



[6450-01-P]

**DEPARTMENT OF ENERGY**

**10 CFR Part 431**

**[EERE-2018-BT-STD-0003]**

**RIN 1904-AE42**

**Energy Conservation Program: Energy Conservation Standards for Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps**

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

**ACTION:** Notice 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 variable refrigerant flow multi-split air conditioners and heat pumps (VRFs), which are a type of commercial and industrial equipment. The Energy Policy and Conservation Act of 1975, as amended (EPCA), requires DOE to evaluate and assess whether there is a need to update its energy conservation standards following changes to the relevant industry consensus standards in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1 (ASHRAE Standard 90.1). Additionally under EPCA, DOE must review its standards for this equipment at least once every six years and publish either a notice of proposed rulemaking (NOPR) to propose new standards for VRFs or a notice of determination that the existing standards do not need to be amended. Accordingly, DOE is also initiating an effort to determine whether to amend the current energy conservation standards for classes of VRFs for which DOE has tentatively determined that the ASHRAE Standard 90.1 levels have not been updated to be more stringent than the current Federal standards. This document solicits

information from the public to help DOE determine whether amended standards for VRFs would result in significant 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 raised in this document), 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 **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

**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-2018-BT-STD-0003, by any of the following methods:

1. *Federal eRulemaking Portal:* <http://www.regulations.gov>. Follow the instructions for submitting comments.
2. *E-mail:* [CommACHeatingEquipCat2017STD0017@ee.doe.gov](mailto:CommACHeatingEquipCat2017STD0017@ee.doe.gov). Include the docket number EERE-2018-BT-STD-0003 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., 6<sup>th</sup> 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 IV 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-2018-BT-STD-0003). 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 webpage can be found at:

<https://www.regulations.gov/docket?D=EERE-2018-BT-STD-0003>. The docket webpage contains instructions on how to access all documents, including public comments, in the docket. See section IV of this document, Public Participation, for information on how to submit comments through <http://www.regulations.gov>.

**FOR FURTHER INFORMATION CONTACT:** Ms. Catherine Rivest, 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](mailto:ApplianceStandardsQuestions@ee.doe.gov).

Mr. Eric Stas, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue SW, Washington, D.C. 20585. Telephone: (202) 586-5827. Email: [Eric.Stas@hq.doe.gov](mailto: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 e-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

## **SUPPLEMENTARY INFORMATION:**

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## **I. Introduction**

### **A. Authority**

The Energy Policy and Conservation Act of 1975, as amended (“EPCA”; 42 U.S.C. 6291 *et seq.*),<sup>1</sup> established the Energy Conservation Program for Consumer Products Other Than Automobiles. Title III, Part C<sup>2</sup> of EPCA, Public Law 94-163 (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. This covered equipment includes small, large, and

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<sup>1</sup> 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).

<sup>2</sup> For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A-1.

very large commercial package air conditioning and heating equipment, which includes variable refrigerant flow multi-split air conditioners and heat pumps (VRF multi-split systems),<sup>3</sup> the subject of this document. (42 U.S.C. 6311(1)(B)-(D))

Pursuant to EPCA, DOE's 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 Act 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 for particular State laws or regulations, in accordance with the procedures and other provisions set forth under 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, 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

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<sup>3</sup> Air-cooled, single-phase VRF multi-split air conditioners and heat pumps with cooling capacity less than 65,000 Btu/h are considered residential central air conditioners and heat pumps and are regulated under the energy conservation program for consumer products. 10 CFR part 430, subpart B, appendices M and M1 and 10 CFR part 430, subpart C.

levels in American Society of Heating, Refrigerating, and Air-Conditioning Engineers (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 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)(ii)) If DOE decides to adopt as a 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.<sup>4</sup> (42 U.S.C. 6313(a)(6)(A)(ii)(II) and (B))

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). However, DOE notes that Congress adopted amendments to these provisions related to ASHRAE Standard 90.1 equipment under the American Energy Manufacturing Technical Corrections Act (Public Law No. 112-210 (Dec. 18, 2012); “AEMTCA”). In relevant part, DOE is prompted to act whenever ASHRAE Standard 90.1 is

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<sup>4</sup> 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))

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. (42 U.S.C. 6313(a)(6)(A)(i))

EPCA does not detail the exact type of amendment that serves as a triggering event. However, DOE has considered whether its obligation is triggered in the context of whether the specific ASHRAE Standard 90.1 requirement on which the most current Federal requirement is based is amended (*i.e.*, the regulatory metric). For example, 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. Conversely, if an amendment to ASHRAE Standard 90.1 were to add an additional metric by which a class of equipment is to be evaluated, but did not amend the requirement that is in terms of the metric on which the Federal requirement was based, DOE would not consider its obligation triggered.<sup>5</sup>

In addition, DOE has explained that its authority to adopt an ASHRAE amendment is limited based on the definition of “energy conservation standard.” 74 FR 36312, 36322 (July 22, 2009). In general, an “energy conservation standard” is limited, per the statutory definition, to either a performance standard or a design requirement. (42 U.S.C. 6311(18)) Informed by the “energy conservation standard” definition, DOE has stated that adoption of an amendment to ASHRAE Standard 90.1 “that establishes both a performance standard and a design requirement

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<sup>5</sup> See the May 16, 2012, final rule for small, large, and very large water-cooled and evaporatively-cooled commercial package air conditioners, and VRF water-source heat pumps with cooling capacity less than 17,000 Btu/h, in which DOE states that “if the revised ASHRAE Standard 90.1 leaves the standard level unchanged or lowers the standard, as compared to the level specified by the national standard adopted pursuant to EPCA, DOE 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). 77 FR 28928, 28929 (emphasis added). See also, 74 FR 36312, 36313 (July 22, 2009).

is beyond the scope of DOE's legal authority, as would be a standard that included more than one design requirement." 74 FR 36312, 36322 (July 22, 2009).

