[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE-2019-BT-STD-0031]

RIN 1904-AE74

Energy Conservation Program: Energy Conservation Standards for Water-Source Heat Pumps

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

ACTION: Request for information.

SUMMARY: The U.S. Department of Energy (DOE) is initiating an effort to determine whether to amend the current energy conservation standards for water-source heat pumps (WSHPs). This request for information (RFI) solicits information from the public to help DOE determine whether amended standards for WSHPs, a category of covered commercial 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 those topics not specifically raised in this 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

[INSERT DATE 30 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-2019-BT-STD-0031 and/or RIN 1904-AE74, by any of the following methods:

1. *Federal eRulemaking Portal*: *http://www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail*: *WaterSourceHP2019STD0031@ee.doe.gov*. Include the docket number EERE-2019-BT-STD-0031 and/or RIN 1904-AE74 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, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
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 this process, see section III of this document.

Docket: The docket for this activity, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *http://www.regulations.gov*. 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: *http://www.regulations.gov/docket?D=EERE-2019-BT-STD-0031.* The docket webpage contains instructions on how to access all documents, including public comments, in the docket. See section III 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. E-mail: *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 20585-0121. Telephone: (202) 586-5827. E-mail: *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*.

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I. Introduction

A. Authority and Background

The Energy Policy and Conservation Act, as amended (EPCA),[1] Public Law 94-163 (42 U.S.C. 6291-6317, as codified), 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, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This covered equipment includes small, large, and very large commercial package air conditioning and heating equipment. WSHPs, the subject of this RFI, are a category of "commercial package air conditioning and heating equipment". (42 U.S.C. 6311(1)(B)-(D)) EPCA prescribed initial standards for this equipment. (42 U.S.C. 6313(a)(1)-(2))

Under 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 EPCA specifically include definitions (42 U.S.C. 6311), energy conservation standards (42 U.S.C. 6313), test procedures (42 U.S.C. 6314),

[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.

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)-(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. (42 U.S.C. 6316(b)(2)(D))

Under 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 and packaged terminal heat pumps, warm-air furnaces, packaged boilers, storage water heaters, instantaneous water heaters, and unfired hot water storage tanks. *Id*. In doing so, EPCA established Federal energy conservation standards at levels that generally corresponded to the levels in the 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 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 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.[3] (42 U.S.C. 6313(a)(6)(A)(ii)(II) and (B))

[3] 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 in the type (or class) compared to any increases in the initial price of, initial charges for, or maintenance expenses of the products that are likely to result from the standard;
(3) The total projected amount of energy savings likely to result directly from the standard;
(4) Any lessening of the utility or the performance of the products likely to result from the standard;
(5) The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the standard;
(6) The need for national energy conservation; and
(7) Other factors the Secretary of Energy (Secretary) considers relevant.

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

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 EPCA, DOE is required to conduct an evaluation of each class of covered equipment in the 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 making a determination, DOE must evaluate whether amended 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); 42 U.S.C. 6313(a)(6)(A)) 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)) 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. Consistent with that statutory duality, 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. 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 July 17, 2015, DOE published a final rule in the *Federal Register* amending the energy conservation standards for WSHPs in response to the 2013 update to ASHRAE Standard 90.1 (*i.e.,* ASHRAE Standard 90.1-2013). 80 FR 42614 (July 2015 final rule). ASHRAE Standard 90.1-2013 set more-stringent standards for WSHPs. In the July 2015 final rule, DOE adopted the standard levels for WSHPS specified in ASHRAE Standard 90.1–2013. *Id*. Compliance with the amended energy conservation standards for WSHPs was required beginning on October 9, 2015. *Id*. The current energy conservation standards are codified in the Code of Federal Regulations (CFR) at 10 CFR 431.97.

The DOE test procedures for WSHPs are codified at 10 CFR 431.96. The current test procedure incorporates by reference International Organization for Standardization (ISO) Standard 13256-1:1998, *Water-source heat pumps-Testing and rating for performance-Part 1: Water-to-air and brine-to-air heat pumps"* (ISO 13256-1:1998), and includes additional provisions for equipment set-up at 10 CFR 431.96(e). Paragraph (e) of 10 CFR 431.96 provides specifications for addressing key information typically found in the installation and operation manuals.

ASHRAE Standard 90.1 has been updated since the 2013 version, most recently with the release of the 2019 version (*i.e.,* ASHRAE Standard 90.1-2019) on October 24, 2019. However, the standard levels for WSHPs remain unchanged from the 2013 version.

DOE is publishing this RFI to collect data and information to inform its decision consistent with its obligations under EPCA.

B. Rulemaking Process

As discussed, DOE is required to conduct an evaluation of each class of covered equipment in ASHRAE Standard 90.1 every six years. (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 follow specific statutory criteria. 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) (*referencing* 42 U.S.C. 6313(a)(6)(A)(ii)(II))

On February 14, 2020, DOE published in the *Federal Register* a final rule which updated the procedures, interpretations, and policies that DOE will follow in the consideration and promulgation of new or revised appliance energy conservation standards and test procedures under EPCA. 85 FR 8626; *see also* 10 CFR part 430, subpart C, appendix A (*i.e.*, "Process Rule"). The Process Rule requires DOE to conduct an early assessment, which includes publishing a notice in the *Federal Register* announcing that DOE is considering a rulemaking proceeding and soliciting the submission of related comments, including data and information on

whether DOE should proceed with the rulemaking, including whether any new or amended rule would be cost-effective, economically justified, technologically feasible, or would result in a significant savings of energy. Section 6(a)(1) of the Process Rule. Based on the responses received to the early assessment and DOE's own analysis, DOE will then determine whether to proceed with a rulemaking for a new or amended energy conservation standard or an amended test procedure. *Id*. If DOE determines that a new or amended standard would not satisfy all of the applicable statutory criteria, DOE would engage in a notice and comment rulemaking to issue a determination that a new or amended standard is not warranted. *Id.* If DOE receives sufficient information suggesting it could justify a new or amended standard or the information received is inconclusive with regard to the statutory criteria, DOE would undertake the preliminary stages of a rulemaking to issue or amend an energy conservation standard. Section 6(a)(2) of the Process Rule. In those instances where the early assessment either suggested that a new or amended energy conservation standard might be justified or in which the information was inconclusive on this, DOE will examine the potential costs and benefits and energy savings potential of a new or amended energy conservation standard. Section 6(a)(3) of the Process Rule.

