capacity limit for downflow and upflow-ducted CRACs in the analysis presented in this notice. The 930,000 Btu/h upper capacity limit (as measured per AHRI 1360–2017) used in the crosswalk analysis is equivalent to the 760,000 Btu/h upper capacity limit (as measured per ANSI/ASHRAE 127–2007) established in the current DOE standards.

2. Crosswalk Results

The ''crosswalked'' DOE efficiency levels (in terms of NSenCOP) and adjusted equipment class capacity boundaries were then compared with the NSenCOP efficiency levels and capacity boundaries specified in ASHRAE Standard 90.1–2019 to determine whether the ASHRAE Standard 90.1–2019 requirements are more stringent than current Federal standards.

Table II–5 presents the preliminary results for the crosswalk analyses (see section II.A.1 of this document for detailed discussion of the methodology for the crosswalk analyses). The last column in the table, labeled ''Crosswalk Comparison,'' indicates whether the ASHRAE Standard 90.1–2019 levels are less stringent, equivalent to, or more stringent than the current Federal standards, based on DOE's analysis.

TABLE II–5—CROSSWALK RESULTS

Condenser system type	Airflow configuration	Current NSCC range (kBtu/h)	Current federal standard (SCOP)	Test procedure changes affecting efficiency *	Cross-walked NSCC range (kBtu/h)	Cross-walked current federal standard (NSenCOP)	ASHRAE standard 90.1–2019 NSenCOP level	Crosswalk comparison
Air-cooled	Downflow	<65	2.20	Return air dry-bulb temperature.	<80	2.62	2.70	More Stringent.
Air-cooled	Downflow	≥65 and <240	2.10		≥80 and <295	2.50	2.58	More Stringent.
Air-cooled	Downflow	≥240 and <760	1.90		≥295 and <930	2.26	2.36	More Stringent.
Air-cooled with fluid economizer.	Downflow	<65	2.20		<80	2.62	2.70	More Stringent.
Air-cooled with fluid economizer.	Downflow	≥65 and <240	2.10		≥80 and <295	2.50	2.58	More Stringent.
Air-cooled with fluid economizer.	Downflow	≥240 and <760	1.90		≥295 and <930	2.26	2.36	More Stringent.
Water-cooled	Downflow	<65	2.60	Return air dry-bulb temperature. Condenser entering water temperature. Add allowance for heat rejection components to total power input.	<80	2.73	2.82	More Stringent.
Water-cooled	Downflow	≥65 and <240	2.50		≥80 and <295	2.63	2.73	More Stringent.
Water-cooled	Downflow	≥240 and <760	2.40		≥295 and <930	2.54	2.67	More Stringent.

[21] In initially establishing standards CRACs, DOE noted that the energy efficiency levels from ASHRAE Standard 90.1 adopted as the Federal standards were based on ANSI/ASHRAE 127–2007. 77 FR 28928, 28945 (May 16, 2012). This includes the relevant capacity values. DOE notes further that EPCA provides a definition for ''very large commercial package air conditioning and heating equipment'' that encompasses such equipment rated at or above 240,000 Btu/h and less than 760,000 Btu/h. (42 U.S.C. 6311(8)(D)) Consequently, DOE does not have authority to set standards for models beyond the capacity range specified for this type of covered equipment.

TABLE II–5—CROSSWALK RESULTS—Continued

Condenser system type	Airflow configuration	Current NSCC range (kBtu/h)	Current federal standard (SCOP)	Test procedure changes affecting efficiency *	Cross-walked NSCC range (kBtu/h)	Cross-walked current federal standard (NSenCOP)	ASHRAE standard 90.1–2019 NSenCOP level	Crosswalk comparison
Water-cooled with fluid economizer.	Downflow	<65	2.55		<80	2.68	2.77	More Stringent.
Water-cooled with fluid economizer.	Downflow	≥65 and <240	2.45		≥80 and <295	2.59	2.68	More Stringent.
Water-cooled with fluid economizer.	Downflow	≥240 and <760	2.35		≥295 and <930	2.50	2.61	More Stringent.
Glycol-cooled	Downflow	<65	2.50	Add allowance for heat rejection components to total power input.	<80	2.43	2.56	More Stringent.
Glycol-cooled	Downflow	≥65 and <240	2.15		≥80 and <295	2.15	2.24	More Stringent.
Glycol-cooled	Downflow	≥240 and <760	2.10		≥295 and <930	2.11	2.21	More Stringent.
Glycol-cooled with fluid economizer.	Downflow	<65	2.45		<80	2.39	2.51	More Stringent.
Glycol-cooled with fluid economizer.	Downflow	≥65 and <240	2.10		≥80 and <295	2.11	2.19	More Stringent.
Glycol-cooled with fluid economizer.	Downflow	≥240 and <760	2.05		≥295 and <930	2.06	2.15	More Stringent.
Air-cooled	Upflow Ducted	<65	2.09	Return air dry-bulb temperature. ESP requirements.	<80	2.65	2.67	More Stringent.
Air-cooled	Upflow Ducted	≥65 and <240	1.99		≥80 and <295	2.55	2.55	Equivalent.
Air-cooled	Upflow Ducted	≥240 and <760	1.79		≥295 and <930	2.26	2.33	More Stringent.
Air-cooled with fluid economizer.	Upflow Ducted	<65	2.09		<80	2.65	2.67	More Stringent.
Air-cooled with fluid economizer.	Upflow Ducted	≥65 and <240	1.99		≥80 and <295	2.55	2.55	Equivalent.
Air-cooled with fluid economizer.	Upflow Ducted	≥240 and <760	1.79		≥295 and <930	2.26	2.33	More Stringent.
Water-cooled	Upflow Ducted	<65	2.49	Return air dry-bulb temperature. Condenser entering water temperature. ESP requirements. Add allowance for heat rejection components to total power input.	<80	2.77	2.79	More Stringent.
Water-cooled	Upflow Ducted	≥65 and <240	2.39		≥80 and <295	2.70	2.70	Equivalent.
Water-cooled	Upflow Ducted	≥240 and <760	2.29		≥295 and <930	2.56	2.64	More Stringent.
Water-cooled with fluid economizer.	Upflow Ducted	<65	2.44		<80	2.72	2.74	More Stringent.
Water-cooled with fluid economizer.	Upflow Ducted	≥65 and <240	2.34		≥80 and <295	2.65	2.65	Equivalent.
Water-cooled with fluid economizer.	Upflow Ducted	≥240 and <760	2.24		≥295 and <930	2.51	2.58	More Stringent.
Glycol-cooled	Upflow Ducted	<65	2.39	Return air dry-bulb temperature. ESP requirements. Add allowance for heat rejection components to total power input.	<80	2.47	2.53	More Stringent.
Glycol-cooled	Upflow Ducted	≥65 and <240	2.04		≥80 and <295	2.19	2.21	More Stringent.
Glycol-cooled	Upflow Ducted	≥240 and <760	1.99		≥295 and <930	2.11	2.18	More Stringent.
Glycol-cooled with fluid economizer.	Upflow Ducted	<65	2.34		<80	2.43	2.48	More Stringent.
Glycol-cooled with fluid economizer.	Upflow Ducted	≥65 and <240	1.99		≥80 and <295	2.14	2.16	More Stringent.
Glycol-cooled with fluid economizer.	Upflow Ducted	≥240 and <760	1.94		≥295 and <930	2.07	2.12	More Stringent.
Air-cooled	Upflow Non-Ducted.	<65	2.09	No changes	<65	2.09	2.16	More Stringent.
Air-cooled	Upflow Non-Ducted.	≥65 and <240	1.99		≥65 and <240	1.99	2.04	More Stringent.
Air-cooled	Upflow Non-Ducted.	≥240 and <760	1.79		≥240 and <760	1.79	1.89	More Stringent.
Air-cooled with fluid economizer.	Upflow Non-Ducted.	<65	2.09		<65	2.09	2.09	Equivalent.
Air-cooled with fluid economizer.	Upflow Non-Ducted.	≥65 and <240	1.99		≥65 and <240	1.99	1.99	Equivalent.
Air-cooled with fluid economizer.	Upflow Non-Ducted.	≥240 and <760	1.79		≥240 and <760	1.79	1.81	More Stringent.

TABLE II–5—CROSSWALK RESULTS—Continued

Condenser system type	Airflow configuration	Current NSCC range (kBtu/h)	Current federal standard (SCOP)	Test procedure changes affecting efficiency *	Cross-walked NSCC range (kBtu/h)	Cross-walked current federal standard (NSenCOP)	ASHRAE standard 90.1–2019 NSenCOP level	Crosswalk comparison
Water-cooled	Upflow Non-Ducted.	<65	2.49	Condenser entering water temperature. Add allowance for heat rejection components to total power input.	<65	2.25	2.43	More Stringent.
Water-cooled	Upflow Non-Ducted.	≥65 and <240	2.39		≥65 and <240	2.17	2.32	More Stringent.
Water-cooled	Upflow Non-Ducted.	≥240 and <760	2.29		≥240 and <760	2.09	2.20	More Stringent.
Water-cooled with fluid economizer.	Upflow Non-Ducted.	<65	2.44		<65	2.21	2.35	More Stringent.
Water-cooled with fluid economizer.	Upflow Non-Ducted.	≥65 and <240	2.34		≥65 and <240	2.13	2.24	More Stringent.
Water-cooled with fluid economizer.	Upflow Non-Ducted.	≥240 and <760	2.24		≥240 and <760	2.05	2.12	More Stringent.
Glycol-cooled	Upflow Non-Ducted.	<65	2.39	Add allowance for heat rejection components to total power input.	<65	2.03	2.08	More Stringent.
Glycol-cooled	Upflow Non-Ducted.	≥65 and <240	2.04		≥65 and <240	1.77	1.90	More Stringent.
Glycol-cooled	Upflow Non-Ducted.	≥240 and <760	1.99		≥240 and <760	1.73	1.81	More Stringent.
Glycol-cooled with fluid economizer.	Upflow Non-Ducted.	<65	2.34		<65	1.99	2.00	More Stringent.
Glycol-cooled with fluid economizer.	Upflow Non-Ducted.	≥65 and <240	1.99		≥65 and <240	1.73	1.82	More Stringent.
Glycol-cooled with fluid economizer.	Upflow Non-Ducted.	≥240 and <760	1.94		≥240 and <760	1.69	1.73	More Stringent.

* Refer to Table II–4 of this document for specific changes in rating conditions.

CRAC Issue 1: DOE requests comment on the methodology and results of the crosswalk analysis.

As indicated by the crosswalk, the standard levels established for CRACs in ASHRAE Standard 90.1–2019 are equivalent to the current Federal standards for 6 equipment classes, and are more stringent than the current Federal standards for all other equipment classes of CRACs. ASHRAE Standard 90.1–2019 also added 66 equipment classes of ceiling-mounted and horizontal-flow CRACs that did not require a crosswalk because there are currently no Federal standards for classes. ASHRAE Standard 90.1–2019 also incorporates shifted capacity bin boundaries for upflow ducted and downflow CRAC equipment classes. DOE's crosswalk analysis indicates that these updated boundaries appropriately reflect the increase in NSCC that results from the changes in test procedure adopted under ASHRAE Standard 90.1–2019 (as discussed in previous sections).

3. Discussion of Comments Received Regarding Amended Standards for CRACs

As mentioned in section I.C of this document, DOE published a description of a crosswalk comparing current Federal standards to the minimum efficiency levels in ASHRAE Standard 90.1–2016 and requested comment on the crosswalk methodology and results in the September 2019 NODA/RFI. 84 FR 48006, 48019 (Sept. 11, 2019). The crosswalk and resulting crosswalked levels of the current Federal standards (*i.e.,* current Federal standards translated to the NSenCOP metric for the purpose of comparison to ASHRAE Standard 90.1 levels) presented in the September 2019 NODA/RFI are the same as in this NODA/RFI because the test conditions specified in AHRI 1360–2016 and AHRI 1360–2017 are the same and the Federal standards were unchanged, so no additional changes to the crosswalk methodology were necessary. DOE received several comments in response to the September 2019 NODA/RFI addressing of DOE's crosswalk methodology and results.