As noted, the ASHRAE Standard 90.1 provision in EPCA acknowledges technological changes that yield energy efficiency benefits, as well as continuing development of industry standards and test methods. Amendments to a uniform national standard provide Federal requirements that continue to reflect energy efficiency improvements identified by industry. Amendments to a uniform national standard that reflect the relevant amended versions of ASHRAE Standard 90.1 would also help reduce compliance and test burdens on manufacturers by harmonizing the Federal requirements, when appropriate, with industry best practices. This harmonization would be further facilitated by establishing not only consistent energy efficiency levels and design requirements between ASHRAE Standard 90.1 and the Federal requirements, but comparable metrics as well.

As stated previously, DOE has limited its review under the ASHRAE Standard 90.1 provisions in EPCA to the equipment class that was subject to the ASHRAE Standard 90.1 amendment. DOE has stated that if ASHRAE has not amended a standard for an equipment class subject to 42 U.S.C. 6313, there is no change that would require action by DOE to consider amending the uniform national standard to maintain consistency with ASHRAE Standard 90.1. See, 72 FR 10038, 10042 (March 7, 2007); 77 FR 36312, 36320-36321 (July 22, 2009); 80 FR 42614, 42617 (July 17, 2015).

In those situations where ASHRAE has not acted to amend the levels in Standard 90.1 for the 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)) In proposing new standards under the 6-year 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)) This is a separate statutory review obligation, as differentiated from the obligation triggered by an ASHRAE Standard 90.1 amendment. While the statute continues to defer to ASHRAE’s lead on covered equipment subject to Standard 90.1, it does allow for a comprehensive review of all such equipment and the potential for adopting more-stringent standards, where supported by the requisite clear and convincing evidence. That is, DOE interprets ASHRAE’s not amending Standard 90.1 with respect to a product or equipment type as ASHRAE’s determination that the standard applicable to that product or equipment type is already at an appropriate level of stringency, and DOE will not amend that standard unless there is clear and convincing evidence that a more-stringent level is justified.

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))

On October 26, 2016, ASHRAE officially released for distribution and made public ASHRAE Standard 90.1-2016. This action by ASHRAE triggered DOE’s obligations under 42

U.S.C. 6313(a)(6), as outlined previously. This notice of data availability (NODA) presents the analysis of the energy savings potential of amended energy efficiency standards, as required under 42 U.S.C. 6313(a)(6)(A)(i). DOE is also taking this opportunity to collect data and information regarding other VRF equipment classes for which it was not triggered but for which DOE plans to conduct a concurrent 6-year-lookback review. (42 U.S.C. 6313(a)(6)(C)) Such information will help DOE inform its decisions, consistent with its obligations under EPCA.

#### 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 VRF multi split systems based on: (1) the amended efficiency levels contained within ASHRAE Standard 90.1-2016, and (2) more-stringent efficiency levels. DOE describes these analyses and preliminary conclusions and seeks input from interested parties, including the submission of data and other relevant information. DOE is also taking the opportunity to consider the potential for more-stringent standards for the other equipment classes of the subject equipment category (*i.e.*, where DOE was not triggered) under EPCA's 6-year-lookback authority.

DOE carefully examined the changes for equipment in ASHRAE Standard 90.1 in order to thoroughly evaluate the amendments in ASHRAE 90.1-2016, thereby permitting DOE to determine what action, if any, is required under its statutory mandate. DOE also will carefully examine the energy savings potential for other equipment classes where it was not triggered, so

as to conduct a thorough review for an entire equipment category. Section II of this NODA contains that evaluation, and section III of this NODA discusses the possibility of more-stringent standards for those equipment classes where DOE was not triggered by ASHRAE action.

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, if DOE determines that the amended efficiency levels in ASHRAE Standard 90.1-2016 increase the energy efficiency level for an equipment class within a given equipment category currently covered by uniform national standards, DOE will commence a rulemaking to amend standards based upon the efficiency levels in ASHRAE Standard 90.1-2016 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 a rulemaking to establish more-stringent efficiency levels under the statute, DOE will address the general rulemaking requirements applicable under 42 U.S.C. 6313(a)(6)(B), such as the anti-backsliding provision<sup>6</sup>, the criteria for making a determination of economic justification as to

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<sup>6</sup> 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))

whether the benefits of the proposed standard exceed the burden of the proposed standard,<sup>7</sup> and the prohibition on making unavailable existing products with performance characteristics generally available in the United States.<sup>8</sup>

### C. Rulemaking Background

DOE's energy conservation standards for VRF multi-split systems are codified at 10 CFR 431.97. DOE defines "variable refrigerant flow multi-split air conditioner" as a unit of commercial package air-conditioning and heating equipment that is configured as a split system air conditioner incorporating a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by an integral control device and common communications network and which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping. 10 CFR 431.92. DOE defines "variable refrigerant flow multi-split heat pump" similarly, but with the addition that it uses reverse cycle refrigeration as

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<sup>7</sup> 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))

<sup>8</sup> 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 U.S. 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))

its primary heating source and that it may include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas. *Id.*

DOE's regulations include test procedures and energy conservation standards that apply to air-cooled VRF multi-split air conditioners, air-cooled VRF multi-split heat pumps, and water-source VRF multi-split heat pumps, with cooling capacity less than 760,000 Btu/h, except air-cooled, single-phase VRF multi-split air conditioners and heat pumps with cooling capacity less than 65,000 Btu/h.<sup>9</sup> 10 CFR 431.96 and 10 CFR 431.97. The energy conservation standards for VRF multi-split systems were most recently amended through the final rule for energy conservation standards and test procedures for certain commercial equipment published on May 16, 2012 ("May 2012 final rule"). 77 FR 28928. The May 2012 final rule established separate equipment classes for VRF multi-split systems 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. 77 FR 28928, 28995 (May 16, 2012).