Because ASHRAE equipment is subject to its own unique statutory requirements and timelines, those provisions will generally govern. For example, when triggered by ASHRAE action in amending Standard 90.1, an early assessment is generally not necessary for the triggered equipment classes, because DOE is statutorily bound to adopt those standard levels, unless the agency has clear and convincing evidence to adopt more-stringent levels. However, in other circumstances where the rulemaking for ASHRAE equipment more closely mirrors a typical DOE rulemaking (such as where DOE is considering more-stringent standards or

conducting a 6-year-lookback rulemaking), the Department would apply all relevant provisions of the Process Rule. *See* section 9 of the Process Rule; *see also* 85 FR 8626, 8637 (Feb. 14, 2020).

Given that this is an ASHRAE 6-year-lookback rulemaking, DOE will first look to the projected energy savings that are likely to result in "significant energy savings," as required under 42 U.S.C. 6295(o)(3)(B) to ensure that DOE avoids setting a standard that "will not result in significant conservation of energy."[4] Section 6(b)(1) of the Process Rule. To determine whether energy savings could be significant, the projected energy savings from a potential maximum technologically feasible (max-tech) standard will be evaluated against a threshold of 0.3 quadrillion Btus (quads) of site energy saved over a 30-year period. Section 6(b)(2) of the Process Rule. If the projected max-tech energy savings do not meet or exceed this threshold, those max-tech savings would then be compared to the total energy usage of the covered product to calculate a potential percentage reduction in energy usage. Section 6(b)(3) of the Process Rule. If this comparison does not yield a reduction in site energy use of at least 10 percent over a 30-year period, the analysis will end, and DOE will propose to determine that no significant energy savings would likely result from setting new or amended standards. Section 6(b)(4) of the Process Rule. If either one of the thresholds is reached, DOE will conduct analyses to ascertain whether a standard can be prescribed that produces the maximum improvement in energy efficiency that is both technologically feasible and economically justified and still

[4] EPCA defines "energy efficiency" as the ratio of the useful output of services from an article of industrial equipment to the energy use of such article, measured according to the Federal test procedures. (42 U.S.C. 6311(3)) EPCA defines "energy use" as the quantity of energy directly consumed by an article of industrial equipment at the point of use, as measured by the Federal test procedures. (42 U.S.C. 6311(4)) Given this context, DOE relies on site energy as the appropriate metric for evaluating the significance of energy savings.

constitutes significant energy savings at the level determined to be economically justified. Section 6(b)(5) of the Process Rule.

Because this rulemaking was already in progress at the time the revised Process Rule was published, DOE will apply those provisions moving forward (*i.e.*, rather than reinitiating the entire rulemaking process). However, DOE welcomes comment, information, and data bearing on the issues that would be raised in an early assessment for WSHPs.

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

> (1) The economic impact of the standard on manufacturers and consumers of the 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 increase in the price of, initial charges for, or maintenance expenses of the covered equipment that are 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 covered equipment 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 of Energy (Secretary) considers relevant.

(42 U.S.C. 6313(a)(6)(C)(i)(II), *referencing* 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 I.1 shows the individual analyses that are performed to satisfy each of the requirements within EPCA.

Table I.1 EPCA Requirements and Corresponding DOE Analysis

EPCA Requirement	Corresponding DOE Analysis
Significant Energy Savings	• Shipments Analysis • National Impact Analysis • Energy and Water Use Determination
Technological Feasibility	• Market and Technology Assessment • Screening Analysis • Engineering Analysis
Economic Justification:	
1. Economic impact on manufacturers and consumers	• Manufacturer Impact Analysis • Life-Cycle Cost and Payback Period Analysis • Life-Cycle Cost Subgroup Analysis • Shipments Analysis
2. Lifetime operating cost savings compared to increased cost for the product	• Mark-ups for Product Price Determination • Energy and Water Use Determination • Life-Cycle Cost and Payback Period Analysis
3. Total projected energy savings	• Shipments Analysis • National Impact Analysis
4. Impact on utility or performance	• Screening Analysis • Engineering Analysis
5. Impact of any lessening of competition	• Manufacturer Impact Analysis
6. Need for national energy and water conservation	• Shipments Analysis • National Impact Analysis
7. Other factors the Secretary considers relevant	• Employment Impact Analysis • Utility Impact Analysis • Emissions Analysis • Monetization of Emission Reductions Benefits • Regulatory Impact Analysis

As detailed throughout this RFI, DOE is publishing this document seeking input and data from interested parties to aid in the development of the technical analyses on which DOE will ultimately rely to determine whether (and if so, how) to amend the energy conservation standards for WSHPs.

II. Request for Information and Comments

In the following 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 WSHPs may be warranted. DOE also welcomes comments on other issues relevant to this data-gathering process that may not specifically be identified in this document.

In addition, as an initial matter, DOE seeks comment on whether there have been sufficient technological or market changes 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 a significant additional savings of energy; (2) is not technologically feasible; (3) is not economically justified; or (4) any combination of foregoing.

A. Equipment Covered by This Process

This RFI covers equipment that meet the definitions of WSHPs, as codified at 10 CFR 431.92. The current definition for WSHPs was established in the July 2015 Final Rule. 80 FR 42614, 42632, 42664 (July 17, 2015).

DOE defines "water-source heat pump" as a single-phase or three-phase reverse-cycle heat pump that uses a circulating water loop as the heat source for heating and as the heat sink for cooling. The main components are a compressor, refrigerant-to-water heat exchanger, refrigerant-to-air heat exchanger, refrigerant expansion devices, refrigerant reversing valve, and

indoor fan. Such equipment includes, but is not limited to, water-to-air water-loop heat pumps. 10 CFR 431.92. EPCA excludes from the definition of "commercial package air conditioning and heating equipment" ground-water-source units. (42 U.S.C. 6311(8)(A)) As such, "water-source heat pump" does not include ground-water-source units.