In response to the September 2019 NODA/RFI, several stakeholders commented that DOE should not adopt the efficiency levels in ASHRAE Standard 90.1–2016 and should instead adopt the levels in the Second Public Review Draft of Addendum 'be' to ASHRAE Standard 90.1–2016 (''the second public review draft''),[22] which were subsequently included in ASHRAE Standard 90.1–2019. (AHRI, No. 7 at p. 3; Trane, No. 5 at p. 1) AHRI also commented that the levels in the second public review draft were generated by AHRI, discussed with DOE, and approved by the ASHRAE 90.1 committee to address all backsliding concerns from the ASHRAE Standard 90.1–2016 levels. AHRI further stated that the levels in the second public review draft are all equal to or greater than the DOE crosswalk values from the current Federal standard and would resolve their concerns over DOE's crosswalk findings presented in the September 2019 NODA/RFI. Specifically, AHRI stated that the levels in the second public review draft represent an increase in stringency by 3 to 5 percent from current Federal minimums for most equipment classes. AHRI recommended that DOE adopt new energy efficiency metrics for the national standards and revise capacity demarcations for relevant equipment classes to be published in the 2019 edition of ASHRAE Standard 90.1. (AHRI, No. 7 at pp. 2–4)

Trane commented that there have been no recent technological advancements for CRACs that would merit an increase of stringency in standards relative to the current efficiency levels (which are

[22] The second public review draft was published by ASHRAE in November 2018. The same levels were included in the subsequent ASHRAE Standard 90.1–2019, which did not publish until after the September 2019 NODA/RFI.

denominated in terms of SCOP), and, therefore, that the levels in ASHRAE Standard 90.1–2019 are the ''most stringent across of all the CRAC systems,'' in addition to being technically feasible and economically justified. (Trane, No. 5 at p. 1) The CA IOUs stated that the publication of ASHRAE Standard 90.1–2019 triggered DOE's statutory requirements to adopt those levels or more-stringent standards, and that the levels in ASHRAE Standard 90.1–2019 ensure that CRAC efficiency levels will be maintained or strengthened. (CA IOUs, No. 6 at pp. 2–3)

AHRI and Trane both recommended that DOE analyze and adopt the levels in ASHRAE Standard 90.1–2019 for all CRAC classes rather than amend efficiencies for only a small subset of products. (Trane, No. 5 at p. 2; AHRI, No. 7 at p. 7) Along these lines, AHRI cautioned that a ''no-new-standards'' decision for a subset of CRACs would ''create a serial rulemaking situation for this equipment.'' (AHRI, No. 7 at p. 7) The CA IOUs similarly encouraged DOE to move forward with an expanded energy conservation standards analysis for all equipment subject to the ASHRAE trigger, as well as the covered equipment classes subject to the six-year-lookback provision. CA IOUs also recommended that DOE not make the decision on whether efficiency levels above ASHRAE 90.1 levels can be justified for CRACs until all energy savings and cost-benefit analyses have been completed. (CA IOUs, No. 6 at p. 3)

In response to these comments, DOE notes that this NODA/RFI evaluates the efficiency levels for CRACs included in ASHRAE Standard 90.1–2019. Section III.F of this NODA/RFI includes discussion of DOE's consideration of standards more stringent than the levels in ASHRAE Standard 90.1–2019 for all CRAC equipment classes. Regarding AHRI's concern of a ''serial rulemaking,'' DOE notes that EPCA prescribes specific timing requirements. As discussed, this NODA/RFI evaluates potential standards pursuant to the ASHRAE trigger in EPCA (42 U.S.C. 6313(a)(6)(A)), as well as pursuant to the periodic lookback review required by EPCA (42 U.S.C. 6313(a)(6)(C)). While DOE has some flexibility to consolidate the reviews mandated by the two separate statutory obligations, EPCA prescribes the specific timing requirements.

In general, EPCA requires DOE conduct an evaluation of each class of covered equipment within six years following an amendment to the Federal standards. (42 U.S.C. 6313(a)(6)(C)(i)) For equipment classes evaluated pursuant to the 6-year-lookback and for which DOE determines amended standards are not justified, EPCA requires DOE to conduct a subsequent review within three years of such a determination. (42 U.S.C. 6313(a)(6)(C)(iii)(II)) As DOE has stated, it may decide in appropriate cases to simultaneously conduct an ASHRAE trigger rulemaking and a lookback rulemaking so as to address all classes of an equipment category at the same time (*see* 85 FR 8626, 8645 (Feb. 14, 2020), but DOE is still bound by the timeframes established in EPCA.

4. CRAC Standards Amended Under ASHRAE Standard 90.1–2019

As discussed, DOE has analyzed the updated CRAC efficiency levels in ASHRAE Standard 90.1–2019 for the purpose of satisfying the requirements of 42 U.S.C. 6313(a)(6)(A). DOE identified 48 equipment classes for which the ASHRAE Standard 90.1–2019 efficiency levels are more stringent than current DOE efficiency levels (expressed in NSenCOP, see the crosswalk results presented in section II.A.2 of this document), 6 equipment classes for which the ASHRAE Standard 90.1–2019 efficiency levels are equal to the current DOE efficiency levels, and 66 classes of CRACs for which standards are specified in ASHRAE Standard 90.1–2019 that are not currently subject to DOE's standards (*i.e.,* horizontal-flow and ceiling-mounted classes).

DOE was unable to obtain the market share data needed to disaggregate energy savings for the 6 air-cooled with fluid economizer equipment classes that currently have DOE standards (*i.e.,* upflow ducted, upflow non-ducted, and down-flow) and that DOE identified as having more-stringent standards under ASHRAE Standard 90.1–2019. Additionally, DOE lacked market share data to establish a market baseline for estimating energy savings potential for the 66 horizontal-flow or ceiling-mounted equipment classes. Thus, DOE conducted an energy savings analysis, presented in section III of this document, for 42 of the 48 CRAC classes that currently have DOE standards and that DOE identified as having more-stringent standards under ASHRAE Standard 90.1–2019.

B. Air-Cooled, Three-Phase, Small Commercial Package AC and HP (<65 K) Equipment

DOE's current standards for small three-phase, air-cooled, commercial package AC and HP (<65 K) equipment cover four equipment classes codified at 10 CFR 431.97, including both single package and split systems. The energy efficiency metric as measured under the DOE test procedure listed in Table 1 to 10 CFR 431.96 is SEER for all equipment types in cooling mode and HSPF for heat pumps operating in heating mode.

ASHRAE Standard 90.1–2019 adopted new energy efficiency levels for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment levels, as well as a metric change. The energy efficiency levels in ASHRAE Standard 90.1–2019 maintain the previous ASHRAE Standard 90.1–2016 levels until January 1, 2023. After this date, the levels for almost all equipment classes in ASHRAE Standard 90.1–2019 will align with Federal standards for air-cooled, single-phase, central air conditioners at 10 CFR 430.32(c)(5), which will also be effective on January 1, 2023. The one exception is the ASHRAE Standard 90.1–2019 energy efficiency level for three-phase space-constrained (S–C) heat pumps, which matches the SEER2 Federal standard for single-phase S–C air conditioners in cooling mode, rather than for single-phase S–C heat pumps in cooling mode. In aligning levels with single-phase central air conditioning standard, the efficiency rating metrics in ASHRAE 90.1–2019 change from SEER to SEER2 and HSPF to HSPF2 effective January 1, 2023.

As discussed, the current DOE test procedure at 10 CFR 431.96 for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment incorporates by reference ANSI/AHRI 210/240–2008. AHRI has recently published updated industry standards in AHRI 210/240–2017 (published in December 2017), as well as AHRI 210/240–2017 with Addendum 1 (published in April 2019). While ASHRAE Standard 90.1–2016 references AHRI 210/240–2008 with Addendum 1 and 2, ASHRAE Standard 90.1–2019 references AHRI 210/240–2017 for the period prior to January 1, 2023. The reference to AHRI 210/240–2017 does not include Addendum 1, which DOE believes was an oversight.

As part of the October 2018 TP RFI, DOE reviewed AHRI 210/240–2017 (with and without Addendum 1) and initially determined that it is consistent with AHRI 210/240–2008 and would not be expected to impact the measured efficiency of the subject equipment during a representative average use cycle as compared to the 2008 version. 83 FR 49501, 49503 (Oct. 2. 2018). Therefore, DOE determined that the pre-2023 levels in ASHRAE Standard 90.1–2019 based on AHRI 210/240–2017 are consistent with those levels in ASHRAE

Standard 90.1–2016 based on AHRI 210/240–2008 and do not constitute a change in efficiency levels that requires a crosswalk analysis.

For the period beginning January 1, 2023, ASHRAE Standard 90.1–2019 references AHRI 210/240–2023 (to align with updates to minimum efficiency standards that take effect on January 1, 2023). AHRI 210/240–2023, which published in May 2020, adopts the SEER2 and HSPF2 metrics and aligns with the test procedure for single-phase central air conditioners in DOE's test procedure at Appendix M1 to 10 CFR part 430, subpart B.

For the analysis of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment conducted for this NODA to assess whether the post-2023 levels in ASHRAE Standard 90.1–2019 are a change that triggers DOE review, DOE has applied the crosswalk from SEER to SEER2 (and HSPF to HSPF2 for heat pumps) developed for single-phase products switching to the SEER2 (and HSPF2 for heat pumps) metric. DOE will update the crosswalk as needed based on any separate test procedure rulemaking that DOE may conduct. The crosswalk methodology and results are discussed in the following section.

DOE also notes that ASHRAE Standard 90.1–2019 provides separate levels for small-duct high-velocity (SDHV) and S–C heat pumps, as did ASHRAE Standard 90.1–2013 and ASHRAE Standard 90.1–2016 [23] (using the nomenclature ''through the wall'' rather than space-constrained). In the notice of proposed rule preceding the July 2015 final rule, DOE stated that EPCA does not separate these equipment from other types of small commercial package air-conditioning and heating equipment in its definitions, and, therefore, EPCA's definition of ''small commercial package air conditioning and heating equipment'' includes SDHV and S–C heat pumps. 80 FR 1172, 1184 (Jan. 8, 2015). As the levels for those classes in ASHRAE Standard 90.1–2013 were lower than the Federal standards for the main classes, DOE concluded that it was not required to take action on those classes. *Id.* As DOE has previously determined that the pre-2023 levels for SDHV and S–C, which are equivalent to the ASHRAE Standard 90.1–2013 levels, constitute backsliding in relation to the Federal standards, DOE is now assessing whether the ASHRAE Standard 90.1–2019 post-2023 levels for SDHV and S–C equipment constitute an increase in stringency as compared to the current Federal standards for the broader equipment classes of single-package and split-system air conditioners and heat pumps. DOE notes that there are currently no three-phase SDHV or S–C air conditioners or heat pumps on the market.

1. Crosswalk Methodology and Results

Given the similarity of the changes occurring, DOE based its preliminary crosswalk analysis on the analysis conducted for single-phase residential central air conditioners and heat pumps switching from SEER and HSPF to SEER2 and HSPF2 in the January 6, 2017 Direct Final Rule for Residential Central Air Conditioners and Heat Pumps (January 2017 direct final rule) published in the **Federal Register**. 82 FR 1786, 1857–1858 (Jan. 6, 2017). The January 2017 direct final rule provides the adopted standard levels for single-phase central air conditioners and heat pumps in terms of SEER (and HSPF for heat pumps) and corresponding crosswalked SEER2 (and HSPF2 for heat pumps) values. 82 FR 1786, 1848–1849, Tables V–29 and V–30 (Jan. 6, 2017). For three-phase equipment classes with Federal standards matching SEER and HPSF standards in Table V–29 of the January 2017 direct final rule, DOE used the corresponding SEER2 and HSPF2 value from Table V–30 of the January 2017 direct final rule.

For three-phase equipment classes that did not have matching SEER values in Table V–29 of the January 2017 direct final rule, DOE evaluated the stringency of the ASHRAE Standard 90.1–2019 SEER2 levels relative to the Federal SEER standard by qualitatively assessing how the testing method changes made for single-phase equipment switching from SEER to SEER2 would impact three-phase equipment. For ducted equipment, the difference between Appendix M to 10 CFR part 430 (the pre-2023 test method) and Appendix M1 to 10 CFR part 430 (the post-2023 test method) that impacts measured energy use is an increase in external static pressure. For a given unit, the increase in external static pressure in the post-2023 test method leads to an increased measurement of unit energy consumption, resulting in a lower SEER2 rating (relative to the unit's comparable SEER rating). For SDHV equipment classes, the specified external static pressure is the same in both the pre-2023 and post-2023 test method. Consequently, for a given unit, there is no change between SEER and SEER2 rating.