DOE's test procedure for VRF multi-split systems is codified at 10 CFR 431.96 and was established in the May 2012 final rule. 77 FR 28928, 28990-28991 (May 16, 2012). DOE's current regulations require that manufacturers test VRF multi-split systems using American National Standards Institute (ANSI)/Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 1230-2010 with Addendum 1, *Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment* (AHRI 1230-2010), except for sections 5.1.2 and 6.6. DOE's current test procedure also requires that manufacturers adhere to additional requirements listed in 10 CFR 431.96(c)-(f) pertaining to compressor break-in

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<sup>9</sup> Air-cooled, single-phase VRF multi-split air conditioners and heat pumps with cooling capacity less than 65,000 Btu/h are considered residential central air conditioners and heat pumps and are regulated under the energy conservation program for consumer products. 10 CFR part 430, subpart B, appendices M and M1 and 10 CFR part 430, subpart C.

period and equipment set-up for testing, including requirements for refrigerant charging, refrigerant line length, air flow rate, and compressor speed, when measuring the energy efficiency ratio (EER) and coefficient of performance (COP) for air-cooled VRF multi-split systems with a cooling capacity between 65,000 Btu/h and 760,000 Btu/h and water-source VRF multi-split systems with a cooling capacity less than 760,000 Btu/h, and when measuring the seasonal energy efficiency ratio (SEER) and heating seasonal performance factor (HSPF) for three-phase air-cooled VRF multi-split systems with a cooling capacity less than 65,000 Btu/h, and when certifying that equipment is compliant with the applicable standard.

On May 27, 2015, the ASHRAE Standards Committee approved Addendum n to ASHRAE Standard 90.1–2013, which raised the minimum integrated energy efficiency ratio (IEER<sup>10</sup>) for air-cooled VRF multi-split systems, effective January 1, 2017. Subsequently, ASHRAE proposed Addendum bs to ASHRAE Standard 90.1–2013, which would raise the minimum IEER and the minimum COP for water-source VRF multi-split systems, effective January 1, 2018. Both of these addenda are incorporated into ASHRAE Standard 90.1-2016. However, at the current time, the Federal energy conservation standards applicable to VRFs do not use IEER as their regulatory metric.

On October 26, 2016, ASHRAE officially released for distribution and made public ASHRAE Standard 90.1-2016. ASHRAE Standard 90.1–2016 revised the efficiency levels for certain commercial equipment, including certain classes of VRF multi-split systems (as

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<sup>10</sup> Integrated energy efficiency ratio (IEER) factors in the efficiency of operating at part-load conditions of 75-percent, 50-percent, and 25-percent of capacity, as well as the efficiency at full-load. The IEER metric is intended to provide a more representative measure of cooling season energy consumption in actual operation using a weighted average of EER values determined for the four test points.

discussed in the following section).<sup>11</sup> For the remaining equipment, ASHRAE left in place the preexisting levels (*i.e.* the efficiency levels specified in EPCA or the efficiency levels in ASHRAE Standard 90.1-2013). ASHRAE Standard 90.1-2016 did not change any of the design requirements for the commercial heating, air conditioning, and water-heating equipment covered by EPCA.

On April 11, 2018, DOE published in the *Federal Register* a notice of its intent to establish a negotiated rulemaking working group (Working Group) under the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC), in accordance with the Federal Advisory Committee Act (FACA<sup>12</sup>) and the Negotiated Rulemaking Act (NRA<sup>13</sup>), to negotiate proposed test procedures and amended energy conservation standards for VRF multi-split systems. 83 FR 15514. The purpose of the Working Group is to discuss and, if possible, reach consensus on a proposed rule regarding test procedures and energy conservation standards for VRF multi-split systems, as authorized by EPCA. 83 FR 15514 (April 11, 2018). DOE explained that the primary reason for using the negotiated rulemaking process for this equipment is that stakeholders strongly support a consensual rulemaking effort and that such a regulatory negotiation process will be less adversarial and better suited to resolving complex technical issues. 83 FR 15514 (April 11, 2018). DOE further stated that an important virtue of negotiated rulemaking is that it allows expert dialog that is much better than traditional techniques at getting the facts and issues right and will result in a proposed rule that will effectively reflect congressional intent. 83 FR 15514 (April 11, 2018). The Working Group has held a number of

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<sup>11</sup> ASHRAE Standard 90.1-2016 also revised standards for certain classes of computer room air conditioners (CRACs) and established new standards for dedicated outdoor air systems (DOASes). DOE is addressing CRACs and DOASes in a separate document.

<sup>12</sup> 5 U.S.C. App. 2, Public Law No. 92-463.

<sup>13</sup> 5 U.S.C. 561-570, Public Law No. 104-320.

meetings. Public meeting dates and information are located on the Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps rulemaking webpage<sup>14</sup> and all related notices, public comments, public meeting transcripts, and supporting documents are available in the associated docket.<sup>15</sup>

## **II. Discussion of Changes in ASHRAE Standard 90.1-2016**

### **A. Amendments to VRF Multi-Split System Standards in ASHRAE Standard 90.1-2016**

As noted, ASHRAE Standard 90.1–2016 revised the efficiency levels for certain commercial equipment, but for the remaining equipment, ASHRAE left in place the preexisting levels. DOE has determined that ASHRAE 90.1-2016 increased the efficiency level for six of the 20 DOE VRF multi-split system equipment classes. Table II.I shows the VRF multi-split system equipment classes provided in ASHRAE Standard 90.1-2016 and the corresponding efficiency levels in ASHRAE Standard 90.1-2013 and in ASHRAE Standard 90.1-2016. Table II.I also displays the existing Federal energy conservation standards for those equipment classes and indicates whether the update in ASHRAE Standard 90.1-2016 triggers DOE evaluation as required under EPCA (*i.e.*, whether the update results in a standard level more stringent than the current Federal level). (As discussed in the following paragraphs, DOE’s standards disaggregate VRF multi-split systems into 20 equipment classes, whereas ASHRAE Standard 90.1 has 22 classes.) The remainder of this section assesses each of these equipment classes and describes whether the amendments in ASHRAE Standard 90.1-2016 constitute increased energy efficiency levels, which would necessitate further analysis of the potential energy savings from corresponding amendments to the Federal energy conservation standards. The conclusions of

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<sup>14</sup> Available at:

[https://www1.eere.energy.gov/buildings/appliance\\_standards/standards.aspx?productid=71&action=viewlive](https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=71&action=viewlive).

