

Appliance Standards Awareness Project  
Natural Resources Defense Council

June 11, 2020

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

**RE: Docket Number EERE–2019–BT–STD–0031/RIN 1904-AE74: Request for Information for Energy Conservation Standards for Water-Source Heat Pumps**

Dear Ms. Rivest:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP) and Natural Resources Defense Council (NRDC) on the request for information (RFI) for energy conservation standards for water-source heat pumps. 85 Fed. Reg. 27929 (May 12, 2020). We appreciate the opportunity to provide input to the Department.

**DOE should conduct a full analysis to evaluate potential amended standards for water-source heat pumps.** As DOE shows in the RFI, the maximum-available efficiency levels are significantly higher than the current minimum standards. For example, for equipment with cooling capacities  $\geq 17,000$  Btu/h and  $< 65,000$  Btu/h, the current standards are 13.0 EER and 4.3 COP, while the maximum-available efficiency levels are 19.6 EER and 6.7 COP.<sup>1</sup> Furthermore, for the  $< 17,000$  Btu/h equipment class and the  $\geq 65,000$  Btu/h and  $< 135,000$  Btu/h equipment class, the maximum-available efficiency levels are higher than the max-tech levels evaluated in the 2015 final rule.<sup>2</sup> DOE's analysis of models in the CCMS Database also found that a large portion of models have efficiency levels that exceed the current minimum standards. For example, for equipment with cooling capacities  $\geq 17,000$  Btu/h and  $< 65,000$  Btu/h, DOE found that 75% of models have an EER rating more than 1.0 EER higher than the minimum standard, and 61% of models have a COP rating more than 0.4 COP higher than the minimum standard.<sup>3</sup> In addition, as described below, we understand that alternative refrigerants can improve efficiency by at least 5% relative to the refrigerant currently being used (R410A).

Furthermore, as explained below, amended standards for water-source heat pumps should be based on an amended test procedure that incorporates part-load performance and better captures fan energy use. These test procedure changes would result in changes to efficiency ratings that would better represent performance during a representative average use cycle while also allowing additional technology options to be considered that could further increase potential savings.

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<sup>1</sup> 85 Fed. Reg. 27935.

<sup>2</sup> Ibid.

<sup>3</sup> <https://www.regulations.gov/document?D=EERE-2019-BT-STD-0031-0001>.

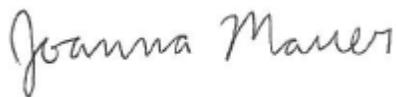
**Amended standards for water-source heat pumps should be based on an amended test procedure that incorporates part-load performance and better captures fan energy use.** The current efficiency metrics for water-source heat pumps, EER and COP, reflect only full-load cooling and heating performance. As we described in our comments on the test procedures RFI, since water-source heat pumps likely spend most of their time operating at part load, the current efficiency ratings are not providing good information to purchasers and do not provide a way for manufacturers to demonstrate the potential savings associated with technologies that improve part-load performance such as variable-speed compressors.<sup>4</sup> We also encouraged DOE in our comments on the test procedures RFI to ensure that the test procedure adequately captures fan energy use, and, specifically, to investigate fan energy consumption when the compressor is off and to establish minimum external static pressure requirements for ducted equipment.

**We encourage DOE to consider alternative refrigerants and microchannel heat exchangers as technology options.** We understand that typical water-source heat pumps use R410A as the refrigerant and that alternatives to R410A such as R32, R452B, and R454B can improve efficiency by at least 5%.<sup>5</sup> And according to one manufacturer of water-source heat pumps, microchannel coils “improve the efficiency of the unit, reduce air pressure drop, reduce fan horsepower, and reduce unit weight.”<sup>6</sup> We encourage DOE to consider alternative refrigerants and microchannel heat exchangers as technology options to improve efficiency.

**DOE should include electronic expansion valves (EEVs) and multi-speed and variable-speed compressors as technology options based on an amended test procedure.** In the RFI, DOE requests comment on excluding EEVs and multi-speed compressors from the analysis because they do not impact energy consumption as measured by the current DOE test procedure.<sup>7</sup> As described above, we urge DOE to consider amended standards for water-source heat pumps based on an amended test procedure that incorporates part-load efficiency performance. DOE should include EEVs and multi-speed and variable-speed compressors as technology options based on such an amended test procedure.

Thank you for considering these comments.

Sincerely,



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Technical Advocacy Manager  
Appliance Standards Awareness Project



Lauren Urbanek  
Senior Energy Policy Advocate  
Natural Resources Defense Council

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<sup>4</sup> <https://www.regulations.gov/document?D=EERE-2017-BT-TP-0029-0010>.

<sup>5</sup> [https://www.aceee.org/files/proceedings/2016/data/papers/3\\_406.pdf](https://www.aceee.org/files/proceedings/2016/data/papers/3_406.pdf).

<sup>6</sup> [https://www.aon.com/Documents/Technical/AAON\\_WSHP\\_161204\\_online.pdf](https://www.aon.com/Documents/Technical/AAON_WSHP_161204_online.pdf).

<sup>7</sup> 85 Fed. Reg. 27934.