



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
 WASHINGTON, D.C. 20460

OFFICE OF  
 AIR AND RADIATION

October 5, 2018

Dear ENERGY STAR® Partners and Stakeholders:

The U.S. Environmental Protection Agency (EPA) is pleased to announce final recognition criteria for ENERGY STAR Most Efficient 2019. This letter outlines the final criteria.

These criteria will recognize the most efficient ENERGY STAR products in 2019 across 14 product categories: Air Source Heat Pumps and Central Air Conditioners, Boilers, Ceiling Fans, Clothes Washers, Dehumidifiers, Dishwashers, Dryers, Computer Monitors, Furnaces, Geothermal Heat Pumps, Refrigerator-Freezers, Televisions, Ventilation Fans, and Residential Windows. Products that meet the 2019 criteria will deliver significant savings over a conventional product as noted below:

Boilers: 14% energy savings	Furnaces: 18% energy savings	Dryers: Compact Ventless 240V: 43% energy savings Electric (All Other): 28% energy savings
Central AC and Air Source Heat Pumps: 20-30% energy savings	Geothermal Heat Pumps: 20-40% energy savings	Ventilating Fans: bathroom/utility: 85% in-line: 44% energy savings
Clothes Washers: ≤ 2.5 cu-ft: 24% energy savings and 36% water savings > 2.5 cu-ft: 43% energy savings and 45% water savings	Monitors: 24% energy savings	Windows: Savings vary by climate, house construction, and number and type of windows replaced.
Ceiling Fans: 66% energy savings	Refrigerators: 10-20% energy savings	Dishwashers: 22% energy savings and 36% water savings
Ductless AC and Heat Pumps: 25%-35%	Dehumidifiers: 23% energy savings	Televisions: 22%

*\*Note: In the case of appliances and HVAC equipment, energy use of a product that meets ENERGY STAR Most Efficient 2019 criteria is compared to the federal standard.*

## Overview of Comments on and Revisions to the ENERGY STAR Most Efficient 2019 Proposals

EPA hosted a webinar on September 11th to present the 2019 proposed recognition criteria. Stakeholders shared feedback with EPA during the webinar and through written comments. The majority of commenters stated support for the program as a tool for advancing efficiency in consumer products and for the proposed 2019 criteria. Constructive feedback was offered on a subset of the proposals, which EPA has considered carefully and is offering revised criteria for Central Air Conditioning/Air Source Heat Pumps in response.

While one commenter supports the proposal requiring that all ENERGY STAR air conditioners and heat pumps (ducted and ductless) provide heating and cooling (as applicable) at more than 3 capacity levels, another commenter raised compelling concerns regarding this proposal. EPA is aware that not all currently-recognized ducted products will meet these criteria and is also aware that some products that do not meet these criteria are highly efficient and provide high sales volume. In further conversation, stakeholders brought up the idea that in some climates, two stage units meet the goals of the variable capacity requirement, providing comfort, efficiency, and grid stability at a lower cost than variable capacity units. EPA will not require variable capacity in 2019, but will investigate these claims further in the coming year, and will decide whether to require variable capacity in 2020.

EPA did not receive formal comments on the proposed update to the dehumidifier criteria, but did receive comments on the ongoing revision of the ENERGY STAR Dehumidifier specification, which are relevant as well to ENERGY STAR Most Efficient. In particular, the stakeholder asked that larger portable dehumidifiers be included in the ENERGY STAR specification as well as in ENERGY STAR Most Efficient. EPA has proposed that they not be included in scope for ENERGY STAR because we have been unable to identify a level which offers cost effective savings to consumers. EPA awaits further data on this point from stakeholders, and may eventually keep them in scope for ENERGY STAR. These data will not be available soon enough to inform the criteria for ENERGY STAR Most Efficient dehumidifiers, however. EPA is, therefore, finalizing the requirements for dehumidifiers as proposed, and will consider including larger models at a future time.

One stakeholder supported the UHD allowance of 45% for TVs capable of Ultra High-Definition (UHD) in order to recognize the most efficient UHD-capable TVs. Another commenter suggested that EPA lower the UHD allowance to 20% noting that 2016 regional sales data from the ENERGY STAR Retail Products Platform (ESRPP) and the reduction in the power consumption gap between HD and UHD TVs in recent years. EPA reviewed the ENERGY STAR Most Efficient TVs analysis and found that of currently certified models only 1% of UHD models could meet the criteria were the UHD adder reduced to 20%. This coupled with the Agency's uncertainty regarding which models will meet the Version 8.0 specification, resulted in EPA maintaining the proposed UHD adder. EPA appreciates the ESRPP data and recognizes that progress can be made specific to the efficiency of UHD. EPA does anticipate reducing this adder meaningfully in ENERGY STAR Version 9.0 and potentially for ENERGY STAR Most Efficient 2020.