<sup>15</sup> Available at: <https://www.regulations.gov/docket?D=EERE-2018-BT-STD-0003>.

this assessment are presented in the last column of Table II.I of this document.

**Table II.I Federal Energy Conservation Standards and Energy Efficiency Levels in ASHRAE Standard 90.1-2016 and the Corresponding Levels in ASHRAE Standard 90.1-2013 for VRF Multi-split Systems<sup>1</sup>**

<b>Considered Equipment Class<sup>2</sup></b>	<b>Energy Efficiency Levels in ASHRAE Standard 90.1-2013 (as corrected)<sup>3</sup></b>	<b>Energy Efficiency Levels in ASHRAE Standard 90.1-2016</b>	<b>Federal Energy Conservation Standards</b>	<b>DOE Triggered by ASHRAE Standard 90.1-2016 Amendment?</b>
VRF Air Conditioners, Air-cooled, <65,000 Btu/h	13.0 SEER	13.0 SEER	13.0 SEER	No
VRF Air Conditioners, Air-cooled, ≥65,000 Btu/h and <135,000 Btu/h, No Heating or Electric Resistance Heating	11.2 EER, 13.1 IEER	11.2 EER, 15.5 IEER	11.2 EER	No
VRF Air Conditioners, Air-cooled, ≥65,000 Btu/h and <135,000 Btu/h, All Other Types of Heating <sup>4</sup>	No standard	No standard	11.0 EER	No
VRF Air Conditioners, Air-cooled, ≥135,000 Btu/h and <240,000 Btu/h, No Heating or Electric Resistance Heating	11.0 EER, 12.9 IEER	11.0 EER, 14.9 IEER	11.0 EER	No
VRF Air Conditioners, Air-cooled, ≥135,000 Btu/h and <240,000 Btu/h, All Other Types of Heating <sup>4</sup>	No standard	No standard	10.8 EER	No
VRF Air Conditioners, Air-cooled, ≥240,000 Btu/h and <760,000 Btu/h, No Heating or Electric Resistance Heating	10.0 EER, 11.6 IEER	10.0 EER, 13.9 IEER	10.0 EER	No
VRF Air Conditioners, Air-cooled, ≥240,000 Btu/h and <760,000 Btu/h, All Other Types of Heating <sup>4</sup>	No standard	No standard	9.8 EER	No
VRF Heat Pumps, Air-cooled, <65,000 Btu/h	13.0 SEER, 7.7 HSPF	13.0 SEER, 7.7 HSPF	13.0 SEER, 7.7 HSPF	No
VRF Heat Pumps, Air-cooled, ≥65,000 Btu/h and <135,000 Btu/h, No Heating or Electric Resistance Heating <sup>5</sup>	11.0 EER, 12.9 IEER, 3.3 COP <sub>H</sub>	11.0 EER, 14.6 IEER, 3.3 COP <sub>H</sub>	11.0 EER, 3.3 COP	No