For three-phase equipment classes that did not have matching HSPF values in Table V–29 of the January 2017 direct final rule, DOE also evaluated the stringency of the ASHRAE Standard 90.1–2019 HSPF2 levels relative to the Federal HSPF standard by qualitatively assessing how the testing method changes made for single-phase equipment switching from HSPF to HSPF2 would impact three-phase equipment. The primary difference between the pre-2023 test method and the post-2023 test method is a change in heating load line. For a given unit, the change in heating load line in the post-2023 test method leads to an increased measurement of unit energy consumption, resulting in a significantly lower HSPF2 rating (relative to the unit's comparable HSPF rating). DOE applied these changes in order to compare the current Federal HSPF to the ASHRAE Standard 90.1–2019 HSPF2.

The results of DOE's preliminary crosswalk are found Table II–6. The last column in the table, labeled ''Crosswalk Comparison,'' indicates whether the ASHRAE Standard 90.1–2019 levels beginning on January 1, 2023, are less stringent, equivalent to, or more stringent than the crosswalked Federal standards, based on DOE's analysis.

TABLE II–6—CROSSWALK RESULTS FOR AIR-COOLED, THREE-PHASE, SMALL COMMERCIAL PACKAGE AC AND HP (<65 K) EQUIPMENT

ASHRAE Standard 90.1–2019 equipment class	Current federal equipment class	Energy efficiency levels in ASHRAE Standard 90.1–2019	Federal energy conservation standard(s)	Cross-walked current federal standard(s)	Crosswalk comparison [1]
Air-cooled Air Conditioner, Three-Phase, Single-Package, <65,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Single-Package, <65,000 Btu/h.	14.0 SEER before 1/1/2023; 13.4 SEER2 on and after 1/1/2023.	14.0 SEER	13.4 SEER2	Equivalent.

[23] DOE notes that ASHRAE Standard 90.1–2016 did not amend levels relative to ASHRAE Standard 90.1–2013 for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

TABLE II–6—CROSSWALK RESULTS FOR AIR-COOLED, THREE-PHASE, SMALL COMMERCIAL PACKAGE AC AND HP (<65 K) EQUIPMENT—Continued

ASHRAE Standard 90.1–2019 equipment class	Current federal equipment class	Energy efficiency levels in ASHRAE Standard 90.1–2019	Federal energy conservation standard(s)	Cross-walked current federal standard(s)	Crosswalk comparison [1]
Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	13.0 SEER before 1/1/2023; 13.4 SEER2 on and after 1/1/2023.	13.0 SEER	<13.0 SEER2 [2]	More Stringent.
Air-cooled Heat Pump, Three-Phase, Single-Package, <65,000 Btu/h.	Air-cooled Heat Pump, Three-Phase, Single-Package, <65,000 Btu/h.	14.0 SEER/8.0 HSPF before 1/1/2023; 13.4 SEER2/6.7 HSPF on and after 1/1/2023.	14.0 SEER; 8.0 HSPF	13.4 SEER2; 6.7 HSPF2	Equivalent.
Air-cooled Heat Pump, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Heat Pump, Three-Phase, Split-System, <65,000 Btu/h.	14.0 SEER/8.2 HSPF before 1/1/2023; 14.3 SEER2/7.5 HSPF2 on and after 1/1/2023.	14.0 SEER; 8.2 HSPF	13.4 SEER2; <7.5 HSPF2 [3].	More Stringent.
Space-Constrained, Air-cooled Air Conditioner, Three-Phase, Single-Package, ≤30,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Single-Package, <65,000 Btu/h.	12.0 SEER before 1/1/2023; 11.7 SEER2 on and after 1/1/2023.	14.0 SEER	>11.7 SEER2 [4]	Less Stringent.
Space-Constrained, Air-cooled Air Conditioner, Three-Phase, Split-System, ≤30,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	12.0 SEER before 1/1/2023; 11.7 SEER2 on and after 1/1/2023.	13.0 SEER	>11.7 SEER2 [4]	Less Stringent.
Space-Constrained, Air-Cooled Heat Pump, Three-Phase, Single-Package, ≤30,000 Btu/h.	Air-cooled Heat Pump, Three-Phase, Single-Package, <65,000 Btu/h.	12.0 SEER/7.4 HSPF before 1/1/2023; 11.7 SEER2/6.3 HSPF2 on and after 1/1/2023.	14.0 SEER; 8.0 HSPF	>11.7 SEER2; [4] >6.3 HSPF2 [3].	Less Stringent.
Space-Constrained, Air-cooled Heat Pump, Three-Phase, Split-System, ≤30,000 Btu/h.	Air-cooled Heat Pump, Three-Phase, Split-System, <65,000 Btu/h.	12.0 SEER/7.4 HSPF before 1/1/2023; 11.7 SEER2/6.3 HSPF2 on and after 1/1/2023.	14.0 SEER; 8.2 HSPF	>11.7 SEER2; [4] >6.3 HSPF2 [3].	Less Stringent.
Small Duct High Velocity, Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Air Conditioner, Three-Phase, Split-System, <65,000 Btu/h.	12.0 SEER before 1/1/2023; 12.0 SEER2 on and after 1/1/2023.	13.0 SEER	13.0 SEER2	Less Stringent.
Small Duct, High Velocity, Air-cooled Heat Pump, Three-Phase, Split-System, <65,000 Btu/h.	Air-cooled Heat Pump, Three-Phase, Split-System, <65,000 Btu/h.	12.0 SEER/7.2 HSPF before 1/1/2023; 12.0 SEER2/6.1 HSPF2 on and after 1/1/2023.	14.0 SEER; 8.2 HSPF	14.0 SEER2; >6.1 HSPF2 [3].	Less Stringent.

[1] Column indicates whether the ASHRAE Standard 90.1–2019 levels beginning on January 1, 2023, are less stringent, equivalent to, or more stringent than the crosswalked Federal standards.
[2] The Federal SEER standard is lower than the ASHRAE Standard 90.1–2019 SEER2 level indicating that the crosswalked Federal SEER2 standard will also be lower than the ASHRAE Standard 90.1–2019 SEER2 level.
[3] For single-phase equipment, the decrease in HSPF2 compared to the equivalent HSPF is in the range of 1.1–1.3 points. 82 FR 1786, 1848–1849, Tables V–29 and V–30 (Jan. 6, 2017). We expect a similar relationship for three-phase equipment and use this to assess whether the crosswalked Federal standard HSPF2 value for a given HSPF value will be greater or less than the ASHRAE Standard 90.1–2019 HSPF2 level.
[4] For S–C equipment classes, there is a small increase in external static pressure between the testing methods for SEER and SEER2 which, for a given unit, decreases the SEER2 rating slightly compared to the equivalent SEER rating. Therefore, the crosswalked Federal SEER2 is expected to be significantly higher than the ASHRAE Standard 90.1–2019 level of 11.7 SEER2.

Based on DOE's preliminary crosswalk, two equipment classes have ASHRAE Standard 90.1–2019 levels that are more stringent that current Federal standards; two equipment classes are equivalent, and six equipment classes have ASHRAE Standard 90.1–2019 levels less stringent than the Federal standards.

DOE notes that although the post-2023 values for S–C and SDHV equipment are less stringent than current Federal standards for these equipment, DOE still intends to consider these ASHRAE classes separately in this rulemaking as part of the six-year-lookback review.

Three-Phase CAC/HP Issue 1: DOE requests feedback on its methodology for determining crosswalked SEER2 and HSPF2 values for three-phase equipment based on crosswalked values of single-phase residential central air conditioners.

III. Analysis of Standards Amended and Newly Established by ASHRAE Standard 90.1–2019

As required under 42 U.S.C. 6313(a)(6)(A), for CRAC and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment classes for which ASHRAE Standard 90.1–2019 specifies amended energy efficiency levels that are more stringent than the corresponding Federal energy conservation standards, DOE performed an analysis to determine the energy-savings potential of amending Federal standards to the amended ASHRAE levels as specified in ASHRAE Standard 90.1–2019. DOE's energy savings analysis is limited to equipment classes for which sufficient data are available. However, as discussed in section III.F of this document, DOE has tentatively determined that it lacks clear and convincing evidence that standards more stringent than the amended ASHRAE Standard 90.1 levels for either CRACs or air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment would result in significant additional energy savings because of uncertainty in estimated energy savings resulting from the change in energy efficiency metrics.

The following discussion provides an overview of the energy savings analysis conducted for 42 classes of CRACs and 2 classes of air-cooled, three-phase, small commercial package AC and HP (<65 K) as defined by ASHRAE Standard 90.1–2019, followed by summary results of that analysis. Although ASHRAE Standard 90.1–2019 included levels for horizontal flow and ceiling-mounted CRAC equipment classes (which currently do not have Federal standards), DOE was unable to find market data that could be used to establish a market baseline for these classes and, thus, estimate energy savings.

In addition to the specific issues identified in the following sections on which DOE requests comment, DOE requests comment on its overall approach and analyses used to evaluate potential standard levels for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K).

For the equipment classes where ASHRAE Standard 90.1–2019 specified more-stringent levels than the corresponding Federal energy conservation standard, DOE calculated the potential energy savings to the Nation associated with adopting ASHRAE Standard 90.1–2019 as the difference between a no-new-standards case projection (*i.e.,* without amended standards) and the ASHRAE Standard 90.1–2019 standards-case projection (*i.e.,* with adoption of ASHRAE Standard 90.1–2019 levels).

The national energy savings (NES) refers to cumulative lifetime energy savings for equipment purchased in a 30-year period that differs by equipment (*i.e.,* the compliance date differs by equipment class (*i.e.,* capacity) depending upon whether DOE is acting under the ASHRAE trigger or the 6-year-lookback (*see* 42 U.S.C. 6313(a)(6)(D)). In the standards case, equipment that is more efficient gradually replaces less-efficient equipment over time. This affects the calculation of the potential energy savings, which are a function of the total number of units in use and their efficiencies. Savings depend on annual shipments and equipment lifetime. Inputs to the energy savings analysis are presented in this document.

A. Annual Energy Use

The purpose of the energy use analysis is to assess the energy savings potential of different equipment efficiencies in the building types that utilize the equipment. DOE uses the annual energy consumption and energy-savings potential in the life-cycle cost (LCC) and payback period (PBP) analyses [24] to establish the savings in consumer operating costs at various equipment efficiency levels.

The Federal standard and ASHRAE Standard 90.1–2019 levels are expressed in terms of an efficiency metric or metrics. For each equipment class, this section describes how DOE developed estimates of annual energy consumption at the Federal baseline efficiency level and the ASHRAE Standard 90.1–2019 level. These annual unit energy consumption (UEC) estimates form the basis of the national energy savings estimates discussed in section III.E of this document.

1. Computer Room Air Conditioners

a. Equipment Classes and Analytical Scope

As noted previously in section II.A.4 of this document, DOE has conducted an energy savings analysis for the 42 CRAC classes that currently have both DOE standards and more-stringent standards under ASHRAE Standard 90.1–2019. DOE was unable to identify market data that would allow for disaggregating results for the six air-cooled with fluid economizer equipment classes with ASHRAE Standard 90.1–2019 levels more stringent than current Federal standards. Although ASHRAE Standard 90.1–2019 included levels for horizontal flow and ceiling-mounted equipment classes which currently are not subject to Federal standards, DOE was unable to identify market data that could be used to establish a market baseline for these classes in order to estimate energy savings. Based on information received in response to this document or otherwise identified, DOE may disaggregate these equipment classes in future analyses and analyze them separately.

In the May 2012 final rule, DOE conducted an energy analysis for 15 downflow CRAC equipment classes using a modified outside temperature bin analysis. 77 FR 28928, 28954 (May 16, 2012). For each air-cooled equipment class, DOE calculated fan energy and condensing unit power consumption at each 5 °F outdoor air dry-bulb temperature bin. The condensing unit power in this context included the compressor(s) and condenser fan(s) and/or pump(s) included as part of the equipment rating. For water-cooled and glycol-cooled equipment, the May 2012 final rule analysis first estimated the entering fluid temperature from either an evaporative cooling tower or a dry cooler for water-cooled and for glycol-cooled CRAC equipment, respectively, based on binned weather data. Using these results, DOE then estimated the condensing unit power consumption and adds to this the estimated supply fan power. The sum of the CRAC condensing unit power and the CRAC supply fan power is the estimated average CRAC total power consumption for each temperature bin. Annual estimates of energy use are developed by multiplying the power consumption at each temperature bin by the number of hours in that bin for each climate analyzed. In the May 2012 final rule, DOE then took a population-weighted average over results for 239 different climate locations to derive nationally representative CRAC annual energy use values. DOE assumed energy savings estimates derived for downflow equipment classes would be representative of upflow equipment. 77 FR 28928, 28954 (May 16, 2012). In this document, DOE is using the results from the May 2012 final rule as the basis for the energy savings potential analysis of the CRAC equipment classes analyzed for this document, similar to the methodology used in the September 2019 NODA/RFI.

b. Efficiency Levels

DOE analyzed the energy savings potential of adopting ASHRAE Standard 90.1–2019 levels for CRAC equipment classes that currently have a Federal standard and have an ASHRAE Standard 90.1–2019 standard more stringent than the current Federal standard. For each equipment class, energy savings are measured relative to the baseline (*i.e.,* the current Federal standard for that class).

c. Analysis Method and Annual Energy Use Results

For this analysis, DOE used a similar analysis to that presented in the September 2019 NODA/RFI. To derive UECs for the equipment classes analyzed in this document, DOE started with the adopted standard level UECs (*i.e.,* the current DOE standard) for downflow equipment classes analyzed in the May 2012 final rule. DOE assumed that these UECs correspond to the NSenCOP derived through the crosswalk analysis (*i.e.,* ''Cross-walked Current Federal Standard'' column in Table II–5). DOE determined the UEC for the ASHRAE Standard 90.1–2019 level by dividing the baseline NSenCOP level by the NSenCOP for the ASHRAE Standard 90.1–2019 level and multiplied the resulting percentage by the baseline UEC.