Two stakeholders supported the proposed cleaning floor for residential clothes washers, while two other commenters were opposed to the criteria questioning the need for the cleaning floor and the repeatability and burden of the ENERGY STAR Test Method for Determining Residential Clothes Washer Cleaning Performance. As a voluntary program, ENERGY STAR is successful only as long as consumers have a positive association with the label. On occasion, requirements are added to prevent trade-offs between efficiency and performance. The need to ensure performance takes on added significance in the context of ENERGY STAR Most Efficient where the levels are more stringent. In response to the concerns specific to the

Department of Energy's (DOE) test method, the program notes that the referenced test method is based on AHAM's HLW-1-2013 test method, which reflects decades of testing and experience. In addition, DOE understands that implementation of this proposed test method would not require any upgrades to test facilities or new training for staff. By mirroring the existing AHAM test method, the ENERGY STAR program is leveraging the existing laboratory capabilities and expertise within the clothes washer industry. EPA has maintained the cleaning floor and the associated test method in the final recognition criteria.

Two commenters asked that ENERGY STAR Most Efficient recognition be extended to room air conditioners and air cleaners. EPA will consider these expansions for Most Efficient 2020. Variable speed room air conditioners offer significant savings and thus may be appropriate for Most Efficient recognition. One stakeholder asked EPA in future years to consider making connected criteria required for ENERGY STAR Most Efficient recognition for some or all products with optional connected criteria in their ENERGY STAR specifications. EPA would welcome further discussion of this idea with a broad range of stakeholders.

Responses to the full range of comments can be found in the attached [ENERGY STAR Most Efficient 2019 Comment Response document](#). You can find all comments received at [www.energystar.gov/mostefficient](http://www.energystar.gov/mostefficient).

### ENERGY STAR Most Efficient 2019 Categories and Recognition Criteria

Final criteria for ENERGY STAR Most Efficient 2019 are summarized below. In addition to meeting these performance requirements, products must be certified as ENERGY STAR by an EPA-recognized certification body. Additional detail for each product category is included in the recognition criteria documents available at [www.energystar.gov/mostefficient](http://www.energystar.gov/mostefficient).

Category	ENERGY STAR Most Efficient 2019 Recognition Criteria											
Boilers	Gas Powered Boilers: 95% AFUE or higher. Oil Powered Boilers: 90% AFUE or higher											
Ceiling Fans	Efficiency as per 10 CFR 430 Subpart B, Appendix U (cfm/W) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Blade span D (inches)</th> <th>Efficiency (CFM/W)</th> </tr> </thead> <tbody> <tr> <td>19" ≤ 36"</td> <td>≥ 1.03D + 60.43</td> </tr> <tr> <td>&gt; 36"</td> <td>≥ 3.88D - 42.17</td> </tr> </tbody> </table>	Blade span D (inches)	Efficiency (CFM/W)	19" ≤ 36"	≥ 1.03D + 60.43	> 36"	≥ 3.88D - 42.17					
Blade span D (inches)	Efficiency (CFM/W)											
19" ≤ 36"	≥ 1.03D + 60.43											
> 36"	≥ 3.88D - 42.17											
Clothes Washers	Top-loading and front-loading products must meet the energy and water performance requirements shown in the table below, as determined by the DOE test procedure in 10 CFR 430, Subpart B, Appendix J2. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Clothes Washer Capacity</th> <th>Integrated Modified Energy Factor (IMEF)</th> <th>Integrated Water Factor (IWF)</th> </tr> </thead> <tbody> <tr> <td>≤ 2.5 cu-ft</td> <td>≥ 2.20</td> <td>≤ 3.7</td> </tr> <tr> <td>&gt; 2.5 cu-ft</td> <td>≥ 2.92</td> <td>≤ 3.2</td> </tr> </tbody> </table> <table border="1" style="margin-left: auto; margin-right: auto; margin-top: 10px;"> <tr> <td>Total Cleaning Score (CS<sub>t</sub>)</td> <td>≥ 85.0</td> </tr> </table>	Clothes Washer Capacity	Integrated Modified Energy Factor (IMEF)	Integrated Water Factor (IWF)	≤ 2.5 cu-ft	≥ 2.20	≤ 3.7	> 2.5 cu-ft	≥ 2.92	≤ 3.2	Total Cleaning Score (CS <sub>t</sub> )	≥ 85.0
Clothes Washer Capacity	Integrated Modified Energy Factor (IMEF)	Integrated Water Factor (IWF)										
≤ 2.5 cu-ft	≥ 2.20	≤ 3.7										
> 2.5 cu-ft	≥ 2.92	≤ 3.2										
Total Cleaning Score (CS <sub>t</sub> )	≥ 85.0											
Ducted Central Air Conditioners and Air	System status and messaging capabilities, two or more capacity levels <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Product type</th> <th>SEER</th> <th>EER</th> <th>HSPF</th> </tr> </thead> <tbody> <tr> <td>Split AC</td> <td>18</td> <td>13.0</td> <td></td> </tr> </tbody> </table>	Product type	SEER	EER	HSPF	Split AC	18	13.0				
Product type	SEER	EER	HSPF									
Split AC	18	13.0										