<b>Considered Equipment Class<sup>2</sup></b>	<b>Energy Efficiency Levels in ASHRAE Standard 90.1-2013 (as corrected)<sup>3</sup></b>	<b>Energy Efficiency Levels in ASHRAE Standard 90.1-2016</b>	<b>Federal Energy Conservation Standards</b>	<b>DOE Triggered by ASHRAE Standard 90.1-2016 Amendment?</b>
VRF Heat Pumps, Air-cooled, ≥65,000 Btu/h and <135,000 Btu/h, All Other Types of Heating <sup>4,5</sup>	10.8 EER, 12.7 IEER; 3.3 COP <sub>H</sub>	10.8 EER, 14.4 IEER; 3.3 COP <sub>H</sub>	10.8 EER, 3.3 COP	No
VRF Heat Pumps, Air-cooled, ≥135,000 Btu/h and <240,000 Btu/h, No Heating or Electric Resistance Heating <sup>5</sup>	10.6 EER, 12.3 IEER, 3.2 COP <sub>H</sub>	10.6 EER, 13.9 IEER, 3.2 COP <sub>H</sub>	10.6 EER, 3.2 COP	No
VRF Heat Pumps, Air-cooled, ≥135,000 Btu/h and <240,000 Btu/h, All Other Types of Heating <sup>4,5</sup>	10.4 EER, 12.1 IEER; 3.2 COP <sub>H</sub>	10.4 EER, 13.7 IEER; 3.2 COP <sub>H</sub>	10.4 EER, 3.2 COP	No
VRF Heat Pumps, Air-cooled, ≥240,000 Btu/h and <760,000 Btu/h, No Heating or Electric Resistance Heating <sup>5</sup>	9.5 EER, 11.0 IEER, 3.2 COP <sub>H</sub>	9.5 EER, 12.7 IEER, 3.2 COP <sub>H</sub>	9.5 EER, 3.2 COP	No
VRF Heat Pumps, Air-cooled, ≥240,000 Btu/h and <760,000 Btu/h, All Other Types of Heating <sup>4,5</sup>	9.3 EER, 10.8 IEER; 3.2 COP <sub>H</sub>	9.3 EER, 12.5 IEER; 3.2 COP <sub>H</sub>	9.3 EER, 3.2 COP	No
VRF Heat Pumps, Water-source, <17,000 Btu/h, Without heat recovery	12.0 EER, 4.2 COP <sub>H</sub>	12.0 EER, 16.0 IEER <sup>6</sup> , 4.3 COP <sub>H</sub> <sup>6</sup>	12.0 EER, 4.2 COP	Yes <sup>7</sup>
VRF Heat Pumps, Water-source, <17,000 Btu/h, With heat recovery	11.8 EER, 4.2 COP <sub>H</sub>	11.8 EER, 15.8 IEER <sup>6</sup> , 4.3 COP <sub>H</sub> <sup>6</sup>	11.8 EER, 4.2 COP	Yes <sup>7</sup>
VRF Heat Pumps, Water-source, ≥17,000 Btu/h and <65,000 Btu/h <sup>8</sup>	12.0 EER, 4.2 COP <sub>H</sub> (without heat recovery); 11.8 EER, 4.2 COP <sub>H</sub> (with heat recovery)	12.0 EER, 16.0 IEER <sup>6</sup> , 4.3 COP <sub>H</sub> <sup>6</sup> (without heat recovery); 11.8 EER, 15.8 IEER <sup>6</sup> , 4.3 COP <sub>H</sub> <sup>6</sup> (with heat recovery)	12.0 EER, 4.2 COP	Yes <sup>9</sup>
VRF Heat Pumps, Water-source, ≥65,000 Btu/h and <135,000 Btu/h <sup>8</sup>	12.0 EER, 4.2 COP <sub>H</sub> (without heat recovery); 11.8 EER, 4.2 COP <sub>H</sub> (with heat recovery)	12.0 EER, 16.0 IEER <sup>6</sup> , 4.3 COP <sub>H</sub> <sup>6</sup> (without heat recovery); 11.8 EER, 15.8 IEER <sup>6</sup> , 4.3 COP <sub>H</sub> <sup>6</sup> (with heat recovery)	12.0 EER, 4.2 COP	Yes <sup>9</sup>
VRF Heat Pumps, Water-source, ≥135,000 Btu/h and <240,000 Btu/h, Without heat recovery	10.0 EER, 3.9 COP <sub>H</sub>	10.0 EER, 14.0 IEER <sup>6</sup> , 4.0 COP <sub>H</sub> <sup>6</sup>	10.0 EER, 3.9 COP	Yes <sup>7</sup>
VRF Heat Pumps, Water-source, ≥135,000 Btu/h and <240,000 Btu/h, With heat recovery	9.8 EER, 3.9 COP <sub>H</sub>	9.8 EER, 13.8 IEER <sup>6</sup> , 4.0 COP <sub>H</sub> <sup>6</sup>	9.8 EER, 3.9 COP	Yes <sup>7</sup>

Considered Equipment Class <sup>2</sup>	Energy Efficiency Levels in ASHRAE Standard 90.1-2013 (as corrected) <sup>3</sup>	Energy Efficiency Levels in ASHRAE Standard 90.1-2016	Federal Energy Conservation Standards	DOE Triggered by ASHRAE Standard 90.1-2016 Amendment?
VRF Heat Pumps, Water-source, ≥240,000 Btu/h and <760,000 Btu/h, Without heat recovery	10.0 EER, 3.9 COP <sub>H</sub>	10.0 EER, 12.0 IEER <sup>6</sup> , 3.9 COP <sub>H</sub>	10.0 EER, 3.9 COP	No
VRF Heat Pumps, Water-source, ≥240,000 Btu/h and <760,000 Btu/h, With heat recovery	9.8 EER, 3.9 COP <sub>H</sub>	9.8 EER, 11.8 IEER <sup>6</sup> , 3.9 COP <sub>H</sub>	9.8 EER, 3.9 COP	No

<sup>1</sup> “SEER” means Seasonal Energy Efficiency Ratio; “EER” means Energy Efficiency Ratio; “IEER” means Integrated Energy Efficiency Ratio; “HSPF” means Heating Seasonal Performance Factor; “COP<sub>H</sub>” means Coefficient of Performance for heating; and “COP” means Coefficient of Performance (equivalent to COP<sub>H</sub>).

<sup>2</sup> Considered equipment classes may differ from the equipment classes defined in DOE’s regulations, but no loss of coverage will occur (i.e., all previously covered DOE equipment classes remained covered equipment).

<sup>3</sup> This table represents values in ASHRAE 90.1-2013 as corrected by various errata sheets issued by ASHRAE. All of the IEER values for air-source VRF multi-split system equipment are based on errata sheets. These errata do not impact existing DOE standards, which are in terms of EER, not IEER.

<sup>4</sup> In ASHRAE 90.1, this equipment class is referred to as units with heat recovery rather than all other types of heating.

<sup>5</sup> In terms of Federal standards, VRF Multi-Split Heat Pumps (Air-Cooled) with heat recovery fall under the category of “All Other Types of Heating” unless they also have electric resistance heating, in which case it falls under the category for “No Heating or Electric Resistance Heating.”

<sup>6</sup> Rating effective 1/1/2018.

<sup>7</sup> An energy savings analysis for this class of equipment was not conducted because there is no equipment on the market that would fall into this equipment class.

<sup>8</sup> DOE cannot adopt the ASHRAE Standard 90.1-2016 efficiency standard for units with heat recovery because it would be back-sliding. As in the original final rule adopting standards for VRF multi-split heat systems (final rule for Energy Conservation Standards and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment), DOE will not subdivide this equipment class. 77 FR 28928, 28938-28939 (May 16, 2012).

<sup>9</sup> DOE did not conduct an energy savings analysis for this equipment class as when combined with the other water-source equipment class with market share their combined market share is estimated to be less than three percent, which would result in minimal national energy savings.