Issue A.1 DOE requests comment on whether the definition for WSHPs requires any revisions – and if so, how the definition should be revised. Please provide the rationale for any suggested change.

Issue A.2 DOE requests comment on whether additional equipment definitions are necessary to close any potential gaps in coverage between equipment categories. If there are such gaps, DOE also seeks input on whether WSHP models currently exist in the market that are in such a gap or whether they are being planned for introduction.

B. Market and Technology Assessment

The market and technology assessment that DOE routinely conducts when analyzing the impacts of a potential new or amended energy conservation standard provides information about the WSHP industry that will be used in DOE's analysis throughout the rulemaking process. DOE uses qualitative and quantitative information to characterize the structure of the industry and market. DOE identifies manufacturers, estimates market shares and trends, addresses regulatory and non-regulatory initiatives intended to improve energy efficiency or reduce energy consumption, and explores the potential for efficiency improvements in the design and manufacturing of WSHPs. DOE also reviews product literature, industry publications, and company websites. Additionally, DOE considers conducting interviews with manufacturers to

improve its assessment of the market and available technologies for WSHPs.

1. Energy Efficiency Descriptor

For WSHPs, DOE currently prescribes energy efficiency ratio (EER) as the cooling mode metric and coefficient of performance (COP) as the heating mode metric. 10 CFR 431.96. These energy efficiency descriptors are the same as those included in ASHRAE 90.1-2019 for WSHPs. EER is the ratio of the produced cooling effect of the WSHP to its net work input, expressed in Btu/watt-hour, and measured at standard rating conditions. COP is the ratio of the produced heating effect of the WSHP to its net work input, when both are expressed in identical units of measurement, and measured at standard rating conditions. DOE's test procedure for WSHPs does not include a seasonal metric or part-load performance.

On June 22, 2018, DOE published an RFI (June 2018 TP RFI) to collect information and data to consider amendments to DOE's test procedure for WSHPs. 83 FR 29048. As part of the June 2018 TP RFI, DOE requested comment on whether adoption of a cooling-mode metric that integrates part-load performance would better represent full-season efficiency. 83 FR 29048, 29051 (June 22, 2018). If DOE amends the WSHP test procedure to incorporate a part-load metric, DOE would consider conducting analyses for future standards rulemakings, if any, based on the amended test procedure, including an added part-load metric.

2. Equipment Classes

For WSHPs, the current energy conservation standards specified in 10 CFR 431.97 are based on three equipment classes delineated by cooling capacity. Table II.1 lists the current three equipment classes for WSHPs.

Table II.1 Current WSHP Equipment Classes

Equipment Class (by Cooling Capacity Range)	
1	<17,000 Btu/h
2	≥17,000 Btu/h and <65,000 Btu/h
3	≥65,000 Btu/h and <135,000 Btu/h

The current Federal test procedure and energy conservation standards at 10 CFR 431.96 and 10 CFR 431.97 apply only to WSHPs with a rated cooling capacity below 135,000 Btu/h. This limit of coverage is consistent with the standards and test procedures specified for WSHPs in ASHRAE 90.1-2019.

3. Review of Current Market

To inform its evaluation of WSHPs, DOE initially reviewed data in DOE's Compliance Certification Database (CCMS Database)[5] to characterize the distribution of efficiencies for WSHP equipment currently available on the market, analyzing cooling and heating efficiency separately. DOE is making available for comment a document that provides the distributions of EER and COP for WSHPs in all three equipment classes: <17,000 Btu/h, ≥17,000 Btu/h and <65,000 Btu/h, and ≥65,000 Btu/h and <135,000 Btu/h. In addition, the document shows the relationship between EER and COP for units in all three equipment classes, including scatterplots and linear regression trendlines (see Docket No. EERE-2019-BT-STD-0031-0001). Table II.2 shows the number of models listed within the DOE Compliance Certification Database that DOE has identified for each class of WSHPs.

[5] DOE's Compliance Certification Database is available at: *https://www.regulations.doe.gov/certification-data/products.html#q=Product_Group_s%3A** (Last accessed Sept. 26, 2019).

Table II.2 Number of Models Under Current WSHP Equipment Classes

Cooling Capacity Range (Btu/h)	Number of Models
<17,000	1,041
≥17,000 and <65,000	5,263
≥65,000 and <135,000	735

4. Technology Assessment

In analyzing the feasibility of potential new or amended energy conservation standards, DOE uses information about existing and past technology options and prototype designs to help identify technologies that manufacturers could use to meet and/or exceed a given set of energy conservation standards under consideration. In consultation with interested parties, DOE intends to develop a complete list of technologies to consider in its analysis. In the interim, DOE conducted preliminary market research by examining manufacturer product literature which identified specific technologies and design options, and DOE will consider these along with others identified during the rulemaking process, should it determine that a rulemaking is necessary. Accordingly, DOE has put together a preliminary list of options in Table II.3 of this document.

Table II.3 Preliminary Technology Options for WSHPs

Technology Options	
Heat Exchanger Improvements	Increased evaporator coil face area
	Increased evaporator coil depth
	Increased condenser coil surface area
Indoor Blower Improvements	Improved fan motor efficiency (*e.g.*, electrically commutated motors (ECMs))
	More-efficient fan geometries
Compressor Improvements	Improved compressor efficiency
Other Improvements	Improved onboard pump efficiency (for units with onboard pumps)

Issue B.2 DOE seeks information on the technologies listed in Table II.3 of this document regarding their applicability to the current market and how these technologies may impact the efficiency of WSHPs as measured according to the DOE test procedure. Specifically, DOE seeks information on the range of efficiencies or performance characteristics that are currently available for each technology option.

Issue B.3 DOE seeks information on the technologies listed in Table II.3 of this document regarding their market adoption, costs, and any concerns with incorporating them into equipment (*e.g.*, impacts on consumer utility, potential safety concerns, manufacturing/production/implementation issues).