Source Heat Pumps	<table border="1"> <tr> <td>Packaged AC</td> <td>16</td> <td>12.0</td> <td></td> </tr> <tr> <td>Split HP</td> <td>18</td> <td>12.5</td> <td>9.6</td> </tr> <tr> <td>Packaged HP</td> <td>16</td> <td>12.0</td> <td>8.2</td> </tr> </table>	Packaged AC	16	12.0		Split HP	18	12.5	9.6	Packaged HP	16	12.0	8.2						
Packaged AC	16	12.0																	
Split HP	18	12.5	9.6																
Packaged HP	16	12.0	8.2																
Dehumidifiers	<p>When complying using representations based on testing in accordance with 10 CFR Appendix X to Subpart B of Part 430, products with capacities less than 75 pints/day must have the following Energy Factor:</p> <table border="1"> <thead> <tr> <th>Product type</th> <th>EF</th> </tr> </thead> <tbody> <tr> <td>Stand Alone</td> <td>≥ 2.20</td> </tr> <tr> <td>Whole House</td> <td>≥ 2.30</td> </tr> </tbody> </table> <p>Or</p> <p>When complying using representations based on testing in accordance with 10 CFR Appendix X1 to Subpart B of Part 430, portable dehumidifiers with a capacity less than or equal to 50 pints/day and whole-home dehumidifiers with a case volume less than or equal to 8 cubic feet, must have the following minimum Integrated Energy Factor:</p> <table border="1"> <thead> <tr> <th>Product type</th> <th>IEF</th> </tr> </thead> <tbody> <tr> <td>Portable, capacity ≤ 25 pints/day</td> <td>≥ 1.57</td> </tr> <tr> <td>Portable, capacity 25.01 – 50 pints/day</td> <td>≥ 1.80</td> </tr> <tr> <td>Whole-Home, case volume ≤ 8 cubic feet</td> <td>≥ 2.09</td> </tr> </tbody> </table>	Product type	EF	Stand Alone	≥ 2.20	Whole House	≥ 2.30	Product type	IEF	Portable, capacity ≤ 25 pints/day	≥ 1.57	Portable, capacity 25.01 – 50 pints/day	≥ 1.80	Whole-Home, case volume ≤ 8 cubic feet	≥ 2.09				
Product type	EF																		
Stand Alone	≥ 2.20																		
Whole House	≥ 2.30																		
Product type	IEF																		
Portable, capacity ≤ 25 pints/day	≥ 1.57																		
Portable, capacity 25.01 – 50 pints/day	≥ 1.80																		
Whole-Home, case volume ≤ 8 cubic feet	≥ 2.09																		
Ductless AC and Heat Pumps	<p>Products must meet the following cooling and heating performance levels: 20 SEER, 12.5 EER, 10 HSPF (Heat pumps only); system status and messaging capabilities, two or more capacity levels.</p>																		
Geothermal Heat Pumps	<p>System status and messaging capabilities; two or more capacity levels except water-to-water models.</p> <table border="1"> <thead> <tr> <th>Product type</th> <th>EER</th> <th>COP</th> </tr> </thead> <tbody> <tr> <td>Closed Loop Water-to-Air/GHP</td> <td>17.1</td> <td>3.6</td> </tr> <tr> <td>Open Loop Water-to-Air GHP</td> <td>21.1</td> <td>4.1</td> </tr> <tr> <td>Closed Loop Water-to-Water GHP</td> <td>16.1</td> <td>3.1</td> </tr> <tr> <td>Open Loop Water-to-Water GHP</td> <td>20.1</td> <td>3.5</td> </tr> <tr> <td>DGX</td> <td>16.0</td> <td>3.6</td> </tr> </tbody> </table>	Product type	EER	COP	Closed Loop Water-to-Air/GHP	17.1	3.6	Open Loop Water-to-Air GHP	21.1	4.1	Closed Loop Water-to-Water GHP	16.1	3.1	Open Loop Water-to-Water GHP	20.1	3.5	DGX	16.0	3.6
Product type	EER	COP																	
Closed Loop Water-to-Air/GHP	17.1	3.6																	
Open Loop Water-to-Air GHP	21.1	4.1																	
Closed Loop Water-to-Water GHP	16.1	3.1																	
Open Loop Water-to-Water GHP	20.1	3.5																	
DGX	16.0	3.6																	
Computer Monitors	<p>Total Energy Consumption (<math>E_{TEC}</math>) in kilowatt-hours per year shall be calculated as follows:</p> $E_{TEC} = 8.76 \times (0.35 \times P_{ON} + 0.65 \times P_{SLEEP})$ <p>Where:</p> <p><math>P_{ON}</math> = measured On Mode power in watts;</p> <p><math>P_{SLEEP}</math> = measured Sleep Mode power in watts;</p> <p>Total Energy Consumption (<math>E_{TEC}</math>) shall be less than or equal to Maximum allowable Total Energy Consumption in kilowatt-hours per year calculated as follows:</p> $E_{TEC\_MAX} = 1.9 + (0.12 \times A) + [3.1 \times (r + C)]$ <p>Where:</p> <p><math>A</math> = viewable screen area in square inches;</p>																		