In the May 2012 final rule, DOE assumed energy savings estimates derived for downflow equipment classes would be representative of upflow equipment classes which differed by a fixed 0.11 SCOP. 77 FR 28928, 28954 (May 16, 2012). Because of the fixed 0.11 SCOP difference between upflow and downflow CRAC units in ASHRAE Standard 90.1–2013, DOE determined

[24] The purpose of the LCC and PBP analyses are to analyze the effects of potential amended energy conservation standards on commercial consumers of CRACs and air-cooled, three-phase, small commercial AC and HP (<65 K) by determining how a potential amended standard affects the commercial consumers' operating expenses (usually decreased) and total installed costs (usually increased).

that the per-unit energy savings benefits for corresponding CRACs at higher efficiency levels could be represented using the 15 downflow equipment classes. *Id.* However, in this analysis, the efficiency levels for the upflow non-ducted equipment classes do not differ from the downflow equipment class by a fixed amount. For this document, DOE assumed that the fractional increase/decrease in NSenCOP between upflow and downflow units corresponds to a proportional decrease/increase in the baseline UEC within a given equipment class grouping of condenser system and capacity.

In response to the September 2019 NODA/RFI, AHRI stated that DOE's proposed approach to determine the UEC of upflow units using the fractional increase or decrease in NSenCOP relative to the baseline downflow unit in a given equipment class grouping of condenser system and capacity was reasonable and an acceptable method to use. (AHRI, No. 7 at p. 5) Trane stated that return air conditions are becoming more likely to approach AHRI 1360 class 4 levels in response to increased use of High-Performance Computing models. At higher return temperatures, CRACs can avoid latent cooling and be more efficient. (Trane, No. 5 at p. 2) However, Trane stated that using the UECs derived for the 2012 rule might be the most workable option for evaluating the impact of proposed standards. (Trane, No. 5 at p. 2) After consideration of these comments, DOE has tentatively decided to maintain the same methodology in this document.

CRAC Issue 2: DOE seeks comment on its energy-use analysis methodology.

Table III–1 shows UEC estimates for the equipment classes triggered by ASHRAE Standard 90.1–2019 (*i.e.,* equipment classes for which the ASHRAE Standard 90.1–2019 energy efficiency level is more stringent than the current applicable Federal standard).

TABLE III–1—NATIONAL UEC ESTIMATES (kWh/Year) FOR CRAC SYSTEMS [1]

Condenser system type	Airflow configuration	Current net sensible cooling capacity	Current federal standard		ASHRAE Standard 90.1–2019	
			NSenCOP	UEC (kwh)	NSenCOP	UEC (kwh)
Air-cooled	Downflow	<65,000 Btu/h	2.62	27,411	2.70	26,599
		≥65,000 Btu/h and <240,000 Btu/h.	2.50	102,762	2.58	99,575
		≥240,000 Btu/h and <760,000 Btu/h.	2.26	246,011	2.36	235,587
	Upflow, ducted	<65,000 Btu/h	2.65	27,100	2.67	26,897
		≥240,000 Btu/h and <760,000 Btu/h.	2.26	247,104	2.33	238,620
	Upflow, non-ducted	<65,000 Btu/h	2.09	34,362	2.16	33,248
		≥65,000 Btu/h and <240,000 Btu/h.	1.99	129,097	2.04	125,933
		≥240,000 Btu/h and <760,000 Btu/h.	1.79	310,606	1.89	294,172
Water-cooled	Downflow	<65,000 Btu/h	2.73	24,726	2.82	23,850
		≥65,000 Btu/h and <240,000 Btu/h.	2.63	92,123	2.73	88,749
		≥240,000 Btu/h and <760,000 Btu/h.	2.54	208,727	2.67	198,564
	Upflow, ducted	<65,000 Btu/h	2.77	24,280	2.79	24,106
		≥240,000 Btu/h and <760,000 Btu/h.	2.56	207,096	2.64	200,821
	Upflow, non-ducted	<65,000 Btu/h	2.25	29,891	2.43	27,677
		≥65,000 Btu/h and <240,000 Btu/h.	2.17	112,169	2.32	104,433
		≥240,000 Btu/h and <760,000 Btu/h.	2.09	254,888	2.20	240,985
Water-cooled with fluid economizer.	Downflow	<65,000 Btu/h	2.68	15,443	2.77	14,885
		≥65,000 Btu/h and <240,000 Btu/h.	2.59	57,537	2.68	55,390
		≥240,000 Btu/h and <760,000 Btu/h.	2.50	129,787	2.61	123,819
	Upflow, ducted	<65,000 Btu/h	2.72	15,159	2.74	15,048
		≥240,000 Btu/h and <760,000 Btu/h.	2.51	128,753	2.58	125,259
	Upflow, non-ducted	<65,000 Btu/h	2.21	18,657	2.35	17,546
		≥65,000 Btu/h and <240,000 Btu/h.	2.13	70,022	2.24	66,271
		≥240,000 Btu/h and <760,000 Btu/h.	2.05	158,416	2.12	152,438
Glycol-cooled	Downflow	<65,000 Btu/h	2.43	24,671	2.56	23,419
		≥65,000 Btu/h and <240,000 Btu/h.	2.15	101,844	2.24	97,297
		≥240,000 Btu/h and <760,000 Btu/h.	2.11	227,098	2.21	215,794
	Upflow, ducted	<65,000 Btu/h	2.47	24,272	2.53	23,696
		≥65,000 Btu/h and <240,000 Btu/h.	2.19	99,975	2.21	98,618
		≥240,000 Btu/h and <760,000 Btu/h.	2.11	226,021	2.18	218,764

TABLE III–1—NATIONAL UEC ESTIMATES (kWh/Year) FOR CRAC SYSTEMS [1]—Continued

Condenser system type	Airflow configuration	Current net sensible cooling capacity	Current federal standard		ASHRAE Standard 90.1–2019	
			NSenCOP	UEC (kwh)	NSenCOP	UEC (kwh)
Glycol-cooled with fluid economizer.	Upflow, non-ducted	<65,000 Btu/h	2.03	29,679	2.08	28,823
		≥65,000 Btu/h and <240,000 Btu/h.	1.77	123,833	1.90	114,708
		≥240,000 Btu/h and <760,000 Btu/h.	1.73	275,668	1.81	263,483
	Downflow	<65,000 Btu/h	2.39	19,813	2.51	18,866
		≥65,000 Btu/h and <240,000 Btu/h.	2.11	81,668	2.19	78,312
		≥240,000 Btu/h and <760,000 Btu/h.	2.06	182,034	2.15	174,414
	Upflow, ducted	<65,000 Btu/h	2.43	19,567	2.48	19,094
		≥65,000 Btu/h and <240,000 Btu/h.	2.14	80,142	2.16	79,400
		≥240,000 Btu/h and <760,000 Btu/h.	2.07	182,034	2.12	176,882
	Upflow, non-ducted	<65,000 Btu/h	1.99	23,796	2.00	23,677
		≥65,000 Btu/h and <240,000 Btu/h.	1.73	99,135	1.82	94,232
		≥240,000 Btu/h and <760,000 Btu/h.	1.69	221,888	1.73	216,757

[1] The air-cooled, upflow ducted, >65,000 Btu/h and <240,000 Btu/h; water-cooled, upflow ducted, >65,000 Btu/h and <240,000 Btu/h; and water-cooled with fluid economizer, upflow ducted, >65,000 Btu/h and <240,000 Btu/h equipment classes are not included in this table, as the ASHRAE Standard 90.1–2019 levels for these equipment classes are equivalent to the current Federal standard.

2. Air-Cooled, Three-Phase, Small Commercial Package AC and HP (<65 K) Equipment

a. Equipment Classes and Analytical Scope

In response to the ASHRAE trigger at 42 U.S.C. 6313(a)(6)(A), DOE conducted an analysis of energy savings potential for two equipment classes of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment: (1) Air-cooled, three-phase, split-system air conditioners less than 65,000 Btu/h, and (2) air-cooled, three-phase, split-system heat pumps less than 65,000 Btu/h.

b. Efficiency Levels

DOE analyzed the energy savings potential of adopting the post-2023 ASHRAE Standard 90.1–2019 levels for air-cooled, three-phase, small commercial package AC and HP (<65 K) classes that currently have a Federal standard and have an ASHRAE Standard 90.1–2019 standard more stringent than current Federal standards. For each equipment class, energy savings are measured relative to the baseline (*i.e.,* current Federal standard for that class).

c. Annual Energy Use Results

The energy use analysis provides estimates of the annual energy consumption of air-cooled, three-phase, small commercial package AC and HP (<65 K), at the current Federal baseline and at the ASHRAE Standard 90.1–2019 level. To estimate the savings of the ASHRAE Standard 90.1–2019 level relative to the current Federal baseline, DOE used the cooling UECs that were developed for the same kind of split systems in the July 2015 final rule. 80 FR 42614, 42625 (July 17, 2015). The UECs in the July 2015 final rule came from the national impact analysis of a direct final rule for residential central air conditioners and heat pumps published June 27, 2011 (76 FR 37408) (June 2011 DFR), specifically the UECs for residential split-system equipment that were used in commercial buildings. (EERE–2011–BT–STD–0011–0011) In the July 2015 final rule, DOE accounted for variability by climate and building type by using estimates of the Full Load Equivalent Operating Hours (FLEOH) for cooling and heating equipment from a Pacific Northwest National Laboratory report.[25] In the July 2015 final rule, DOE reviewed the heating loads that were used to determine heating energy use for the June 2011 DFR and determined that the heating loads were small (less than 500 kWh/year) and, therefore, did not include any energy savings due to the increase in HSPF for this equipment in the July 2015 final rule. 80 FR 42614, 42625 (July 17, 2015). DOE maintained that approach to develop UECs in its current analysis for this rulemaking. The UECs for split-system air conditioners and split-system heat pumps are shown in Table III–2.

[25] See Appendix D of the 2000 Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment. (EERE–2006–STD–0098–0015).

TABLE III–2—UNIT ENERGY CONSUMPTION OF SPLIT-SYSTEM AIR CONDITIONERS AND HEAT PUMPS

Efficiency Level	Three-phase, air-cooled split-system air conditioners <65,000 Btu/h	Three-phase, air-cooled split-system heat pumps <65,000 Btu/h
	Annual Energy Use (kWh)	
Federal Baseline	2,701	2,660
ASHRAE Standard 90.1–2019	2614	2,502

Three-Phase CAC/HP Issue 2: DOE requests comment on its approach to estimate the energy use of air-cooled, three-phase, small commercial package AC and HP (<65 K).

B. Shipments

DOE uses shipment projections by equipment class to calculate the national impacts of standards on energy consumption, as well as net present value and future manufacturer cash flows. DOE shipments projections typically are based on available historical data broken out by equipment. Current sales estimates allow for a more accurate model that captures recent trends in the market.

1. Computer Room Air Conditioners

In the September 2019 NODA/RFI, DOE performed a ''bottom-up'' calculation to estimate CRAC shipments based on the cooling demand required from CRAC-cooled data centers. Where possible, DOE has incorporated data and information received in comments to that document to better inform its analysis. DOE's approach in this document estimates total annual shipments for the entire CRAC market and then uses market share data to estimate shipments for ASHRAE Standard 90.1–2019 triggered equipment classes.

