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

OFFICE OF
AIR AND RADIATION

July 18, 2023

Dear ENERGY STAR® Partners and other Stakeholders:

The U.S. Environmental Protection Agency (EPA) is pleased to share both an update on ENERGY STAR Most Efficient 2023 and proposed recognition criteria for 2024. Stakeholders are invited to provide written comments on these proposed criteria no later than August 21, 2023, to MostEfficient@energystar.gov.

ENERGY STAR Most Efficient 2023

As of June 2023, 2651 models from 343 ENERGY STAR partners meet the ENERGY STAR Most Efficient 2023 recognition criteria. The number of models and partners per category is noted in the following table:

Product Category	Product Count	Partner Count
Air Conditioners and Heat Pumps	35	3
Ceiling Fans	163	15
Clothes Dryers	34	8
Clothes Washers	62	6
Computer Monitors	130	21
Dehumidifiers	330	49
Dishwashers	288	37
Freezers	20	11
Geothermal Heat Pumps	348	23
Refrigerators	750	66
Room Air Cleaners	53	19
Room Air Conditioners	75	14
Ventilating Fans	194	23
Windows/Sliding Glass Doors/Skylights	517	48
Totals	2651	343

ENERGY STAR Most Efficient enjoys robust utility support and is leveraged by 17 energy efficiency program sponsors, serving over 5.3 million households (or roughly 13.8 million consumers). These rebate programs feature one or more product categories covered by ENERGY STAR Most Efficient 2023 and reflect a diverse geographic spread.

ENERGY STAR Most Efficient is also leveraged for retailer incentives as part of the ENERGY STAR Retail Products Platform (ESRPP), an innovative, nationally coordinated, market transformation initiative. ESRPP retailers now represent 1,243 appliance storefronts in current program sponsors' service areas. In 2023, there are 15 efficiency program sponsors participating in ESRPP currently serving 21.3% of U.S. households.

EPA provides consumers with information about recognized products through a filter on the popular ENERGY STAR Products Finders. This year, EPA created the first ever EPA hosted ENERGY STAR and ENERGY STAR Most Efficient Product Finders for central air conditioners and air source heat pumps making identification of an energy efficient choice in heating and cooling much easier. EPA also recently launched a new consumer friendly ENERGY STAR Product Finder for Windows, Doors, and Skylights and intends to feature ENERGY STAR Most Efficient models through this interface in 2024.

2024 Product Categories and Recognition Criteria

EPA completed a review of the data associated with currently recognized models and found in multiple cases updates to the ENERGY STAR Most Efficient criteria are needed to recognize the best of ENERGY STAR. EPA is proposing changes for ceiling fans, CAC/ASHP, computer monitors, dehumidifiers, dishwashers, dryers, freezers, room air cleaners, room air conditioners, vent fans, and windows. Criteria for clothes washers, geothermal heat pumps, refrigeration products, and skylights will remain unchanged in 2024.

Ceiling Fans: EPA proposes to raise the current criteria for ceiling fans for 2024 as many high performing fans have entered the market recently. Savings offered by the proposed criteria are significant, 74% for a 52-inch fan, the most common size on the market, and 75% for Hugger fans.

Clothes Washers: No changes are proposed to the current criteria for clothes washer types. The ENERGY STAR Most Efficient list includes 41 base models from 5 brands, providing consumers with a good selection of models with superior energy and water efficiency.

Computer Monitors: Recognizing the availability of more efficient models, EPA proposes to revise the current criteria for 2024. 52 models meet the proposed criteria, offering consumers an average of 15.7kWh/year and savings of 38% over conventional models.

Dehumidifiers: EPA proposes to revise the criteria for dehumidifiers for 2024. Currently, there are 35 base models that meet the proposed criteria, offering consumers significant savings between 10% and 27%, depending on product class, over conventional models. Five whole-home dehumidifiers meet the criteria with a savings between 23% and 45%, depending on product class, over conventional models.

Dishwashers: With the Version 7.0 specification being equal to the current Most Efficient level, EPA proposes to revise the criteria for 2024. Currently, there are 20 base models from 8 brands that meet this proposal. Additionally, EPA is removing the cleaning performance requirement from the ENERGY STAR Most Efficient criteria since cleaning performance is part of the Version 7.0 specification taking effect on July 19, 2023. The proposed criteria save consumers 27% in energy and 36% in water over the federal standard.