Before beginning an analysis of the potential energy savings that would result from adopting a uniform national standard at the minimum level specified by ASHRAE Standard 90.1-2016 or a more-stringent uniform national standard, DOE must first determine whether the ASHRAE Standard 90.1-2016 standard levels actually represent an increase in efficiency above the current Federal standard levels, thereby triggering DOE action. This section contains a discussion of each equipment classes of VRF multi-split systems where the ASHRAE Standard

90.1-2016 efficiency levels differed from the ASHRAE Standard 90.1-2013 level(s)<sup>16</sup> (based on a rating metric used in the relevant Federal energy conservation standards) or where ASHRAE created new equipment classes, along with DOE's preliminary conclusion regarding the appropriate action to take with respect to that equipment. DOE is also examining the other equipment classes (*i.e.*, non-triggered classes) of VRFs under its 6-year-lookback authority. (42 U.S.C. 6313(a)(6)(C))

The current Federal energy conservation standards include 20 equipment classes in the equipment category for VRF multi-split systems, which can be found in DOE's regulations at 10 CFR 431.97. The Federal energy conservation standards for VRF multi-split systems are differentiated based on whether it is an air-conditioner or a heat pump, the cooling capacity, and the heat source (air-cooled or water-source). Additionally, air-cooled equipment classes are further differentiated based on the supplemental heating type (No Heating or Electric Resistance Heating; or All Other Types of Heating). Finally, some water-source equipment classes with cooling capacity <17,000 Btu/h or with cooling capacities  $\geq 135,000$  Btu/h and <760,000 Btu/h are differentiated based on whether or not they have heat recovery. The DOE equipment classes do not disaggregate per these characteristics in all cases. For example, the VRF multi-split system equipment classes for water-source heat pumps  $\geq 65,000$  Btu/h and <135,000 do not differentiate based on whether or not the units have heat recovery. Also, as discussed in the following paragraph, the divisions between equipment classes, including the disaggregation

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<sup>16</sup> ASHRAE Standard 90.1-2016 did not change any of the design requirements 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.

between equipment class capacity ranges, is not entirely consistent between the Federal standards and ASHRAE Standard 90.1-2016.<sup>17</sup>

DOE notes that in ASHRAE Standard 90.1-2016 (as in previous versions of ASHRAE Standard 90.1), the equipment class VRF Heat Pumps, Water-source,  $\geq 17,000$  Btu/h and  $< 65,000$  Btu/h and the equipment class VRF Heat Pumps, Water-source,  $\geq 65,000$  Btu/h and  $< 135,000$  Btu/h are disaggregated into units with heat recovery and units without heat recovery, with each ASHRAE equipment class having a separate minimum cooling efficiency. Currently, the Federal standards do not disaggregate such VRF multi-split systems based on the presence of heat recovery. The cooling efficiency EER standard in ASHRAE Standard 90.1-2016 for these units with heat recovery is below the current Federal standard. Under EPCA, the Secretary may not prescribe any amended standard under the ASHRAE review provisions that 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)) Therefore, as in May 2012 final rule, DOE has not subdivided these equipment classes. DOE does not consider whether heat recovery is a performance characteristic under 42 U.S.C. 6313(a)(6)(B)(iii)(II)(aa), unless DOE is doing so in the context of considering uniform national standards that are more-stringent than the corresponding standards set by ASHRAE in Standard 90.1.

DOE also notes that ASHRAE Standard 90.1-2016 has subdivided the VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 760,000$  Btu/h classes, both with and without heat recovery, into separate equipment classes for units with cooling capacities  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h and units with cooling capacities  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h, and included different minimum efficiency levels for each. All efficiency levels meet or exceed the current

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<sup>17</sup> In addition to the items listed in the subsequent paragraphs, there are some nomenclature differences in the VRF air-cooled heat pump equipment classes, as described in Table I.1.

Federal standards for DOE's broader efficiency class. Further, although DOE does not regulate VRF multi-split systems with an efficiency metric of IEER, ASHRAE Standard 90.1-2016 specifies lower IEER standards for water-source systems that are  $\geq 240,000$  Btu/h, as compared to those in the  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h class. As such, DOE is assuming that there could be technical reasons for which water-source systems in the  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h cooling capacity range may not be able to achieve the same efficiency levels as systems that are  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, and that this likely justifies establishing separate DOE equipment classes which are split at the 240,000 Btu/h point. For these reasons, DOE is considering revising its current equipment class structure to align more closely with the structure used by ASHRAE Standard 90.1-2016. If DOE were to revise the above water-source equipment classes, then the total number of equipment classes for VRF multi-split systems would increase from 20 to 22.

Issue 1: DOE requests feedback on its consideration of additional equipment classes for VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 760,000$  Btu/h, both with and without heat recovery, by separating the equipment classes into units with cooling capacities  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h and units with cooling capacities  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h.

ASHRAE Standard 90.1-2016 increased the heating energy efficiency levels, as represented by the COP metrics, for six of the 20 DOE equipment classes in the VRF multi-split system equipment category that DOE is considering for this NODA.<sup>18</sup> These classes are:

1. VRF Heat Pumps, Water-source,  $< 17,000$  Btu/h, Without heat recovery
2. VRF Heat Pumps, Water-source,  $< 17,000$  Btu/h, With heat recovery

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<sup>18</sup> ASHRAE 90.1-2016 left in place the existing EER levels for these classes, which are equivalent to current Federal standards.