DOE's shipments model first estimates the installed CRAC base stock by equipment size from information on data centers in the 2012 Commercial Business Energy Consumption Survey (CBECS).[26] CBECS identifies buildings that contain data centers, the number of servers in the data center, and associated square footage. CBECS does not specifically inquire about the presence of CRACs.

In the September 2019 NODA/RFI, DOE assumed any building identified as having a data center in CBECS 2012 that did not have a central chiller or district chilled water system would be serviced by a CRAC. DOE assumed that a building with a central chiller or district chilled water system would use a computer room air handler (CRAH) and not a CRAC for its data center cooling, and, thus, such building was not included in the analysis.[27] Additionally, DOE assumed buildings that contained 10 or more servers (but did not explicitly identify as having a data center) and did not have a central chiller or district chilled water system would also be serviced by CRAC units.

In response to the September 2019 NODA/RFI, DOE received a number of comments on DOE's assumptions for identifying data centers that would be serviced by CRACs. AHRI stated that DOE's methodology for using server count to identify data centers could be improved by using either counts by ''rack'' or estimates for ''kW per rack.''[28] (AHRI, No. 7 at p. 5) Trane recommended using the definitions of ''computer room'' in ASHRAE Standard 90.1, the International Energy Conservation Code (IECC), and the CFR, rather than use a threshold of 10 servers, to determine whether CRACs should be used for cooling. (Trane, No. 5 at p. 2) Regarding DOE's assumption that buildings with a central chiller or district water system would not utilize a CRAC, AHRI stated that edge computing centers[29] may use a chilled water system that may also use a CRAC for cooling. (AHRI, No. 7 at pgs. 6–7)

For this RFI/NODA, DOE adjusted its assumptions for identifying data centers in CBECS 2012 that would utilize CRACs. DOE is unable to use rack counts or ''kW per rack'' to identify data centers in CBECS 2012 because this information is not recorded in the survey. CBECS 2012 provides a variable as to whether or not the building has a data center. In this RFI/NODA, DOE assumed that any building with a data center, regardless of the building's main cooling system, would use a CRAC, in order to account for the use of CRACs in edge computing centers and to align with the ASHRAE Standard 90.1 definition of a ''computer room''.

CRAC Issue 3: DOE seeks comment on its methodology for identifying data centers within CBECS 2012.

After identifying buildings with data centers in CBECS 2012, DOE then estimated the CRAC cooling capacity required by estimating the total heat generated from servers, networks, and storage equipment within data centers. In the September 2019 NODA/RFI, DOE used estimates from the Lawrence Berkeley National Laboratory (LBNL) data center report to estimate average power consumption of volume servers, network equipment, and storage equipment.[30] Servers that were not in a data center were assumed to only have network equipment, while servers in a data center had both network and storage equipment, and thus a higher power draw.[31] DOE assumed 100 percent of the power draw was converted into heat exhaust that would need to be removed by a CRAC.

In comments in the September 2019 NODA/RFI, AHRI recommended using ASHRAE Datacom Series Book 2, ''IT Equipment Power Trends,'' third edition, published in 2018, which shows power consumption trends for all types of IT equipment through 2026. AHRI noted that that source is what the industry uses to estimate server power, expectations of future server stock, and energy use in many different types of data centers. (AHRI, No. 7 at p. 6) Trane also suggested using the same source for projecting future server power consumption. (Trane, No. 5 at p. 2)

In this analysis, DOE used estimates for server power draw for different IT applications matched to CBECS building type based on ASHRAE Datacom Series Book 2, ''IT Equipment Power Trends.''[32] For volume servers used in office buildings, DOE assumed a typical power consumption of 575 W based on the typical heat load for a business analytics 2U server.[33] For volume servers used in buildings identified as laboratories, DOE used a typical power consumption of 1150 W based on the typical heat load for a scientific computing 2U server. DOE used a multiplier of 1.265 to account for the heating load due to network devices connected to servers within the data center based on the LBNL data center report.[34] The LBNL data center report assigned mid-range and high-end servers, which have estimated power consumptions of 2 kW and 12 kW, respectively, to localized, mid-tier, and high-end data centers. To account for the higher cooling needs of these servers with high power consumption, DOE assumed that 1 percent of servers in CBECS 2012 were high end, and that 6 percent were mid-range. The LBNL data center report did not provide estimates of the high-end and mid-range server stock; however, it did provide estimates of total electricity consumption by server class. The high-end and mid-range classes represent about 30 percent of electricity consumption (when

[26] U.S. Department of Energy—Energy Information Administration, 2012 CBECS Survey Data (Last accessed March 9, 2020) (Available at: *https://www.eia.gov/consumption/commercial/data/2012/*). This is the most recent release of CBECS.

[27] A ''CRAH'' is a specialized air handling unit designed for use in data centers with an internal cooling coil supported by centralized chilled water system. In contrast, CRACs contain a cooling coil filled with a refrigerant.

[28] Server racks are racks designed to hold and organize multiple servers and supporting information technology (IT) equipment. The amount of energy produced by a server rack can be measured in terms of kW per rack.

[29] ''Edge'' data centers are small-scale data centers built closer to the end user, thereby reducing the time it takes for a server to respond to a user's request.

[30] Shehabi, A., Smith, S.J., Horner, N., Azevedo, I., Brown, R., Koomey, J., Masanet, E., Sartor, D., Herrlin, M. and Lintner, W., *United States data center energy usage report* (2016), Lawrence Berkeley National Laboratory, LBNL–1005775 (Available at: *https://datacenters.lbl.gov/sites/all/files/DataCenterEnergyReport2016_0.pdf*) (Last accessed June 6, 2019).

[31] *Id.*

[32] ASHRAE, *IT Equipment Power Trends,* Third Edition, ASHRAE Datacom Series: Book 2 (2018).

[33] In Table 4.4 of the ASHRAE *IT Equipment Power Trends* book, an example of the server heat by workload is given. 575 W represents the workloads for analytics, storage, and visualization and audio. 550 Watts is the workload for business processing. In non-scientific buildings, these workloads are likely the most common. Therefore, DOE used 575 W for the servers in most data centers.

[34] Shehabi, A., Smith, S.J., Horner, N., Azevedo, I., Brown, R., Koomey, J., Masanet, E., Sartor, D., Herrlin, M. and Lintner, W., *United States data center energy usage report* (2016), Lawrence Berkeley National Laboratory, LBNL–1005775 (Available at: *https://datacenters.lbl.gov/sites/all/files/DataCenterEnergyReport2016_0.pdf)* (Last accessed June 6, 2019).

removing unbranded servers, which are used in hyperscale data centers that are not considered in this report as they do not used CRACs). By assigning 1 percent of the servers in CBECS to high-end and 6 percent to mid-range, the total CRAC cooling required by those servers is approximately 30 percent of the total calculated for all CBECS data centers.

In the September 2019 NODA/RFI, DOE calculated the cooling load for each data center by multiplying the total server power draw by the number of servers in each CBECS-identified building and then applying an oversize factor of 1.3. Research has shown that oversizing of the cooling load gives the data center operator the flexibility to add more servers (and thus more heat) without having to increase the size of the cooling system.[35] 84 FR 48006, 48028 (Sept. 11, 2019).

In response to the September 2019 NODA/RFI, Trane stated that redundant or oversized units, if used, would be closely tied to specific needs of the system they are cooling, so the commenter does not recommend using broad assumptions for CRAC oversizing. (Trane, No. 5 at p. 2) AHRI stated that DOE is likely overestimating energy use by using an oversize factor and recommended DOE not oversize equipment in its energy use analysis. (AHRI, No. 7 at p. 5) Based on information gathered by Red Car Analytics, the CA IOUs stated that oversizing factors of 20 to 30 percent are common for CRACs. (CA IOUs, No. 6 at p. 3).

In response, DOE continues to believe that oversizing is occurring in data center settings, based upon the available literature and the comment of the CA IOUs. However, DOE is taking account of other commenters' suggestions that the Department's previous oversize factor of 1.3 may have been too high. Accordingly, for this analysis, based on AHRI's and Trane's comments, DOE has adjusted the oversizing factor to 1.2, consistent with the lower estimate provided by the CA IOUs.

CRAC Issue 4: DOE requests comment on its server power consumption estimates and any information or data on expectations of future server stock and energy use in small data centers.

One ton of cooling can remove 3.5 kW of heat from a space.[36] All data centers without central chillers were assumed to have CRACs, and the cooling capacity of the CRAC units were based on the three representative capacities analyzed in the May 2012 final rule. 77 FR 28928, 28954 (May 16, 2012). For CRACs with a cooling capacity of less than 65,000 Btu/h, a 3-ton unit was assigned as the representative capacity; cooling capacities from 65,000 Btu/h to 240,000 Btu/h were assigned a representative capacity of 11 tons, and air conditioners greater than or equal to 240,000 Btu/h and less than 760,000 Btu/h were assigned a 24-ton unit.

The final part of the stock methodology is estimating the redundancy requirements of the data center which reduces the per-unit energy use and increases the total estimated shipment of CRACs. Redundancy varies significantly across data centers, ranging from having one extra CRAC unit (N + 1 redundancy) to having complete redundancy (2N redundancy).[37]

In the September 2019 NODA/RFI, DOE assigned redundancy depending on the data center square footage provided in CBECS 2012. Categories 1–4 (data centers under 10,000 square feet) were given N + 1 redundancy; category 5 (greater than 10,000+ sq. ft.) was assigned 2N redundancy. DOE assumed that servers that were not in a data center do not have cooling redundancy. 84 FR 48006, 48028 (Sept. 11, 2019).

In response to the September 2019 NODA/RFI, AHRI stated that redundancy can be N + 1 or 2N, but argued that it will not be operational all the time. (AHRI, No. 7 at p. 5) Trane states that the level of redundancy is dependent on the size and need of the data center. (Trane, No. 5 at p. 2) The CA IOUs recommended DOE base the breakout between N + 1 and 2N redundancy on total load (with a cut-off of 50 cooling tons) and load density (with a cut-off of 100 watts/square foot (ft^2)). The CA IOUs suggested that load densities above this threshold would have higher redundancy. (CA IOUs, No. 6 at pp. 3–4).

Through a confidential data submission, AHRI provided DOE with a CRAC shipments time series from 2012–2018 and market shares broken out by the 30 Federal equipment classes. Accordingly, for this analysis, DOE calibrated the stock of CRACs in CBECS 2012 to an amount that would be equal to the number of 2012 shipments multiplied by the average lifetime of a CRAC (*i.e.,* 15 years). In this model, DOE assumed an N + 1 redundancy in this NODA/RFI for any data center that is larger than 1,501 square feet and has a cooling load that requires a CRAC that is larger than 65,000 Btu/h. All data centers with a cooling load less than 65,000 Btu/h were assigned one CRAC without redundancy. For buildings that had more than 20 servers but did not identify as having a data center in CBECS, a CRAC without redundancy was used, regardless of the cooling load. As DOE was able to calibrate shipments without using 2N redundancy, DOE did not consider those levels of redundancy in this analysis. As in the May 2012 final rule, DOE assumed the average sensible cooling load on a CRAC unit would be 65 percent of the unit's sensible capacity, factoring in operation of redundant CRAC units, oversizing, and the diversity in server loads.

In the September 2019 NODA/RFI, DOE estimated future CRAC shipments in the no-new standards case (*i.e.,* shipments in the absence of an amended standard) by estimating future cooling demand for CRAC-cooled data centers using projected trends in data center growth. DOE used two variables to change the future server stock: (1) A 10-percent reduction in the number of servers in small data centers in 2050 (the final year of the shipments period for that analysis) and (2) a doubling of the power per server by 2050. DOE then calculated the stock using the same approach used to calculate stock in 2012. DOE then used model counts from the CCMS database to determine market shares by equipment class. 84 FR 48006, 48028 (Sept. 11, 2019).

AHRI commented that DOE's total shipments estimates for 2012 were reasonable. (AHRI, No.7 at p. 6) However, AHRI argued that DOE estimates based on model counts in the CCMS database significantly overestimated shipments of the water-cooled and glycol-cooled equipment classes. (AHRI, No 7 at p. 3).

In this analysis, DOE used the confidential shipments data provided by AHRI to calibrate its shipment model to produce a revised breakdown by equipment class. DOE then used a stock turnover model to project shipments over the shipments analysis period assuming a constant annual growth in stock, calibrated using confidential shipments data provided by AHRI,

[35] Rasmussen, N., *Calculating Total Cooling Requirements for Data Centers—White paper 25. Schneider Electric* (Available at: *https://www.apcdistributors.com/white-papers/Cooling/WP-25%20Calculating%20Total%20Cooling%20Requirements%20for%20Data%20Centers.pdf*) (Last accessed June 6, 2019).