Issue B.4 DOE seeks comment on other technology options that it should consider for inclusion in its analysis and if these technologies may impact equipment features or consumer utility.

DOE does not consider technologies that do not have an impact on the energy consumption as measured according to the DOE test procedure. For WSHPs, technologies excluded on this basis include electronic expansion valves (EEVs) and multi-speed compressors. As discussed in section II.B.1 of this document, the current DOE test procedure for WSHPs measures efficiency at full-load conditions, while EEVs and multi-speed compressor technologies provide benefit at part-load conditions. EEVs regulate the flow of liquid refrigerant entering the evaporator and can adapt to changes in operating conditions, such as variations in temperature, humidity, and compressor staging. As a result, EEVs can control for optimum

system operating parameters over a wide range of operating conditions, which would be a consideration in an evaluation of seasonal and/or part-load efficiency. Multi-speed compressors (*e.g.*, two-speed, variable-capacity, and variable-speed compressors) enable modulation of the refrigeration system cooling capacity, allowing the unit to match the cooling load. This modulation can improve efficiency by: (1) reducing off-cycle losses; and (2) improving heat exchanger effectiveness at part-load conditions by operating at a lower refrigerant mass flow rate.

Issue B.5 DOE seeks comment on whether it is appropriate to exclude EEVs and multi-speed compressors from DOE's analysis because these features do not impact energy consumption as measured according to the current DOE test procedure.

C. Screening Analysis

The purpose of the screening analysis is to evaluate the technologies that improve equipment efficiency to determine which technologies will be eliminated from further consideration and which will be passed to the engineering analysis for further consideration.

DOE determines whether to eliminate certain technology options from further consideration based on the following criteria:

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

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

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

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

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

10 CFR part 430, subpart C, appendix A, 6(c)(3) and 7(b).

Technology options identified in the technology assessment are evaluated against these criteria using DOE analyses and inputs from interested parties (*e.g.*, manufacturers, trade

organizations, and energy efficiency advocates). Technologies that pass through the screening analysis are referred to as "design options" in the engineering analysis. Technology options that fail to meet one or more of the listed criteria are eliminated from consideration.

DOE did not screen out any technology options in the July 2015 final rule based on any of the screening criteria.

Issue C.1 DOE requests feedback on what impact, if any, the four screening criteria described in this section would have on consideration of each of the technology options listed in Table II.3 of this document with respect to WSHPs. Similarly, DOE seeks information regarding how these same criteria would affect consideration of any other technology options not already identified in this document with respect to their potential use in WSHPs.

D. Engineering Analysis

The engineering analysis estimates the cost-efficiency relationship of equipment at different levels of increased energy efficiency (efficiency levels). This relationship serves as the basis for the cost-benefit calculations for consumers, manufacturers, and the Nation. In determining the cost-efficiency relationship, DOE estimates the increase in manufacturer production cost (MPC) associated with increasing the efficiency of equipment above the Federal minimum level (*i.e.*, the baseline), up to the maximum technologically feasible (max-tech) efficiency level for each equipment class.

DOE historically has used the following three methodologies to generate incremental

manufacturing costs and establish efficiency levels (ELs) for analysis: (1) the design-option approach, which provides the incremental costs of adding to a baseline model design options that will improve its efficiency; (2) the efficiency-level approach, which provides the relative costs of achieving increases in energy efficiency levels, without regard to the particular design options used to achieve such increases; and (3) the cost-assessment (or reverse-engineering) approach, which provides "bottom-up" manufacturing cost assessments for achieving various levels of increased efficiency, based on detailed cost data for parts and materials, labor, shipping/packaging, and investment for models that operate at particular efficiency levels.

1. Baseline Efficiency Levels

For each established equipment class, DOE selects a baseline model as a reference point against which any changes resulting from new or amended energy conservation standards can be measured. The baseline model in each equipment class represents the characteristics of common or typical equipment in that class. Typically, a baseline model is one that just meets the current minimum energy conservation standards and provides basic consumer utility.

If it determines that a rulemaking is necessary, consistent with this analytical approach, DOE tentatively plans to consider the current minimum energy conservation standards to establish the baseline efficiency levels for each equipment class. As discussed in section II.B.1 of this document, the current standards for WSHPs are based on the full-load metrics (*i.e.*, EER and COP). The current standards for WSHPs are found at 10 CFR 431.97 and are presented in Table II.4 of this document.

Table II.4 Current WSHP Energy Conservation Standard Levels

Equipment Class (by Cooling Capacity Range)	Current Minimum Energy Conservation Standard Levels
<17,000 Btu/h	EER = 12.2 COP = 4.3
≥17,000 Btu/h and <65,000 Btu/h	EER = 13.0 COP = 4.3
≥65,000 Btu/h and <135,000 Btu/h	EER = 13.0 COP = 4.3

Issue D.1 DOE requests feedback on whether the current established minimum energy conservation standards for WSHPs are appropriate baseline efficiency levels for DOE to apply to each equipment class in evaluating whether to amend the current energy conservation standards for this equipment. DOE requests data and suggestions to evaluate the baseline efficiency levels in order to better evaluate the potential for amending energy conservation standards for this equipment.

Issue D.2 DOE requests feedback on the appropriate baseline efficiency levels for any newly analyzed equipment classes that are not currently in place or for any contemplated combined equipment classes, as discussed in section II.B.2 of this document. For newly analyzed equipment classes, DOE requests energy use data to develop a baseline relationship between energy use and the basis for the new class (*e.g.*, cooling capacity).

2. Maximum-Available and Maximum-Technologically-Feasible Levels

As part of DOE's analysis, DOE considers the maximum-available efficiency level, which is the highest-efficiency unit currently available on the market. DOE also considers the max-tech efficiency level, which it defines as the level that represents the theoretical maximum

possible efficiency if all available design options are incorporated in a model. In many cases, the max-tech efficiency level is not commercially available because it is not economically feasible.

For the July 2015 final rule, DOE surveyed the AHRI Directory of Certified Product Performance[6] (AHRI Database) to determine the highest efficiency that commercially-available WSHP equipment could attain. 80 FR 42614, 42632 (July 17, 2015).