3. VRF Heat Pumps, Water-source,  $\geq 17,000$  Btu/h and  $< 65,000$  Btu/h
4. VRF Heat Pumps, Water-source,  $\geq 65,000$  Btu/h and  $< 135,000$  Btu/h
5. VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, Without heat recovery
6. VRF Heat Pumps, Water-source,  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, With heat recovery

#### B. Energy Savings Potential for Considered Equipment Classes

As required under 42 U.S.C. 6313(a)(6)(A), for VRF equipment classes for which ASHRAE Standard 90.1-2016 set more stringent levels than the current Federal standards, DOE performed an assessment to determine the energy-savings potential of amending Federal standard levels to reflect the efficiency levels specified in ASHRAE Standard 90.1-2016.

DOE has determined, based on a report by Cadeo Group,<sup>19</sup> that four of the six VRF water-source classes for which ASHRAE Standard 90.1-2016 increased the energy efficiency levels— those with cooling capacities that are less than 17,000 Btu/h or greater than or equal to 135,000 Btu/h— do not have any market share and, therefore, no energy savings potential at this time. Also based on the Cadeo Group report, DOE has tentatively determined that the remaining two VRF water-source classes, with cooling capacities greater than or equal to 17,000 Btu/h and less than 135,000 Btu/h, together represent only three percent of the entire VRF market. Due to the low market share and corresponding minimal total potential energy savings, DOE has

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<sup>19</sup> Cadeo Report, Variable Refrigerant Flow: A Preliminary Market Assessment. See: <https://www.regulations.gov/document?D=EERE-2017-BT-TP-0018-0002>. The report presents market share by VRF multi-split system equipment class, based on confidential sales data given in interviews with several major manufacturers of VRF multi-split equipment and DOE's Compliance Certification Database.

tentatively determined that the energy savings potential for more stringent efficiency standards for these two equipment classes is *de minimis*.

Given the extremely low market share of the VRF equipment classes for which DOE was triggered, DOE did not conduct a quantitative estimate of potential energy savings. If DOE does not identify any other data regarding market share for the above six classes, DOE would propose to adopt the levels in ASHRAE 90.1-2016 as the Federal standards, as required by EPCA, because more-stringent standards for these equipment classes would be unlikely to produce significant additional energy savings.

Issue 2: DOE requests feedback on its proposal to adopt the levels in ASHRAE 90.1-2016 as the Federal standards for the six VRF water-source classes that are triggered by ASHRAE 90.1.2016.

### **III. Consideration of More-Stringent Standards: Requested Information**

As discussed, if 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 level for the equipment in question would result in significant additional conservation of energy and is technologically feasible and economically justified, DOE must adopt the more-stringent standard. (42 U.S.C. 6313(a)(6)(A)(ii)(II) and (B)(i)) Therefore, for the six equipment classes identified in the prior section for which ASHRAE has amended the standards, DOE is evaluating whether more-stringent standards would meet the specified statutory criteria (as discussed in section II of this notice).

In addition, DOE is also evaluating the remaining 16 VRF equipment classes for which ASHRAE Standard 90.1-2016 did not increase the stringency of the standards pursuant to the

six-year look-back provision at 42 U.S.C. 6313(a)(6)(C)(i). In making a determination of whether standards for such equipment need to be amended, DOE must also follow specific statutory criteria. Similar to the consideration of whether to adopt a standard more stringent than an amended ASHRAE Standard 90.1 standard, DOE must evaluate whether amended Federal standards would result in significant additional conservation of energy and are technologically feasible and economically justified. (42 U.S.C. 6313(a)(6)(C)(i)(I)-(II))

#### A. Rulemaking Process

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

- (1) The economic impact of the standard on the manufacturers and consumers of the equipment subject to the standard;
- (2) The savings in operating costs throughout the estimated average life of the covered equipment in the type (or class) compared to any increases in the price, initial charges, or maintenance expenses for the covered equipment likely to result from the standard;
- (3) The total projected amount of energy savings likely to result directly from the standard;
- (4) Any lessening of the utility or the performance of the products likely to result from the standard;
- (5) The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the standard;
- (6) The need for national energy and water conservation; and
- (7) Other factors the Secretary of Energy (Secretary) considers relevant.

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

DOE fulfills these and other applicable requirements by conducting a series of analyses throughout the rulemaking process. Table III.I shows the individual analyses that are performed to satisfy each of the requirements within EPCA.

**Table III.I EPCA Requirements and Corresponding DOE Analysis**

<b>EPCA Requirement</b>	<b>Corresponding DOE Analysis</b>
<b>Technological Feasibility</b>	<ul style="list-style-type: none"> <li>• Market and Technology Assessment</li> <li>• Screening Analysis</li> <li>• Engineering Analysis</li> </ul>
<b>Economic Justification:</b>	
1. Economic impact on manufacturers and consumers	<ul style="list-style-type: none"> <li>• Manufacturer Impact Analysis</li> <li>• Life-Cycle Cost and Payback Period Analysis</li> <li>• Life-Cycle Cost Subgroup Analysis</li> <li>• Shipments Analysis</li> </ul>
2. Lifetime operating cost savings compared to increased cost for the product	<ul style="list-style-type: none"> <li>• Markups for Product Price Determination</li> <li>• Energy and Water Use Determination</li> <li>• Life-Cycle Cost and Payback Period Analysis</li> </ul>
3. Total projected energy savings	<ul style="list-style-type: none"> <li>• Shipments Analysis</li> <li>• National Impact Analysis</li> </ul>
4. Impact on utility or performance	<ul style="list-style-type: none"> <li>• Screening Analysis</li> <li>• Engineering Analysis</li> </ul>
5. Impact of any lessening of competition	<ul style="list-style-type: none"> <li>• Manufacturer Impact Analysis</li> </ul>
6. Need for national energy and water conservation	<ul style="list-style-type: none"> <li>• Shipments Analysis</li> <li>• National Impact Analysis</li> </ul>
7. Other factors the Secretary considers relevant	<ul style="list-style-type: none"> <li>• Employment Impact Analysis</li> <li>• Utility Impact Analysis</li> <li>• Emissions Analysis</li> <li>• Monetization of Emission Reductions Benefits</li> <li>• Regulatory Impact Analysis</li> </ul>

DOE is publishing this document seeking input and data from interested parties to aid in the development of the technical analyses for VRF multi-split systems. The issues listed below primarily pertain to the VRF market and the requested information will be relevant to conducting the technical and economic analyses. Information received in response to this document is intended to supplement any information received in the course of the ASRAC Working Group's efforts.