[36] Rasmussen, N., *Calculating Total Cooling Requirements for Data Centers—White paper 25. Schneider Electric* (Available at: *https://www.apcdistributors.com/white-papers/Cooling/WP-25%20Calculating%20Total%20Cooling%20Requirements%20for%20Data%20Centers.pdf*) (Last accessed June 6, 2019).

[37] Shehabi, A., Smith, S.J., Horner, N., Azevedo, I., Brown, R., Koomey, J., Masanet, E., Sartor, D., Herrlin, M. and Lintner, W., *United States data center energy usage report* (2016) Lawrence Berkeley National Laboratory, LBNL–1005775 (Available at: *https://datacenters.lbl.gov/sites/all/files/DataCenterEnergyReport2016_0.pdf*) (Last accessed June 6, 2019).

within a given cooling capacity equipment size. Total shipments are projected to grow slightly over the analysis period as shown in Table III–3.

TABLE III–3—ESTIMATED CRAC SHIPMENTS BY SCOP NET SENSIBLE COOLING CAPACITY

	<65,000 Btu/h	≥65,000 Btu/h and <240,000 Btu/h	≥240,000 Btu/h and <760,000 Btu/h	Total shipments
2020 Shipments	3,208	2,132	3,190	8,530
2052 Shipments	2,634	3,650	3,178	9,462

The AHRI market share data provided to DOE was broken out by the 30 currently defined Federal equipment classes. DOE assumed upflow market share would be evenly split between the upflow ducted and upflow non-ducted equipment classes. As the AHRI data does not include market share for horizontal-flow, ceiling-mounted, and air-cooled with fluid economizer CRAC equipment classes, DOE was unable to disaggregate savings for these classes.

CRAC Issue 5: DOE requests shipments data on horizontal-flow, ceiling-mounted, and air-cooled with fluid economizer CRAC equipment classes.

2. Air-Cooled, Three-Phase, Small Commercial Package AC and HP (<65 K) Equipment

DOE based shipments estimates for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment on the model developed for the July 2015 final rule. 80 FR 42614, 42629–42630 (July 17, 2015). As explained more fully in that document, shipments projections in the July 2015 final rule relied on four data sources: A 1999 estimate of shipments from the 2000 Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment (EERE–2006–STD–0098–0015), data from the U.S. Census Bureau for central AC and HP shipments (for both single-phase and three-phase equipment),[38] data from AHRI[39] (for both single-phase and three-phase equipment), and commercial floor space projections from the 2014 *Annual Energy Outlook* (*AEO 2014*).[40] The shipments model began with the 1999 estimates and projected shipments within 2000–2010 using the year-over-year growth rate from U.S. Census data. Shipments in 2011 shipments were estimated using the AHRI shipments data. From 2012 through 2049 (the end of the analysis period) shipments were based on the growth rate of commercial floor space from *AEO 2014.*

In the current analysis, DOE updated the shipments model in two ways: (1) The shipments estimates from 2012–2018 were updated using the growth rates from the most recent AHRI data,[41] and (2) the projections from 2019 through 2054 were based on the commercial floor space projections from *AEO 2020.*[42] The shipments estimates for the compliance year, end year, and select years in-between can be found in Table III–4.

TABLE III–4—SHIPMENTS OF SPLIT-SYSTEM, AIR-COOLED, THREE-PHASE, AIR CONDITIONERS AND HEAT PUMPS <65,000 BTU/H

Year	AC	HP
2025	116,300	35,045
2030	122,300	36,853
2035	128,503	38,721
2040	134,418	40,504
2045	140,464	42,326
2050	146,648	44,189
2054	151,704	45,713

Three-Phase CAC/HP Issue 3: DOE requests comment on it approach to estimate the shipments of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

C. No-New-Standards-Case Efficiency Distribution

The no-new-standards case efficiency distribution is used to establish the market share of each efficiency level in the case where there is no new or amended standard. DOE is unaware of available market data that reports CRAC efficiency in terms of NSenCOP that can be used to determine the no-new-standards case efficiency distribution. For this analysis, DOE relied on DOE's Compliance Certification Database for CRACs which reports efficiency in terms of SCOP. DOE applied the crosswalk methodology discussed in section II.A.1 of this document to translate each model's reported SCOP into NSenCOP.

DOE estimated the no-new-standards case efficiency distribution for each CRAC equipment class using model counts from DOE's Compliance Certification Database.[43] DOE calculated the fraction of models that are above the current Federal baseline and below the ASHRAE Standard 90.1–2019 level and assigned this to the Federal baseline. All models that are at or above that ASHRAE Standard 90.1–2019 are assigned to the ASHRAE level. The no-new-standard case distribution for CRACs can be found in Table III–5.

[38] U.S. Census Bureau, Current Industrial Reports for Refrigeration, Air Conditioning, and Warm Air Heating Equipment, MA333M (Available at: *http://www.census.gov/manufacturing/cir/historical_data/ma333m/index.html*).

[39] AHRI, HVACR & Water Heating Industry Statistical Profile (2012) (Available at: *http://www.ari.org/site/883/Resources/Statistics/AHRIIndustry-Statistical-Profile*). See also AHRI Monthly Shipments: *http://www.ari.org/site/498/Resources/Statistics/Monthly-Shipments;* especially December 2013 release: *http://www.ari.org/App_Content/ahri/files/Statistics/Monthly%20Shipments/2013/December2013.pdf;* May 2014 release: *http://www.ari.org/App_Content/ahri/files/Statistics/Monthly%20Shipments/2014/May2014.pdf.*

[40] 2014 *Annual Energy Outlook,* Energy Information Administration, Commercial Sector Key Indicators (Available at: *https://www.eia.gov/outlooks/aeo/data/browser/#/?id=5-AEO2014&cases=ref2014&region=0-0*).

[41] AHRI Historical Data: Central Air Conditioners and Heat Pumps (Available at: *http://ahrinet.org/Resources/Statistics/Historical-Data/Central-Air-Conditioners-and-Air-Source-Heat-Pumps*) (Last accessed July 9, 2020).

[42] 2020 *Annual Energy Outlook,* Energy Information Administration, Commercial Sector Key Indicators (Available at: *https://www.eia.gov/outlooks/aeo/data/browser/#/?id=5-AEO2020&cases=ref2020&sourcekey=0*).

[43] Available at: *https://www.regulations.doe.gov/certification-data/CCMS-4-Air_Conditioners_and_Heat_Pumps_-_Computer_Room_Air_Conditioners.html#q=Product_Group_s%3A%22Air%20Conditioners%20and%20Heat%20Pumps%20-%20Computer%20Room%20Air%20Conditioners%22.*

TABLE III–5—NO-NEW-STANDARDS CASE EFFICIENCY DISTRIBUTION FOR CRACS [1]

Condenser system type	Airflow configuration	Current net sensible cooling capacity	Federal baseline (%)	ASHRAE 90.1–2019 level (%)
Air-cooled	Downflow	<65,000 Btu/h	2	98
		≥65,000 Btu/h and <240,000 Btu/h	22	78
		≥240,000 Btu/h and <760,000 Btu/h	20	80
	Upflow, ducted	<65,000 Btu/h	0	100
		≥240,000 Btu/h and <760,000 Btu/h	4	96
	Upflow, non-ducted	<65,000 Btu/h	4	96
		≥65,000 Btu/h and <240,000 Btu/h	11	89
		≥240,000 Btu/h and <760,000 Btu/h	23	77
Water-cooled	Downflow	<65,000 Btu/h	11	89
		≥65,000 Btu/h and <240,000 Btu/h	15	85
		≥240,000 Btu/h and <760,000 Btu/h	24	76
	Upflow, ducted	<65,000 Btu/h	0	100
		≥240,000 Btu/h and <760,000 Btu/h	13	87
	Upflow, non-ducted	<65,000 Btu/h	11	89
		≥65,000 Btu/h and <240,000 Btu/h	21	79
		≥240,000 Btu/h and <760,000 Btu/h	27	73
Water-cooled with fluid economizer	Downflow	<65,000 Btu/h	2	98
		≥65,000 Btu/h and <240,000 Btu/h	13	87
		≥240,000 Btu/h and <760,000 Btu/h	38	62
	Upflow, ducted	<65,000 Btu/h	2	98
		≥240,000 Btu/h and <760,000 Btu/h	13	87
	Upflow, non-ducted	<65,000 Btu/h	8	92
		≥65,000 Btu/h and <240,000 Btu/h	16	84
		≥240,000 Btu/h and <760,000 Btu/h	20	80
Glycol-cooled	Downflow	<65,000 Btu/h	57	43
		≥65,000 Btu/h and <240,000 Btu/h	31	69
		≥240,000 Btu/h and <760,000 Btu/h	36	64
	Upflow, ducted	<65,000 Btu/h	20	80
		≥65,000 Btu/h and <240,000 Btu/h	6	94
		≥240,000 Btu/h and <760,000 Btu/h	30	70
	Upflow, non-ducted	<65,000 Btu/h	20	80
		≥65,000 Btu/h and <240,000 Btu/h	38	62
		≥240,000 Btu/h and <760,000 Btu/h	30	70
Glycol-cooled with fluid economizer	Downflow	<65,000 Btu/h	57	43
		≥65,000 Btu/h and <240,000 Btu/h	31	69
		≥240,000 Btu/h and <760,000 Btu/h	31	69
	Upflow, ducted	<65,000 Btu/h	10	90
		≥65,000 Btu/h and <240,000 Btu/h	8	92
		≥240,000 Btu/h and <760,000 Btu/h	33	67
	Upflow, non-ducted	<65,000 Btu/h	2	98
		≥65,000 Btu/h and <240,000 Btu/h	30	70
		≥240,000 Btu/h and <760,000 Btu/h	27	73

[1] The air-cooled, upflow ducted, >65,000 Btu/h and <240,000 Btu/h; water-cooled, upflow ducted, >65,000 Btu/h and <240,000 Btu/h; and water-cooled with fluid economizer, upflow ducted, >65,000 Btu/h and <240,000 Btu/h equipment classes are not included in this table, as the ASHRAE Standard 90.1–2019 levels for these equipment classes are equivalent to the current Federal standard.

CRAC Issue 6: DOE requests efficiency data for CRACs in terms of NSenCOP that can be used to estimate the no-new-standards case efficiency distribution.

For air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment, DOE estimated the market share of equipment at the current Federal baseline and the ASHRAE efficiency level using DOE's Compliance Certification Database. Table III–6 and Table III–7 show the model counts and their percentage by the Federal or the ASHRAE Standard 90.1–2019 efficiency level. The fraction of the market that meets or exceeds the ASHRAE Standard 90.1–2019 level is attributed to the ASHRAE Standard 90.1–2019 level.

TABLE III–6—NO-NEW-STANDARDS CASE EFFICIENCY DISTRIBUTION FOR SPLIT-SYSTEM AIR CONDITIONERS

EL	Model count	% by EL
Federal Baseline	10,268	23
ASHRAE 90.1–2019	34,580	77

TABLE III–7—NO-NEW-STANDARDS CASE EFFICIENCY DISTRIBUTION FOR SPLIT-SYSTEM HEAT PUMPS

EL	Model count	% by EL
Federal Baseline	6,438	57

TABLE III–7—NO-NEW-STANDARDS CASE EFFICIENCY DISTRIBUTION FOR SPLIT-SYSTEM HEAT PUMPS—Continued

EL	Model count	% by EL
ASHRAE 90.1–2019	4,858	43

For assessing the energy savings potential of adopting ASHRAE Standard 90.1–2019 levels, DOE assumed shipments at the Federal baseline efficiency would most likely roll up to the ASHRAE Standard 90.1–2019 level.

CRAC Issue 7: DOE seeks input on its determination of the no-new-standards case distribution of efficiencies for CRACs.

Three-Phase CAC/HP Issue 4: DOE seeks input on its determination of the no-new-standards case distribution of efficiencies for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

D. Other Analytical Inputs

1. Equipment Lifetime

DOE defines ''equipment lifetime'' as the age at which a unit is retired from service. For the September 2019 NODA/RFI, DOE used a 15-year lifetime for all CRAC equipment classes based on the lifetime used in the May 2012 final rule. 84 FR 48006. 48030 (Sept. 11, 2019) (*citing* the May 2012 final rule at 77 FR 28928, 28958 (May 16, 2012)). In response to the September 2019 NODA/RFI, AHRI and Trane agreed that 15 years was a reasonable average lifetime. (AHRI, No. 7 at p.7; Trane, No. 5 at p. 2) Accordingly, DOE maintains an equipment lifetime of 15 years for this analysis.