Dryers: EPA proposes to adjust the criteria for dryers for 2024 in light of more efficient products entering the market. Currently 21 base models from 8 brands, representing both heat pump and hybrid heat pump technologies, meet the proposed criteria. EPA is proposing to carve out a separate product class for compact ventless 120V units for 2024. At the proposed levels energy savings will increase to 40% better than the federal standard for standard sized units, 61% for compact ventless 240V units, and 52% for compact ventless 120V units. EPA continues to encourage partners to complete optional fields for technology type when certifying products to make it easier for utilities to incentivize these technologies in the market.

Ducted and Ductless Air Source Heat Pumps: EPA proposes to adjust the criteria for ductless heat pumps, in light of the opportunity to make equipment that meets the requirements for tax credits easier to find while maintaining the exclusiveness of ENERGY STAR Most Efficient recognition. The criteria for ducted products remain unchanged. For ductless heat pumps, EPA has aligned SEER2, EER2, and HSPF2 requirements with tax credit levels, such that all ENERGY STAR Most Efficient non-ducted heat pumps will be eligible for a tax credit. In addition, since the installation benefits requirement has proven to be a challenge particularly for ductless units, EPA is pausing this requirement for ductless units in 2024. As indicated when finalizing the 2023 criteria and in line with EPA's May 18 proposal to sunset the ENERGY STAR specification for CAC, EPA proposes to cease ENERGY STAR Most Efficient recognition of CAC in 2024. Lastly, EPA has reorganized the criteria documents, grouping all air-source heat pumps together and creating a separate recognition criteria document for geothermal heat pumps.

Geothermal Heat Pumps: No changes are proposed to the current criteria for geothermal heat pumps.

Refrigerators-Freezers and Freezers: EPA proposes to make a single adjustment to the criteria for refrigerators and freezers for 2024. Specifically, EPA proposes to revise the level for upright freezers from 15% to 20% better than the federal standard for 2024. This proposal will reduce the base models meeting the criteria from 18% to 7% of base models on the market. EPA proposes to maintain the criteria for all other product classes for 2024. There are 292 base models from 59 brands of standard size refrigerators, which represents 28% of the standard size market. For compact refrigerators, there are 43 base models from 23 brands that meet the proposed criteria representing 4% of the market. There are 10 upright freezer and chest freezer base models from 7 brands that meet the criteria representing 4% of the market.

Room Air Cleaners: EPA proposes to revise the metric but maintain the same levels for Room Air Cleaners in 2024. The proposal is for the metric to change from Smoke CADR to $PM_{2.5}$ to align with the new DOE test procedure going into effect next year. Under this proposal, EPA estimates 49 base models from 25 brands will meet the criteria, which represents 9% of the market. There has been tremendous growth in shipments over the past few years due to both COVID + wildfires making it more important to highlight greater efficiency for consumers.

Room Air Conditioners: EPA proposes to revise the criteria for most of the room air conditioner product classes in 2024 in light of the ENERGY STAR Version 5.0 specification taking effect in October 2023. There are currently 13 base models from 6 brands meeting the proposed criteria, which represents 2% of the market. EPA also proposes that for products with heating capability, the heating mode efficiency be reported based on the *TBD* ENERGY STAR Heating Mode Test for room air conditioners. EPA will be working with stakeholders to develop this test procedure with the goal of finalizing later this year.

Ventilating Fans: EPA proposes to revise the criteria for 2024. 10% of the market and 20% of ENERGY STAR certified models meet the proposed criteria, offering more than 80% savings over a baseline bath fan, and almost 60% savings over baseline in-line vent fans across a variety of fan types and 15 brands.