## B. Request for Information and Comment

In addition to the specific issues identified below on which DOE seeks comment, DOE requests comment on its overall approach and analyses that will be used to evaluate potential standard levels for VRFs. In particular, 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 standards rulemakings, recordkeeping and reporting requirements, and compliance and certification requirements applicable to VRF multi-split systems while remaining consistent with the requirements of EPCA.

Based on the Cadeo report, DOE has determined that only four of the 16 equipment classes for which ASHRAE Standard 90.1 did not amend the standard have market share, specifically the air-source heat pumps with cooling capacities greater than or equal to 65,000 Btu/h and less than 240,000 Btu/h. These equipment classes, which are listed below, are the focus of DOE’s request for information.

1. VRF Heat Pumps, Air-cooled,  $\geq 65,000$  Btu/h and  $< 135,000$  Btu/h, No Heating or Electric Resistance Heating
2. VRF Heat Pumps, Air-cooled,  $\geq 65,000$  Btu/h and  $< 135,000$  Btu/h, All Other Types of Heating
3. VRF Heat Pumps, Air-cooled,  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, No Heating or Electric Resistance Heating

4. VRF Heat Pumps, Air-cooled,  $\geq 135,000$  Btu/h and  $< 240,000$  Btu/h, All Other Types of Heating

Below are the specific issues that DOE is seeking input and data from interested parties pertaining to the VRF multi-split system market and industry.

Issue 3: DOE seeks comment on whether, in the context of its consideration of more-stringent standards, there have been sufficient technological or market changes for VRFs since the most recent standards update that may justify a new rulemaking to consider more-stringent standards. Specifically, DOE seeks data and information that could enable the agency to determine whether DOE should propose a “no new standard” determination because 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.

Issue 4: DOE requests information on the typical applications of VRF multi-split systems and what the most common applications are (*e.g.*, specific building types and climates). DOE also requests information on typical practices for sizing outdoor units (*e.g.*, sized to match calculated building loads or oversized) and zoning indoor units.

Issue 5: DOE seeks historical shipments data for VRF multi-split systems and projections for growth of the market based on trends stakeholders have observed. DOE is interested in this data by equipment class, efficiency, and climatic region.

Issue 6: DOE requests data on the breakdown of the market between new construction, replacements, and new owners (*i.e.*, owners that choose to replace their current system with a VRF multi-split system in an existing building).

A table of the types of shipments data requested in Issues 5 and 6 can be found in Table III.2 of this document. Interested parties are also encouraged to provide additional shipments data as may be relevant.

**Table III.2: Summary Table of Shipments Data Requests**

Equipment Class		Annual Shipments (Year)		
		New Construction	New Owners	Replacements
Air-Cooled, No Heating or Electric Resistance	≥65,000 Btu/h and <135,000			
	≥135,000 Btu/h and <240,000 Btu/h			
Air-Cooled, All Other Types of Heating	≥65,000 Btu/h and <135,000			
	≥135,000 Btu/h and <240,000 Btu/h			

As part of the manufacturer impact analysis (MIA), DOE intends to analyze potential impacts of amended energy conservation standards on subgroups of manufacturers of covered equipment, including small business manufacturers. DOE uses the Small Business Administration’s (“SBA”) small business size standards to determine whether manufacturers qualify as small businesses, which are listed by the applicable North American Industry Classification System (“NAICS”) code. Manufacturing of VRF multi-split systems is classified under NAICS 333415, “Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing,” and the SBA sets a threshold of 1,250 employees or less for a domestic entity to be considered as a small business 13 CFR 121.201.

This employee threshold includes all employees in a business' parent company and any other subsidiaries.

Issue 7: DOE requests the names and contact information of small business manufacturers, as defined by the SBA's size threshold, of VRF multi-split systems that distribute products in the United States. In addition, DOE requests comment on any other manufacturer subgroups that could be disproportionately impacted by amended energy conservation standards for VRF multi-split systems. DOE requests feedback on any potential approaches that could be considered to address impacts on manufacturers, including small businesses.

Issue 8: To the extent feasible, DOE seeks to identify all VRF multi-split system manufacturers that currently distribute equipment in the United States. Currently, DOE has identified Daikin, Fujitsu, GD Midea, Gree, Hitachi, LG, Mitsubishi, Panasonic, Samsung, and Toshiba as VRF multi-split system manufacturers. DOE seeks comment on the comprehensiveness of this list of manufacturers, and requests the names and contact information of any other domestic or foreign-based manufacturers that sell or otherwise market their VRF multi-split systems in the United States.

## C. Other Energy Conservation Standards Topics

### 1. 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 VRF multi-split systems.

## 2. 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 RFI as they may be applicable to VRFs.

## 3. Other

In addition to the issues identified earlier in this document, DOE welcomes comment on any other aspect of energy conservation standards for VRF multi-split systems not already addressed by the specific areas identified in this document.

## **IV. Public Participation**

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 NODA and RFI and on other matters relevant to DOE's consideration of amended energy conservation standards for VRF multi-split systems. 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> webpage will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

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

Do not submit to <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 e-mail at *ApplianceStandardsQuestions@ee.doe.gov*.

**V. Approval of the Office of the Secretary**

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

Signed in Washington, D.C., on June 28, 2019.

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Alexander N. Fitzsimmons  
Acting Deputy Assistant Secretary for Energy Efficiency  
Energy Efficiency and Renewable Energy

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