For the other set of equipment under consideration, DOE based equipment lifetime on a retirement function in the form of a Weibull probability distribution in its analysis of air-cooled, three-phase, small commercial package AC and HP (<65 K). A Weibull distribution is a probability distribution function that is commonly used to measure failure rates. Its form is similar to an exponential distribution, which would model a fixed failure rate, except that it allows for a failure rate that changes over time. DOE used a mean lifetime of 19 years for air conditioners and 16.2 years for heat pumps. These are the same values that were used in the July 2015 final rule. 80 FR 42614, 42627 (July 17, 2015).

Three-Phase CAC/HP Issue 5: DOE seeks comment on the approach of using a Weibull probability distribution with an average lifetime of 19 years for air conditioners and 16.2 years for heat pumps. DOE also requests data or information which can be used to inform the equipment lifetime for air-cooled, three-phase, small commercial package AC and HP (<65 K).

2. Compliance Dates and Analysis Period

If DOE were to prescribe energy conservation standards at the efficiency levels contained in ASHRAE Standard 90.1–2019, EPCA states that any such standard shall become effective on or after a date that is two or three years (depending on the equipment type or size) after the effective date of the applicable minimum energy efficiency requirement in the amended ASHRAE standard. (42 U.S.C. 6313(a)(6)(D)).

ASHRAE Standard 90.1–2019 does not list an effective date for CRAC levels. For estimating the energy savings potential of adopting ASHRAE Standard 90.1-levels, DOE assumed a compliance date of an amended Federal standard relative to the publication of ASHRAE Standard 90.1–2019 (*i.e.,* October 23, 2019).

For air-cooled, three-phase, small commercial package AC and HP (<65 K), ASHRAE Standard 90.1–2019 maintains ASHRAE Standard 90.1–2016 levels, which are consistent with the current Federal standards, until January 1, 2023, after which levels are changed, triggering DOE's review. DOE assumed a compliance date of an amended Federal standard relative to the effective date of January 1, 2023.

If DOE were to prescribe standards more stringent than the efficiency levels contained in ASHRAE Standard 90.1–2019, EPCA dictates that any such standard will become effective for equipment manufactured on or after a date which is four years after the date of publication of a final rule in the **Federal Register**. (42 U.S.C. 6313(a)(6)(D)) For equipment classes where DOE is acting under its 6-year lookback authority, if DOE were to adopt more-stringent standards, EPCA states that any such standard shall apply to equipment manufactured after a date that is the latter of the date three years after publication of the final rule establishing such standard or six years after the effective date for the current standard. (42 U.S.C. 6313(a)(6)(C)(iv)) However, as explained in sections III.F and IV of this document, DOE has tentatively concluded that it lacks the clear and convincing evidence that would be required to adopt more-stringent standard levels.

For purposes of calculating the national energy savings (NES) for the equipment in this evaluation, DOE used a 30-year analysis period starting with the assumed year of compliance listed in Table III–8 for equipment analyzed in this NODA/RFI. This is the standard analysis period of 30 years that DOE typically uses in its NES analysis. For equipment classes with a compliance date in the last six months of the year, DOE starts its analysis period in the first full year after compliance. For example, if CRACs less than 65,000 Btu/h were to have a compliance date of October 23, 2021, the analysis period for calculating NES would begin in 2022 and extend to 2051.

TABLE III–8—APPROXIMATE COMPLIANCE DATE OF AN AMENDED ENERGY CONSERVATION STANDARD FOR TRIGGERED EQUIPMENT CLASSES

Equipment class	Approximate compliance date for adopting the efficiency levels in ASHRAE Standard 90.1–2019
Computer Room Air Conditioners	
Equipment with current NSCC <65,000 Btu/h	10/23/2021
Equipment with current NSCC ≥65,000 and <240,000 Btu/h	10/23/2022

TABLE III–8—APPROXIMATE COMPLIANCE DATE OF AN AMENDED ENERGY CONSERVATION STANDARD FOR TRIGGERED EQUIPMENT CLASSES—Continued

Equipment class	Approximate compliance date for adopting the efficiency levels in ASHRAE Standard 90.1–2019
Equipment with current NSCC ≥240,000 Btu/h and <760,000 Btu/h	10/23/2022
Air-cooled, three-phase, small commercial package AC and HP (<65 K)	
All Equipment Classes	1/1/2025

E. Estimates of Potential Energy Savings

DOE estimated the potential site, primary, and full-fuel-cycle (FFC) energy savings in quads (*i.e.,* 10^{15} Btu) for adopting ASHRAE Standard 90.1–2019 within each equipment class analyzed. The potential energy savings of adopting ASHRAE Standard 90.1–2019 levels are measured relative to the current Federal standards. Table III–9 and Table III–10 show the potential energy savings resulting from the analyses conducted for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K), respectively. The reported energy savings are cumulative over the period in which equipment shipped in the 30-year analysis continues to operate.

TABLE III–9—POTENTIAL ENERGY SAVINGS OF ADOPTING ASHRAE STANDARD 90.1–2019 FOR CRACS [1]

Condenser system type	Airflow configuration	Current net sensible cooling capacity	ASHRAE efficiency level	Site savings	Primary savings	FFC savings
			NSenCOP	quads	quads	quads
Air-cooled	Downflow	<65,000 Btu/h	2.70	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.58	0.0011	0.0029	0.0030
		≥240,000 Btu/h and <760,000 Btu/h.	2.36	0.0071	0.0185	0.0193
	Upflow, ducted	<65,000 Btu/h	2.67	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.33	0.0001	0.0003	0.0003
	Upflow, non-ducted	<65,000 Btu/h	2.16	0.0000	0.0001	0.0001
		≥65,000 Btu/h and <240,000 Btu/h.	2.04	0.0003	0.0007	0.0008
		≥240,000 Btu/h and <760,000 Btu/h.	1.89	0.0014	0.0037	0.0039
Water-cooled	Downflow	<65,000 Btu/h	2.82	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.73	0.0001	0.0003	0.0003
		≥240,000 Btu/h and <760,000 Btu/h.	2.67	0.0003	0.0007	0.0008
	Upflow, ducted	<65,000 Btu/h	2.79	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.64	0.0000	0.0001	0.0001
	Upflow, non-ducted	<65,000 Btu/h	2.43	0.0001	0.0004	0.0004
		≥65,000 Btu/h and <240,000 Btu/h.	2.32	0.0002	0.0005	0.0006
		≥240,000 Btu/h and <760,000 Btu/h.	2.20	0.0001	0.0003	0.0003
Water-cooled with fluid economizer.	Downflow	<65,000 Btu/h	2.77	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.68	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.61	0.0001	0.0002	0.0002
	Upflow, ducted	<65,000 Btu/h	2.74	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.58	0.0000	0.0000	0.0000
	Upflow, non-ducted	<65,000 Btu/h	2.35	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.24	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.12	0.0000	0.0000	0.0000
Glycol-cooled	Downflow	<65,000 Btu/h	2.56	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.24	0.0001	0.0002	0.0002
		≥240,000 Btu/h and <760,000 Btu/h.	2.21	0.0001	0.0003	0.0003
	Upflow, ducted	<65,000 Btu/h	2.53	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.21	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.18	0.0000	0.0000	0.0000
	Upflow, non-ducted	<65,000 Btu/h	2.08	0.0000	0.0000	0.0000

TABLE III–9—POTENTIAL ENERGY SAVINGS OF ADOPTING ASHRAE STANDARD 90.1–2019 FOR CRACS [1]—Continued

Condenser system type	Airflow configuration	Current net sensible cooling capacity	ASHRAE efficiency level	Site savings	Primary savings	FFC savings
			NSenCOP	quads	quads	quads
		≥65,000 Btu/h and <240,000 Btu/h.	1.90	0.0001	0.0003	0.0003
		≥240,000 Btu/h and <760,000 Btu/h.	1.81	0.0000	0.0001	0.0001
Glycol-cooled with fluid economizer.	Downflow	<65,000 Btu/h	2.51	0.0000	0.0001	0.0001
		≥65,000 Btu/h and <240,000 Btu/h.	2.19	≤0.0003	0.0007	0.0007
		≥240,000 Btu/h and <760,000 Btu/h.	2.15	0.0009	0.0022	0.0023
	Upflow, ducted	<65,000 Btu/h	2.48	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	2.16	0.0000	0.0000	0.0000
		≥240,000 Btu/h and <760,000 Btu/h.	2.12	0.0002	0.0004	0.0004
	Upflow, non-ducted	<65,000 Btu/h	2.00	0.0000	0.0000	0.0000
		≥65,000 Btu/h and <240,000 Btu/h.	1.82	0.0003	0.0007	0.0008
		≥240,000 Btu/h and <760,000 Btu/h.	1.73	0.0001	0.0003	0.0003

[1] The air-cooled, upflow ducted, >65,000 Btu/h and <240,000 Btu/h; water-cooled, upflow ducted, >65,000 Btu/h and <240,000 Btu/h; and water-cooled with fluid economizer, upflow ducted, >65,000 Btu/h and <240,000 Btu/h equipment classes are not included in this table, as the ASHRAE Standard 90.1–2019 levels for these equipment classes are equivalent to the current Federal standard.

TABLE III–10—POTENTIAL ENERGY SAVINGS FOR AIR-COOLED, THREE-PHASE, SMALL COMMERCIAL PACKAGED AC AND HP

[<65 K]

	Split-system, air conditioner		Split-system, heat pump	
	ASHRAE efficiency Level	quads	ASHRAE efficiency level	quads
Site Energy Savings Estimate				
Level 0—ASHRAE	13.4 SEER2	0.0007	14.3 SEER2, 7.5 HSPF2	0.0017
Primary Energy Savings Estimate				
Level 0—ASHRAE	13.4 SEER2	0.0017	14.3 SEER2, 7.5 HSPF2	0.0044
FFC Energy Savings Estimate				
Level 0—ASHRAE	13.4 SEER2	0.0018	14.3 SEER2, 7.5 HSPF2	0.0047

F. Consideration of More-Stringent Energy Efficiency Levels

EPCA requires DOE to establish an amended uniform national standard for equipment classes at the minimum level specified in the amended ASHRAE Standard 90.1 unless DOE determines, by rule published in the **Federal Register**, and supported by clear and convincing evidence, that adoption of a uniform national standard more stringent than the amended ASHRAE Standard 90.1 for the equipment class would result in significant additional conservation of energy and is technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(I)–(II)) As discussed in the following paragraphs, because of uncertainty in estimated energy savings resulting from the change in energy efficiency metrics, DOE has tentatively determined that it lacks clear and convincing evidence that standards more stringent than the amended ASHRAE Standard 90.1 levels for either CRACs or air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment would result in significant additional energy savings.

For CRACs, further energy savings analysis would rely on market efficiency data in terms of the analyzed metric (*i.e.,* NSenCOP). In order to determine whether the adoption of an updated metric for CRACs in ASHRAE Standard 90.1 triggered DOE's obligation under EPCA, DOE was required to perform a crosswalk between the Federal energy conservation standards and the amended ASHRAE levels. (*See* 42 U.S.C. 6313(a)(6)(A)(i)) This crosswalk required only that DOE translate the efficiency levels between the metrics at the baseline levels, and not all efficiency levels currently represented in the market (*i.e.,* high efficiency levels). In addition, the analysis of the amended ASHRAE levels does not require analysis of higher efficiency models because DOE's analyses assume that a standards change only affects shipments with efficiency lower than the analyzed efficiency level (*i.e.,* ''roll-up'' shipments scenario). Additionally, as discussed in section II.A.3 of this document, DOE's crosswalk was used to confirm levels separately generated by AHRI for inclusion in ASHRAE Standard 90.1–2019 (*i.e.,* DOE was able to compare its crosswalk to the crosswalk conducted by industry).

An estimation of energy savings potentials of energy efficiency levels more stringent than the amended ASHRAE Standard 90.1 levels would require developing efficiency data for the entire market in terms of the NSenCOP metric. This much broader crosswalk would require DOE to translate the individual SCOP ratings to NSenCOP ratings for all models certified in DOE's CCMS Database. As the range of model efficiencies increases, so does the number of different technologies used to achieve such efficiencies. With this increase in variation, there is an increase in the potential for variation in the crosswalk results from the actual performance under the new metric of the analyzed models. As noted, there is limited market data regarding the performance of CRACs as represented according to the updated metric, and there is not a comparable industry analysis (*i.e.,* translating ratings to the updated metric for all models on the market) for comparison.