Windows and Sliding Glass Doors: EPA proposes to revise the window and sliding glass door criteria for 2024. No changes are proposed for the Northern Zone and North-Central Zone criteria. EPA proposes to revise the SHGC down to 0.23 in the South-Central Zone to align with the new ENERGY STAR Version 7.0 criteria. In addition, EPA proposes to revise U-factor and SHGC of the Southern Zone criteria to 2 equivalent energy performance options: Either U ≤ 0.21 and SHGC ≤ 0.23 or U = 0.22 and SHGC ≤ 0.21 may be used. This change in the Southern Zone may help expand the number of products available to consumers. These combinations of performance criteria for the Southern Zone have equivalent energy performance when using the 'Results and Assumptions' table created for the Version 7.0 criteria revision analysis. EPA is also proposing to remove the requirement of North American Fenestration Standard/Specification (NAFS) Performance Grade ≥15 for windows, doors, and skylights. This will simplify the criteria. EPA believes that the NAFS Performance Grade requirement has not been shown to be beneficial in the product's energy performance. EPA is not proposing any changes to the skylight U-factor or SHGC criteria.

The proposed ENERGY STAR Most Efficient 2024 criteria for the full suite of products is summarized below. In addition to meeting these recognition criteria, 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.

Category	ENERGY STAR Most Efficient 2024 Recognition Criteria
Ceiling Fans	Efficiency as per 10 CFR 430 Subpart B, Appendix U (cfm/W)

<table>
<tr><td></td><td>
<table>
<tr><th>Ceiling Fan Type</th><th>Ceiling Fan Efficiency (CFM/W)*</th></tr>
<tr><td>Standard</td><td>3.25 x Blade Span + 107</td></tr>
<tr><td>Hugger</td><td>1.44 x Blade Span + 120</td></tr>
<tr><td>HSSD Ceiling Fans</td><td>3.25 x Blade Span + 107</td></tr>
</table>
*D is the ceiling fan blade span in inches
**This is a weighted average efficiency in different modes, according to 10 CFR 430 Subpart B, Appendix U
</td></tr>
<tr><td>Clothes Washers*</td><td>
<table>
<tr><th>Clothes Washer Capacity</th><th>Integrated Modified Energy Factor (IMEF)</th><th>Integrated Water Factor (IWF)</th></tr>
<tr><td>≤ 2.5 cu-ft</td><td>≥ 2.2</td><td>≤ 3.7</td></tr>
<tr><td>> 2.5 cu-ft</td><td>≥ 2.92</td><td>≤ 3.2</td></tr>
<tr><td colspan="2">Total Cleaning Score (CS_t)</td><td>≥ 85.0</td></tr>
</table>
To be recognized, laundry centers must meet the Most Efficient washer and dryer criteria.
</td></tr>
<tr><td>Ducted Air Source Heat Pumps</td><td>
Installation benefits, multiple capacities
<table>
<tr><th>Product type</th><th>SEER2</th><th>EER2</th><th>HSPF2</th></tr>
<tr><td>Split HP</td><td>16.9</td><td>12.0</td><td>8.2</td></tr>
<tr><td>Packaged HP</td><td>15.2</td><td>11.5</td><td>7.2</td></tr>
<tr><td>Cold Climate HP</td><td>15.2</td><td>11.0</td><td>8.5</td></tr>
</table>
Cold climate heat pumps must also meet a COP of 1.75 at 5 degrees F, and provide 70% capacity maintenance at 5 degrees F.
</td></tr>
<tr><td>Dehumidifiers</td><td>
<table>
<tr><th>Type, Size</th><th>Integrated Energy Factor (IEF)</th></tr>
<tr><td>Portable, capacity ≤ 25.00 pints/day</td><td>≥ 1.70</td></tr>
<tr><td>Portable, capacity 25.01 to 50.00 pints/day</td><td>≥ 2.01</td></tr>
<tr><td>Portable, capacity > 50.00 pints/day</td><td>≥ 3.10</td></tr>
</table>
</td></tr>
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<table>
<tr><td></td><td>
<table>
<tr><td>Whole Home, case volume ≤ 8.0 ft3</td><td>≥ 2.22</td></tr>
<tr><td>Whole Home, case volume > 8.0 ft3</td><td>≥ 3.81</td></tr>
</table>
Product must meet the following applicable minimum Integrated Energy Factor (IEF):
</td></tr>
<tr><td>Ductless Heat Pumps</td><td>
Multiple capacities.
<table>
<tr><th>Product type</th><th>SEER2</th><th>EER2</th><th>HSPF2</th></tr>
<tr><td>Ductless HP</td><td>16.0</td><td>12.0</td><td>9.0</td></tr>
<tr><td>Ductless Cold Climate HP</td><td>16.0</td><td>9.0</td><td>9.5</td></tr>
</table>
Ductless old climate heat pumps must also meet a COP of 1.75 at 5 degrees F, and provide 70% capacity maintenance at 5 degrees F.
</td></tr>
<tr><td>Geothermal Heat Pumps*</td><td>
<table>
<tr><th>Product type</th><th>EER</th><th>COP</th></tr>
<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>
<tr><td>DGX-to-Water</td><td>15</td><td>3.1</td></tr>
</table>
</td></tr>
<tr><td>Computer Monitors</td><td>
Total Energy Consumption (E_{TEC}) in kilowatt-hours per year shall be calculated as follows:
$$E_{TEC} = 8.76 \times (0.35 \times P_{ON} + 0.65 \times P_{SLEEP})$$
Where:
P_{ON} = measured On Mode power in watts; P_{SLEEP} = measured Sleep Mode power in watts;