Table II.5 shows the maximum-available efficiency levels considered for the July 2015 final rule and based on the current market for each equipment classes. 80 FR 42614, 42634 (July 17, 2015). DOE reviewed the CCMS Database to determine the maximum-available units on the current market for each equipment class. For the July 2015 final rule analysis, DOE did not develop COP efficiency levels independent of EER efficiency levels. Rather, DOE developed the COP efficiency levels using a relationship between EER and COP from AHRI Database market data, thus determining an "average" COP level for each EER efficiency level. See chapter 4 of the July 2015 final rule technical support document (TSD); (Docket No.: EERE-2014-BT-STD-0015-0043 at p. 53). Therefore, DOE did not separately analyze maximum-available COP levels as part of the July 2015 final rule. See section II.D.4 of this notice for further discussion on heating efficiency levels.

[6] The AHRI Directory of Certified Product Performance is available at: *http://www.ahridirectory.org* (Last accessed Nov. 11, 2013).

Table II.5 Maximum-Available Efficiency Levels for WSHPs

Equipment Class (by Cooling Capacity Range)	July 2015 Final Rule	Current Market
<17,000 Btu/h	18.1 EER	18.8 EER 6.4 COP
≥17,000 Btu/h and <65,000 Btu/h	21.6 EER	19.6 EER 6.7 COP
≥65,000 Btu/h and <135,000 Btu/h	17.2 EER	18.2 EER 6.0 COP

Issue D.3 DOE seeks input on whether the current maximum-available efficiency levels are appropriate and technologically feasible for potential consideration as possible energy conservation standards for the equipment at issue – and if not, why not?

Issue D.4 DOE seeks feedback on which design options would be incorporated at a max-tech efficiency level. DOE also seeks information as to whether there are limitations on the use of certain combinations of design options.

3. Manufacturer Production Costs and Manufacturing Selling Price

As described at the beginning of this section, the main outputs of the engineering analysis are cost-efficiency relationships that describe the estimated increases in manufacturer production cost associated with higher-efficiency equipment for the analyzed equipment classes. For the July 2015 final rule, DOE developed the cost-efficiency relationships by identifying incremental improvements in efficiency for each equipment class and developing a cost for each efficiency level, based on a catalog teardown (or "virtual teardown") analysis, in which published manufacturer catalog data and supplementary component data were used to estimate the major physical differences between WSHPs and commercial heating and cooling products with similar

components that were previously disassembled. 80 FR 42614, 42633 (July 17, 2015); *see also* chapter 3 of the July 2015 final rule TSD (EERE-2014-BT-STD-0015-0043 at p. 35).

Issue D.5 DOE requests feedback on how manufacturers would incorporate the technology options listed in Table II.3 of this document to increase energy efficiency in WSHPs beyond the current levels. This includes information on the order in which manufacturers would incorporate the different technologies to incrementally improve the efficiencies of equipment. DOE also requests feedback on whether the increased energy efficiency would lead to other design changes that would not occur otherwise. DOE is also interested in information regarding any potential impact of design options on a manufacturer's ability to incorporate additional functions or attributes in response to consumer demand.

Issue D.6 DOE also seeks input on the increase in MPC associated with incorporating each particular design option and/or with reaching efficiency levels above the baseline. Specifically, DOE is interested in whether and how the costs estimated in the July 2015 final rule have changed since the time of that analysis. DOE also requests information on the investments necessary to incorporate specific design options, including, but not limited to, costs related to new or modified tooling (if any), materials, engineering and development efforts to implement each design option, and manufacturing/production impacts.

Issue D.7 DOE requests comment on whether certain design options may not be applicable to (or incompatible with) specific equipment classes.

To account for manufacturers' non-production costs and profit margin, DOE applies a non-production cost multiplier (the manufacturer mark-up) to the MPC. The resulting manufacturer selling price (MSP) is the price at which the manufacturer distributes a unit into commerce. For the July 2015 final rule, DOE used a manufacturer mark-up of 1.30 for all WSHPs. *See* chapter 3 of the July 2015 final rule TSD (EERE-2014-BT-STD-0015-0043 at p. 39).

Issue D.8 DOE requests feedback on whether a manufacturer mark-up of 1.30 is appropriate for WSHPs.

4. Other Engineering Topics

As previously discussed, for the July 2015 final rule analysis, DOE developed COP efficiency levels using a relationship between EER and COP from AHRI Database market data, thus determining an "average" COP level for each EER efficiency level. As mentioned in section II.B.3 of this RFI, DOE is making available for comment a document that shows relationships between EER and COP through linear regression, based on current market data from the CCMS database (see Docket No. EERE-2019-BT-STD-0031-0001 at pp. 5-7).

Issue D.9 DOE requests feedback on whether the approach used in the July 2015 final rule of developing COP levels based on a correlated relationship between EER and COP for WSHPs is appropriate for this rulemaking, or whether cooling and heating efficiency levels should be analyzed separately. Specifically, DOE requests comment on whether the relationships between EER and COP presented for each WSHP equipment class (see Docket No. EERE-2019-BT-STD-0031-0001 at pp. 5-7) would be appropriate to use for developing COP

efficiency levels based on EER efficiency levels. Additionally, DOE seeks feedback on whether WSHPs are typically designed to prioritize efficiency in cooling mode over heating mode.

DOE is aware of several different configurations of WSHPs currently on the market. Specifically, DOE understands that the most common WSHP configuration is a single-package unit, typically in a horizontal or vertical configuration. DOE has also identified WSHPs in the following configurations: split system, console (*e.g.*, installed on a wall below a window), and vertical stack units (*e.g.*, taller and narrower than typical single package WSHPs, in order to minimize footprint). DOE is considering whether the different WSHP configurations should be treated similarly in the rulemaking analyses, or whether separate analyses/inputs are warranted for each configuration.

Issue D.10 DOE requests comment on whether alternate configurations of WSHPs (*e.g.*, split systems, console units, vertical stack units) have different design options, achievable efficiency levels, or cost-efficiency relationships than typical single-package units. DOE also requests comment on whether there are any other types of WSHP configurations that may have different design options, efficiency levels, or cost-efficiency relationships. Further, DOE requests data and comment on the market share of alternate WSHP configurations.