For air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment, ASHRAE Standard 90.1–2019 amended the applicable metric, and the amended standards that rely on the updated metric are intended to apply in 2023. As with the amended CRAC standards, DOE was required to conduct a crosswalk to compare the stringency levels of the Federal standards and the amended ASHRAE Standard 90.1–2019 efficiency levels to determine whether its obligation under EPCA to adopt amended ASHRAE Standard 90.1 efficiency levels was triggered. (42 U.S.C. 6313(a)(6)(A)(i)).

As with an analysis of the CRAC standards amended by ASHRAE Standard 90.1–2019, an analysis of standard levels more stringent than the amended standards in ASHRAE Standard 90.1 for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment) would require DOE to crosswalk the entire market for this equipment. As noted, the amended ASHRAE Standard 90.1–2019 levels for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment rely on updated metrics (*i.e.,* SEER2 and HSPF2), and they have the added issue that the amended ASHRAE Standard 90.1 efficiency levels in terms of the new SEER2 and HSPF2 metrics are not applicable until 2023. This future applicability date compounds the problem of a lack of market data.

As discussed in the October 2018 TP RFI for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment, such equipment is essentially identical to its single-phase residential counterparts, is manufactured on the same production lines, and is physically identical to their corresponding single-phase central air conditioner and heat pump models (with the exception of the electrical systems and compressors). 83 FR 49501, 49504 (Oct. 2, 2018). Single-phase central air conditioners are subject to new Federal standards based on SEER2 and HSPF2 beginning January 1, 2023. 10 CFR 430.32(c)(5)–(6). Currently, manufacturers are permitted to make representations under the SEER2 and HSPF2 representations metrics only if they certify to compliance to the 2023 standards. As a result, there is a lack of SEER2 and HSPF2 data available for single-phase central air conditioners and central air conditioning heat pumps, which if available may have provided for a certain level of assessment of the air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment market.

The market for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment has not responded to the change in the metrics, particularly given that ASHRAE Standard 90.1–2019 does not specify use of SEER2 and HSPF2 until 2023. Likewise, the closely related single-phase market has not yet fully responded to the amended Federal metrics and standards, for which manufacturers are not required to comply until 2023. Given the change in metrics and the future compliance dates of the ASHRAE Standard 90.1–2019 amendments, and the comparable changes to the Federal requirements for the closely related single-phase market, determination of max-tech levels and projections of market distribution according to efficiency levels have an increased degree of uncertainty.

As noted previously, EPCA provides that in order to adopt a standard more stringent than an amended ASHRAE Standard 90.1, DOE must determine, by rule published in the **Federal Register**, and supported by clear and convincing evidence, that adoption of a uniform national standard more stringent than the amended ASHRAE Standard 90.1 would result in significant additional conservation of energy and is technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(A)(ii)(II)) In the updated Process Rule, DOE reiterated the existing statutory requirement stating that the statutory threshold of ''clear and convincing evidence'' is a very high bar. 85 FR 8626, 8708 (Feb. 14, 2020). Clear and convincing evidence would exist only where the specific facts and data made available to DOE regarding a particular ASHRAE amendment demonstrates that there is no substantial doubt that a standard more stringent than that contained in the ASHRAE Standard 90.1 amendment is permitted because it would result in a significant additional amount of energy savings, is technologically feasible and economically justified. *Id.*

The lack of market data and the uncertainties in the market and technology projections regarding energy efficiency levels under the new metrics for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment create substantial doubt in any analysis of energy savings that would result from efficiency levels more stringent than the amended ASHRAE Standard 90.1–2019 levels for this equipment. Regardless of the results of any such analysis, the degree of uncertainty would create substantial doubt as to whether a standard more stringent than the ASHRAE Standard 90.1–2019 amendment would result in a significant additional amount of energy savings as required for DOE to establish more-stringent standards. As a result, DOE did not conduct an analysis of any associated energy savings for more-stringent standards for the subject equipment in this document.

CRAC Issue 8: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for CRACs would result in significant additional energy savings for classes for which DOE is triggered.

Three-Phase CAC/HP Issue 6: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for air-cooled, three-phase, small commercial package ACs and HPs (<65 K) would result in significant additional energy savings for classes for which DOE is triggered.

IV. Review Under Six-Year-Lookback Provisions: Requested Information

As discussed, DOE is required to conduct an evaluation of each class of covered equipment in ASHRAE Standard 90.1 every 6 years. (42 U.S.C. 6313(a)(6)(C)(i)) Accordingly, DOE is also evaluating the remaining 6 CRAC equipment classes and 8 air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment classes for which ASHRAE Standard 90.1–2019 did not increase the stringency of the standards. As explained in the February 2020 final rule updating DOE's Process Rule, EPCA applies the ''clear and convincing'' evidentiary threshold to both ASHRAE ''trigger'' and 6-year-lookback rulemakings. 85 FR 8626, 8647 (Feb. 14, 2020). Thus, when conducting a six-year look-back review, DOE may establish a uniform national standard more stringent than the corresponding ASHRAE Standard 90.1 level only upon a determination, supported by clear and convincing evidence, that such an amended Federal 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)(I) (*referencing* 42 U.S.C. 6313(a)(6)(B), which in turn references 42 U.S.C. 6313(a)(6)(A)(ii)(II)).

The 6 equipment classes of CRACs and 8 equipment classes of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment suffer from the same lack of data and market uncertainties resulting from the metric changes and future compliance dates as with the equipment classes for which DOE was triggered, as discussed in section III.F of this document. As such, any analysis of energy efficiency standards more stringent than the current levels would be subject to a degree of uncertainty that would create substantial doubt as to whether a standard more stringent than the current Federal standard would result in a significant additional amount of energy savings as required for DOE to establish more-stringent standards. Because DOE does not have sufficient data to meet the ''clear and convincing'' threshold, DOE did not conduct an energy savings analysis of standard levels more stringent than the current Federal standard levels for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment that were not amended in ASHRAE Standard 90.1–2019. See section III.F of this notice for further discussion of the consideration of energy efficiency levels more stringent than the ASHRAE Standard 90.1–2019 levels.

CRAC Issue 9: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for CRACs would result in significant additional energy savings for classes for which DOE is not triggered.

Three-Phase CAC/HP Issue 7: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for air-cooled, three-phase, small commercial package ACs and HPs (<65 K) would result in significant additional energy savings for classes for which DOE is not triggered.

V. Public Participation

A. Submission of Comments

DOE invites all interested parties to submit in writing by the date specified previously in the **DATES** section of this document, comments, data, and information on matters addressed in this document and on other matters relevant to DOE's consideration of amended energy conservation standards for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment. 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 http://www.regulations.gov. The *http://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. Following such instructions, 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 *http://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 *http://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 *http://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 *http://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 *http://www.regulations.gov.* If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information in a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies.

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.

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, postal mail, or hand delivery/courier 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. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) A description of the items, (2) whether and why such items are customarily treated as confidential within the industry, (3) whether the information is generally known by or available from other sources, (4) whether the information has previously been made available to others without obligation concerning its confidentiality, (5) an explanation of the competitive injury to the submitting person which would result from public disclosure, (6) when such information might lose its confidential character due to the passage of time, and (7) why disclosure of the information would be contrary to the public interest.

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).

DOE considers public participation to be a very important part of the process for developing energy conservation standards. DOE actively encourages the participation and interaction of the public during the comment period in each stage of the rulemaking process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the rulemaking process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this process or would like to request a public meeting should contact Appliance and Equipment Standards Program staff at (202) 287–1445 or via email at *ApplianceStandardsQuestions@ee.doe.gov.*

B. Issues on Which DOE Seeks Comment

DOE welcomes comments on any aspect of this document for CRAC and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment classes where ASHRAE Standard 90.1–2019 increased stringency (thereby triggering DOE's review of amended standards) and for CRAC and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment classes undergoing 6-year-lookback review.

In the preceding sections, DOE has identified a variety of issues on which it seeks input to aid in the development of the technical and economic analyses regarding whether amended standards for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment may be warranted. DOE notes that under Executive Order 13771, ''Reducing Regulation and Controlling Regulatory Costs,'' Executive Branch agencies such as DOE are directed to manage the costs associated with the imposition of expenditures required to comply with Federal regulations. *See* 82 FR 9339 (Feb. 3, 2017). Consistent with that Executive Order, DOE encourages the public to provide input on measures DOE could take to lower the cost of its energy conservation standard rulemakings, recordkeeping and reporting requirements, and compliance and certification requirements applicable to CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment while remaining consistent with the requirements of EPCA. Other general topics of interest include the following.

Market Failures

In the field of economics, a market failure is a situation in which the market outcome does not maximize societal welfare. Such an outcome would result in unrealized potential welfare. DOE welcomes comment on any aspect of market failures, especially those in the context of amended energy conservation standards for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

Network Mode/''Smart'' Equipment

DOE recently published an RFI on the emerging smart technology appliance and equipment market. 83 FR 46886 (Sept. 17, 2018). In that RFI, DOE sought information to better understand market trends and issues in the emerging market for appliances and commercial equipment that incorporate smart technology. DOE's intent in issuing the RFI was to ensure that DOE did not inadvertently impede such innovation in fulfilling its statutory obligations in setting efficiency standards for covered products and equipment. DOE seeks comments, data, and information on the issues presented in the NODA/RFI as they may be applicable to CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

Other

In addition to the issues identified earlier in this document, DOE welcomes comment on any other aspect of energy conservation standards for CRACs and air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment not already addressed.

To summarize the specific issues identified in this NODA/RFI, DOE is particularly interested in receiving comments and views of interested parties concerning the following topics, listed by equipment category:

CRAC Issue 1: DOE requests comment on the methodology and results of the crosswalk analysis.

CRAC Issue 2: DOE seeks comment on its energy-use analysis methodology.

CRAC Issue 3: DOE seeks comment on its methodology for identifying data centers within CBECS 2012.

CRAC Issue 4: DOE requests comment on its server power consumption estimates and any information or data on expectations of future server stock and energy use in small data centers.

CRAC Issue 5: DOE requests shipments data on horizontal-flow, ceiling-mounted, and air-cooled with fluid economizer CRAC equipment classes.

CRAC Issue 6: DOE requests efficiency data for CRACs in terms of NSenCOP that can be used to estimate the no-new-standards case efficiency distribution.

CRAC Issue 7: DOE seeks input on its determination of the no-new-standards case distribution of efficiencies for CRACs.

CRAC Issue 8: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for CRACs would result in significant additional energy savings for classes for which DOE is triggered.

CRAC Issue 9: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for CRACs would result in significant additional energy savings for classes for which DOE is not triggered.

Three-Phase CAC/HP Issue 1: DOE requests feedback on its methodology for determining crosswalked SEER2 and HSPF2 values for three-phase equipment based on crosswalked values of single-phase residential central air conditioners.

Three-Phase CAC/HP Issue 2: DOE requests comment on its approach to estimate the energy use of air-cooled, three-phase, small commercial package AC and HP (<65 K).

Three-Phase CAC/HP Issue 3: DOE requests comment on it approach to estimate the shipments of air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

Three-Phase CAC/HP Issue 4: DOE seeks input on its determination of the no-new-standards case distribution of efficiencies for air-cooled, three-phase, small commercial package AC and HP (<65 K) equipment.

Three-Phase CAC/HP Issue 5: DOE seeks comment on the approach of using a Weibull probability distribution with an average lifetime of 19 years for air conditioners and 16.2 years for heat pumps. DOE also requests data or information which can be used to inform the equipment lifetime for air-cooled, three-phase, small commercial package AC and HP (<65 K).

Three-Phase CAC/HP Issue 6: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for air-cooled, three-phase, small commercial package ACs and HPs (<65 K) would result in significant additional energy savings for classes for which DOE is triggered.

Three-Phase CAC/HP Issue 7: DOE is requesting data and information that could enable the agency to determine whether standards levels more stringent than the levels in ASHRAE Standard 90.1–2019 for air-cooled, three-phase, small commercial package ACs and HPs (<65 K) would result in significant additional energy savings for classes for which DOE is not triggered.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of data availability and request for information.

Signing Authority

This document of the Department of Energy was signed on August 21, 2020, by Alexander N. Fitzsimmons, Deputy Assistant Secretary for Energy Efficiency, Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE **Federal Register** Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on August 21, 2020.

Treena V. Garrett,

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

[FR Doc. 2020–18778 Filed 9–24–20; 8:45 am]

BILLING CODE 6450–01–P