$$r = \text{Total Native Resolution in megapixels; and}$$

$$C = \begin{cases} 1.9 & \text{if } A < 180 \text{ in}^2 \\ 2.7 & \text{if } 180 \text{ in}^2 \leq A < 220 \text{ in}^2 \\ 2.0 & \text{if } A \geq 220 \text{ in}^2 \end{cases}$$

Dishwashers

Products must meet the applicable energy and water performance requirements shown in the table below, as determined by the DOE test procedure 10 CFR 430, Subpart B, Appendix C1.

Product Type	Annual Energy Use (kWh/yr)	Water Consumption (gallons/cycle)
Standard Dishwasher	≤ 240	≤ 3.2

Test Cycle	Cleaning Index
Heavy	70
Medium	70
Light	70

Dryers

Products must meet the applicable energy performance requirements shown in the table below, as determined by 10 CFR Part 430 Subpart B Appendix D2, unless noted otherwise.

Cycle Setting	Product Type	CEF <sub>BASE</sub> (lbs/kWh)
Normal	Compact Ventless Electric (240V)	≥ 3.70
	Electric (All Other)	≥ 4.30
	Gas	≥ 3.80
Normal, Maximum Dryness <sup>1</sup>	Compact Ventless Electric (240V)	≥ 2.68
	Electric (All Other)	≥ 3.93
	Gas	≥ 3.48

Furnaces

AFUE 97% or higher; system status and messaging capabilities.

Refrigerator-Freezers

Product must have an Annual Energy Consumption (AEC) of less than or equal to 637 kWh per year.

As determined by the DOE test procedure in 10 CFR 430 Subpart B, Appendix A, side-by-side and bottom freezer product types must be ENERGY STAR certified and at least 20% more efficient than federal requirements. Top freezers must be ENERGY STAR certified.

<sup>1</sup> For purposes of this requirement, the manufacturer shall test the dryer according to the provisions in the DOE test procedure in 10 CFR 430, Subpart B, Appendix D2, but where the drying temperature setting can be chosen independently of the program, it shall be set to the maximum. At the time of certification, for each basic model the manufacturer shall report per this criteria section the energy performance (CEF), the cycle program name, the temperature setting, the dryness setting, as well as any settings enabled by default, and the time taken to complete the energy test cycle (as defined in the ENERGY STAR Version 1.1 specification, Section 5C).