E. Mark-ups and Distribution Channels

In generating end-user price inputs for the life-cycle cost (LCC) analysis and the national impact analysis (NIA), DOE must identify distribution channels (*i.e.*, how the products are moved from the manufacturer to the consumer), and estimate relative sales volumes through each channel. Additionally, DOE needs to determine the cost to the commercial consumer of a

baseline piece of equipment that satisfies the currently applicable standards, and the cost of the more-efficient piece of equipment the consumer would purchase under potential new and/or amended standards. By applying a multiplier called a "mark-up" to the MSP, DOE estimates the commercial consumer's price. The appropriate mark-ups for determining the end-user equipment price depend on the distribution channels.

In the July 2015 final rule, DOE identified four distribution channels based on the analysis conducted for commercial unitary air conditioners and heat pumps, as WSHPs are also commercial equipment and move to the market through the same channels. Two distribution channels represent the sale of new equipment, and two represent the sale of replacement equipment. In the new equipment distribution channel, a WSHP manufacturer sells the equipment to a heating, ventilation, and air conditioning (HVAC) distributor, who sells to either a small or large mechanical contractor, who in turn sells it to a general contractor, who sells it to the customer. 80 FR 42614, 42625 (July 17, 2015).

New Distribution Channels

Manufacturer → HVAC Distributor → Large Mechanical Contractor → General Contractor → End User

Manufacturer → HVAC Distributor → Small Mechanical Contractor → General Contractor → End User

In the replacement distribution channel, a WSHP manufacturer sells the product to an HVAC distributor, who then sells it to either a small or large mechanical contractor, who sells it to the customer and performs the installation. 80 FR 42614, 42625 (July 17, 2015).

Replacement Distribution Channels

Manufacturer → HVAC Distributor → Large Mechanical Contractor → End User

Manufacturer → HVAC Distributor → Small Mechanical Contractor → End User

A recent literature review indicates that the end users of WSHPs have not changed since the July 2015 final rule, and, therefore, DOE is using the same distribution channels in this RFI. 80 FR 42614, 42625 (July 17, 2015).

Were DOE to undertake an energy conservation standards rulemaking, DOE would determine the mark-ups for HVAC distributors and contractors by examining the updated versions of the sources of information used in the previous energy conservation standards rulemaking for WSHPs. In the July 2015 final rule, DOE developed baseline and incremental mark-ups based on available financial data. More specifically, DOE based the HVAC distributor mark-ups on data from the Heating, Air Conditioning, and Refrigeration Distributors International (HARDI) 2010 Profit Report. DOE also used financial data from the U.S. Census Bureau[7] to estimate mark-ups for mechanical contractors and general contractors. See Chapter 6 of the July 2015 final rule TSD for more details on mark-ups and distribution channels.

[7] Available at: *https://www.census.gov/programs-surveys/economic-census.html* (Last accessed March 12, 2020).

Issue E.1 DOE requests information on the existence of any distribution channels other than the four distribution channels identified in the July 2015 final rule that are used to distribute the WSHP equipment at issue into the market. DOE also requests data on the fraction of WSHPs that go through each of the four identified distribution channels, as well as the fraction of sales that go through any other identified channels. DOE also welcomes comment on its approach to estimating mark-ups and any financial data available that would assist DOE in developing mark-ups for the various segments in the above-mentioned distribution channels.

F. Energy Use Analysis

As part of a typical rulemaking process, DOE conducts an energy use analysis to identify how equipment is used by consumers, and thereby determine the energy savings potential of energy efficiency improvements. To determine the energy savings potential, DOE develops estimates of the annual unit energy consumption (UEC) for each efficiency level developed in the engineering analysis. The energy savings are calculated by comparing the UEC of a baseline product to the UECs of higher-efficiency products. In the July 2015 final rule, DOE developed estimates of the UEC in kilowatt hours (kWh) by equipment type and efficiency level (EL). Energy savings from higher-efficiency equipment was measured by comparing the UECs of higher ELs to the UEC of the ASHRAE baseline EL.[8] 80 FR 42614, 42625 (July 17, 2015). However, because this current rulemaking is being conducted under EPCA's 6-year-lookback

[8] As stated in section I.A, EPCA directs DOE to adopt the ASHRAE standard unless there is clear and convincing evidence to support a higher standard level. (42 U.S.C. 6313(a)(6)(A)(ii)(I)-(II)) The July 2015 final rule was an ASHRAE trigger rulemaking, and as DOE is obligated to adopt ASHRAE as the minimum standard level, the energy use analysis uses the UEC of the ASHRAE level as the baseline.

authority, energy savings for higher-efficiency equipment was measured by comparing the UECs of higher ELs to UECs of the baseline EL (*i.e.*, the current Federal standards).

The cooling UECs came from Appendix D of the 2000 Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment (2000 Screening Analysis).[9,10] If the efficiency levels in the 2000 Screening Analysis were identical to the levels developed in the engineering analysis for WSHPs, DOE used that UEC. For other efficiency levels, DOE scaled the UEC based on the ratio of EER. Heating UECs were developed using the 2003 Commercial Building Energy Consumption Survey[11] (CBECS 2003). DOE analyzed the heating energy use of buildings in CBECS 2003 that use heat pumps for heating and developed a national-average annual energy use per square foot value. DOE converted that into an energy use per ton value using a ton per square foot relationship derived from the energy use analysis in the 2014 Commercial Unitary Air Conditioner (CUAC) NOPR. 80 FR 1172, 1202 (Jan. 8, 2015). DOE determined that the average COP of a commercial heat pump was 2.9 and developed a heating UEC for a WSHP with a COP of 2.9 by multiplying energy use per ton by the representative capacity for each equipment class. DOE then developed corresponding COPs for each efficiency level by correlating COP to EER based on the AHRI Certified Equipment Database. To determine the heating UECs for all efficiency levels, DOE scaled the UEC based on the COP level relative to a COP of 2.9. 80 FR 42614, 42635 (July 17, 2015). DOE noted that this approach to heating energy use represented air-source heat pumps, not WSHP, and asked for

[9] Pacific Northwest National Laboratory, "Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment, Report number 13232 (April 2000) (Available at: *https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-13232.pdf*).