Televisions	<p>Product must be certified to the ENERGY STAR Televisions Version 8.0 Program Requirements.</p> <p>The On Mode Power shall be less than or equal to the sum of the maximum allowable On Mode Power consumption and the high resolution On Mode Power Allowance:</p> $P_{ON} \leq P_{ON\_MAX} + P_{HR}$ $P_{ON\_MAX} = 66 * \tanh[0.000412 \times (A - 140) + 0.014] + 14$ $P_{HR} = 0.45 \times P_{ON\_MAX}$ <p>Where:</p> <p><math>P_{ON}</math> is the On Mode Power in watts;</p> <p><math>P_{ON\_MAX}</math> is the maximum allowable On Mode Power consumption in watts;</p> <p><math>P_{HR}</math> is the high resolution On Mode Power Allowance in watts;</p> <p><math>A</math> is the viewable screen area of the product in square inches; and</p> <p><math>\tanh</math> is the hyperbolic tangent function.</p>
Ventilating Fans	<p>Bathroom/utility fans: Efficacy at high speed (cfm/W): <math>\geq 10</math></p> <p>In line fans: Efficacy at high speed (cfm/W): <math>\geq 5</math></p> <p>In-line Ventilating Fan tested with a filter in place (<math>6 \leq \text{MERV} &lt; 13</math>): <math>\geq 4.7</math></p> <p>In-line Ventilating Fan tested with a filter in place (<math>\text{MERV} \geq 13</math>): <math>\geq 3.8</math></p> <p>Bathroom and Utility Room Fans must provide a sound level <math>\leq 4.0</math> sones at 0.25 inches of water gauge external static pressure at high speed.</p>
Residential Windows	<p>U-factor <math>\leq 0.20</math> in all Zones</p> <p>SHGC in Northern Zone <math>\geq 0.20</math></p> <p>SHGC in North-Central Zone <math>\leq 0.40</math></p> <p>SHGC in South-Central and Southern Zones <math>\leq 0.25</math></p> <p>North American Fenestration Standard/Specification (NAFS) Performance Grade <math>\geq 15</math></p>

### ENERGY STAR Most Efficient 2019 Recognition

ENERGY STAR certified products meeting these requirements will be highlighted as ENERGY STAR Most Efficient for 2019 at: [www.energystar.gov/mostefficient](http://www.energystar.gov/mostefficient) beginning January 1, 2019. Shortly, EPA will begin distributing the 2019 ENERGY STAR Most Efficient designation to brand owners of eligible products. As a reminder, usage guidelines are available at [http://www.energystar.gov/index.cfm?c=partners.most\\_efficient\\_criteria](http://www.energystar.gov/index.cfm?c=partners.most_efficient_criteria). As new products are certified that meet the criteria, EPA will contact partners and invite them to augment their product listing with the following:

- A product image. Product images can be in any common format (jpg, png, gif), should include only one product - do not include other people and objects - be a minimum of 250 pixels wide, and for best results, be on a single color background, preferably white; and
- A product description for use on the web page (i.e., key features and functionalities, MSRP - for windows and HVAC only). The first 50 words will be displayed beside the product photo on the web page; additional text will link to a separate web page.

To ensure the greatest utility of the ENERGY STAR Most Efficient webpage to consumers, EPA will only highlight products that are currently available for sale in the U.S. As such, EPA reminds partners that it is critical that they keep product availability information with their Certification Bodies current.

For all HVAC product categories **except boilers**, partners must apply for recognition for all products new to ENERGY STAR Most Efficient in order for the Agency to verify the system status and messaging and staged capacity requirements. To this end, partners must submit a narrative description of how their communications system and associated products and controllers meet the requirements. EPA has provided a guide to speed the recognition process by ensuring that narratives address all the information EPA needs. EPA recognizes that these narratives apply to series of related products and only expects one submission for the entire series. For all partners with CAC, ASHP, Ductless AC or HP, or DGX and water to air heat pump products recognized in 2018, EPA will confirm the staged capacity capabilities of their products before distributing the ESME 2018 graphic. For window products, partners will need to apply for recognition for all products new to ENERGY STAR Most Efficient in order for the Agency to verify that a product meets the recognition criteria outlined above. Since the recognition criteria have not changed, window products recognized in 2018 need not be resubmitted and EPA will distribute the ESME 2019 graphic. Detailed instructions can be [found on this website](#).

The ENERGY STAR Most Efficient 2019 designation is intended for use at point-of-sale on point-of-purchase materials, product literature, and websites. It may not be factory-applied to products or product packaging. Failure to abide by these guidelines may result in loss of recognition. EPA will highlight recognized products on the ENERGY STAR Most Efficient 2019 web page through December 31, 2019.



We look forward to working with you to market ENERGY STAR Most Efficient products in 2019. Please e-mail [mostefficient@energystar.gov](mailto:mostefficient@energystar.gov) with any questions.

Thank you for your support of the ENERGY STAR program.

Sincerely,

A handwritten signature in black ink, appearing to read "Ann Bailey". The signature is fluid and cursive, with the first letter of each name being capitalized and prominent.

Ann Bailey, Director  
ENERGY STAR Product Labeling