[10] The 2000 Screening Analysis was conducted by Pacific Northwest National Laboratory on behalf of DOE to determine the energy savings potential of the efficiency levels in ASHRAE Standard 90.1-1999.

[11] Energy Information Administration, 2003 *Commercial Building Energy Consumption Survey* (2006) (Available at: *https://www.eia.gov/consumption/commercial/data/2003/index.php?view=microdata*).

comment from stakeholders on the validity of this approach in the January 2015 NOPR. 80 FR 42614, 42635 (July 17, 2015). However, no comments were received from stakeholders. Therefore, DOE maintained this approach to estimate the heating UEC.

DOE also adjusted the UECs to account for improvements in building shell characteristics and changes in internal loads, using scalars from the Energy Information Administration's National Energy Modeling System (NEMS)[12]. In order to incorporate variability by region and building type into the energy use analysis, DOE created distributions of UECs using estimates of Full-Load Equivalent Operating Hours for cooling and heating developed in the 2000 Screening Analysis. DOE developed UECs for five building types: offices, lodging, education, multi-family housing, and healthcare across the nine Census divisions. 80 FR 42614, 42635 (July 17, 2015).

Issue F.1 DOE requests comment on the approach that was used to develop UECs in the energy use analysis for the July 2015 final rule, as well as any potential improvements that might impact UECs, or data indicating actual UECs for this equipment.

Issue F.2 DOE requests comment on the building types used in the energy use analysis for the July 2015 final rule. Specifically, should any other types of commercial buildings be included in the energy use analysis?

Issue F.3 DOE requests comment on a new approach to the energy use analysis which would use the DOE commercial reference buildings to develop annual building loads for cooling

[12] Available at: *https://www.eia.gov/outlooks/aeo/nems/documentation/*.

and heating. The building loads would be matched with WSHP performance data in order to develop a UEC. DOE also requests performance data, as well as any data that measures the energy use of WSHPs in the field.

G. Life-Cycle Cost and Payback Period Analysis

DOE conducts the life-cycle cost (LCC) and payback period (PBP) analysis to evaluate the economic effects of potential energy conservation standards for WSHPs on individual customers. For any given efficiency level, DOE measures the PBP and the change in LCC relative to an estimated baseline level. The LCC is the total customer expense over the life of the equipment, consisting of purchase, installation, and operating costs (including expenses for energy use, maintenance, and repair). Inputs to the calculation of total installed cost include the cost of the equipment—which includes MSPs, distribution channel mark-ups, and sales taxes—and installation costs. Inputs to the calculation of operating expenses include annual energy consumption, energy prices and price projections, repair and maintenance costs, equipment lifetimes, discount rates, and the year that compliance with new and amended standards is required.

1. Repair and Maintenance Costs

In order to develop annual operating costs and savings for the life-cycle cost analysis, DOE estimates repair and maintenance costs over the lifetime of the WSHP. In the July 2015 final rule, DOE used RS Means[13] in order to develop annualized repair and maintenance costs.

[13] RS Means, Facilities Maintenance & Repair Cost Data 2013, *Reed Construction Data, LLC.* (*2012*).

The repair costs represent the expenses associated with repairing or replacing a damaged component of a WSHP that has failed, and the first instance of a significant repair is on average about 10 years after the initial purchase of the WSHP. The materials portion of the repair cost scales with the manufacturer selling price, although the labor portion stays constant, so higher-efficiency units will typically have higher repair costs. The annual maintenance cost represents expenses associated with ensuring continued operation of the covered equipment over time, something which remained constant across all efficiency levels. For a detailed description of the repair and maintenance cost methodology, please refer to chapter 6 of the July 2015 final rule TSD (EERE-2014-BT-STD-0015-0043). RS Means is a leading source for facility repair and maintenance data for space conditioning equipment; as such, DOE intends to use the most current version of RS Means for any future rulemakings for WSHPs.

Issue G.1 DOE requests feedback and data on whether maintenance costs differ in comparison to the baseline maintenance costs for any of the specific technology options listed in Table II.3 of this document. To the extent that these costs differ, DOE seeks supporting data and an explanation of the reasons for those differences.

Issue G.2 DOE requests information and data on the frequency of repair and repair costs by equipment class for the technology options listed in Table II.3 of this document. While DOE is interested in information regarding each of the listed technology options, DOE is also interested in the extent to which and at what point, consumers simply replace, as opposed to repair, failed WSHPs.

H. Shipments Analysis

DOE develops shipments projections of WSHPs to calculate the national impacts of potential amended energy conservation standards on energy consumption, net present value (NPV), and future manufacturer cash flows. DOE shipments projections are based on available historical data of total annual WSHP shipments. In the July 2015 final rule, DOE used data published by the U.S. Census in the years 1980, 1983-1994, 1997-2006, and 2008-2010 to develop a time series of historical shipments. DOE projected future shipments using a linear trend developed from the historical time series. To distribute the total shipments into the three equipment classes, DOE used the shipments data provided by AHRI in 1999 and published in the 2000 Screening Analysis for EPACT-Covered Commercial HVAC and Water-Heating Equipment. 80 FR 42614, 42638 (July 17, 2015). DOE intends to update the shipments trend and equipment class breakdown with new data, if available.

Issue H.1 DOE requests DOE requests the most recent annual sales data for WSHPs (*i.e.*, number of shipments), as well as historical annual sales data going back to 2015. DOE also requests the shipments by equipment class and efficiency level for the most recent year available and if possible, for each year going back to 2015.

Table II.6 which presents the number of WSHP models listed in the DOE CCMS database[14] by equipment class, along with the fraction of models by EER bins, is an example of the types of shipments and market share data that DOE seeks in Issue H.1. DOE requests that

[14] DOE's Compliance Certification Database is available at: *https://www.regulations.doe.gov/certification-data/products.html#q=Product_Group_s%3A** (Last accessed Sept. 26, 2019).

interested parties supplement this table with shipments data from 2018. Interested parties are also encouraged to provide additional shipments data as may be relevant.

Table II.6 Summary Table of WSHP Model Counts in the DOE CCMS Database*

Equipment Class	CCMS Model Count (2018)	Fraction of Models by EER Bin (%)						
		12.2 -13.2 EER	13.3 -14.2 EER	14.3 -15.2 EER	15.3 -16.2 EER	16.3 -17.2 EER	17.3 - 18.2 EER	> 18.3 EER
WSHP <17,000 Btu/h	1,009	39.2%	26.6%	16.7%	10.1%	3.8%	2.9%	0.8%
		13 - 14 EER	14.1 - 15 EER	15.1 - 16 EER	16.1 - 17 EER	17.1 - 18 EER	18.1 - 19 EER	> 19 EER
WSHP ≥17,000 Btu/h and <65,000 Btu/h	5,199	25.2%	28.0%	21.6%	16.0%	5.5%	3.4%	0.1%
WSHP ≥65,000 Btu/h and <135,000 Btu/h	739	37.2%	32.3%	25.2%	4.1%	0.8%	0.4%	0.0%

* See supplemental document for plots of cooling and heating efficiency distributions of WSHPs for all three equipment classes. (Docket No. EERE-2019-BT-STD-0031-0001)

If disaggregated fractions of annual sales are not available at the equipment class or efficiency level, DOE request more aggregated annual sales at the equipment category level.

In the July 2015 final rule, DOE based equipment lifetime on a retirement function in the form of a Weibull probability distribution, with a mean of 19 years. 80 FR 42614, 42637 (July 17, 2015). A Weibull distribution is a probability distribution function that is commonly used to measure failure rates, and, therefore, DOE intends to use the same approach in this RFI with updated information on lifetimes and 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. For more detail on the lifetime measurement, please refer to Chapter 6 of the July 2015 final rule TSD (EERE-2014-BT-STD-0015-0043).

Issue H.2 DOE requests comment on the estimated average lifetime of 19 years and the Weibull approach, as well as any new data that is available regarding the lifetime or annual failure rates of WSHPs. DOE also requests input on whether the lifetimes changes by equipment class, efficiency, or end use.

I. Manufacturer Impact Analysis

The purpose of the manufacturer impact analysis (MIA) is to estimate the financial impact of amended energy conservation standards on manufacturers of WSHPs, and to evaluate the potential impact of such standards on direct employment and manufacturing capacity. The MIA includes both quantitative and qualitative aspects. The quantitative part of the MIA primarily relies on the Government Regulatory Impact Model (GRIM), an industry cash-flow model adapted for each product in this analysis, with the key output being industry net present value (INPV). The qualitative part of the MIA addresses the potential impacts of energy conservation standards on manufacturing capacity and manufacturing employment, as well as factors such as product characteristics, impacts on particular subgroups of firms, and important market and product trends.

As part of the MIA, DOE intends to analyze 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.[15] Manufacturing of WSHPs 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. This employee threshold includes all employees in a business's parent company and any other subsidiaries.

One aspect of assessing manufacturer burden involves examining the cumulative impact of multiple DOE standards and the product-specific regulatory actions of other Federal agencies that affect the manufacturers of a covered product or equipment. While any one regulation may not impose a significant burden on manufacturers, the combined effects of several existing or impending regulations may have serious consequences for some manufacturers, groups of manufacturers, or an entire industry. Assessing the impact of a single regulation may overlook this cumulative regulatory burden. In addition to energy conservation standards, other regulations can significantly affect manufacturers' financial operations. Multiple regulations affecting the same manufacturer can strain profits and lead companies to abandon product lines or markets with lower expected future returns than competing products. For these reasons, DOE conducts an analysis of cumulative regulatory burden as part of its rulemakings pertaining to appliance efficiency.

Issue I.1 To the extent feasible, DOE seeks the names and contact information of any domestic or foreign-based manufacturers that distribute WSHPs in commerce in the United

[15] Available online at *https://www.sba.gov/document/support--table-size-standards*.

States.

Issue I.2 DOE identified small businesses as a subgroup of manufacturers that could be disproportionally impacted by amended energy conservation standards. DOE requests the names and contact information of small business manufacturers (as defined by the SBA's size threshold) of WSHPs that distribute products in commerce in the United States. In addition, DOE requests comment on any other manufacturer subgroups that could be disproportionally impacted by amended energy conservation standards. DOE requests feedback on any potential approaches that could be considered to address impacts on manufacturers, including small businesses.

Issue I.3 DOE requests information regarding the cumulative regulatory burden impacts on manufacturers of WSHPs associated with: (1) other DOE standards applying to different equipment that these manufacturers may also make and (2) equipment-specific regulatory actions of other Federal agencies. DOE also requests comment on its methodology for computing cumulative regulatory burden and whether there are any flexibilities it can consider that would reduce this burden while remaining consistent with the requirements of EPCA.

J. 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 WSHPs.

2. Network Mode / "Smart" Equipment

DOE 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 that RFI as they may be applicable to energy conservation standards for WSHPs.

3. Other

Additionally, DOE welcomes comments on any other aspect of energy conservation standards for WSHPs that may not specifically be identified in this document. 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 WSHPs while remaining consistent with the requirements of EPCA.

III. 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 and information on matters addressed in this document and on other matters relevant to DOE's consideration of amended energy conservations standards for WSHPs. After the close of the comment period, DOE will review the public comments received and may begin collecting data and conducting the analyses discussed in this RFI.

Submitting comments via *http://www.regulations.gov*. The *http://www.regulations.gov* webpage requires you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies Office 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 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. No

telefacsimiles (faxes) will be accepted.

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

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

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, 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.

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 process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this process should contact Appliance and Equipment Standards Program staff at (202) 287-1445 or via e-mail at *ApplianceStandardsQuestions@ee.doe.gov*.

Signing Authority

This document of the Department of Energy was signed on April 2, 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 April 2, 2020