Total Energy Consumption (ETEC) shall be less than or equal to Maximum allowable Total Energy Consumption in kilowatt-hours per year calculatd as follows:
$$E_{TEC_{MAX}} = (1.9 + (0.12 \times A) + [3.1 \times (r + C)]) \times eff_{AC\_DC}$$
Where:

eff_{AC_DC} = 1.00 for AC-powered monitors
0.85 for DC-powered monitors

A= viewable screen area in square inches;
</td></tr>
</table>

<table>
<tr><td></td><td>r = Total Native Resolution in megapixels; and

$C = \begin{cases} 4.07 & \text{if } A < 180 \text{ in}^2 \\ 3.43 & \text{if } 180 \text{ in}^2 \leq A < 220 \text{ in}^2 \\ 5.67 & \text{if } A \geq 220 \text{ in}^2 \end{cases}$</td></tr>
<tr><td>Dishwashers</td><td><table><tr><th>Product Type</th><th>Annual Energy Use (kWh/yr)</th><th>Water Consumption (gallons/cycle)</th></tr><tr><td>Standard Dishwasher</td><td>≤ 225</td><td>≤ 3.2</td></tr></table></td></tr>
<tr><td>Dryers</td><td>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.

<table><tr><th>Cycle Setting</th><th>Product Type</th><th>CEF_{BASE} (lbs/kWh)</th></tr><tr><td rowspan="3">Normal</td><td>Compact Ventless Electric (240 V)</td><td>≥ 5.5</td></tr><tr><td>Compact Electric (120V)</td><td>≥ 6.3</td></tr><tr><td>Electric (all others)</td><td>≥ 5.2</td></tr><tr><td rowspan="3">Normal, Maximum Dryness[1]</td><td>Compact Ventless Electric (240 V)</td><td>≥ 2.68</td></tr><tr><td>Compact Electric (120V)</td><td>≥ 3.80</td></tr><tr><td>Electric (all others)</td><td>≥ 3.93</td></tr></table></td></tr>
<tr><td>Refrigerator-Freezers and Freezers*</td><td>Product must have an Annual Energy Consumption (AEC) of less than or equal to 637 kWh per year.</td></tr>
</table>

[1] 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).

<table>
<tr><td></td><td>Side-by-side and bottom freezer product types must be at least 30% more efficient than federal requirements. Top freezers must be at least 10% more efficient than federal requirements. Standard-size upright freezer and chest freezer product types must be at least 20% more efficient than federal requirements. Compact freezer product types must be at least 20% more efficient than federal requirements. Compact refrigerator or refrigerator-freezer product types must be at least 30% more efficient than federal requirements. Optional reporting of refrigerant type.</td></tr>
<tr><td>Room Air Cleaners</td><td>Product must meet the minimum $PM_{2.5}$ Clean Air Delivery Rate per Watt ($PM_{2.5}$ CADR/W) requirements shown in the table below, as determined by Appendix FF to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Air Cleaners
.
<table><tr><th>$PM_{2.5}$ CADR Bins</th><th>Minimum $PM_{2.5}$ CADR/W</th></tr><tr><td>30 ≤ $PM_{2.5}$ CADR < 100</td><td>5.4</td></tr><tr><td>100 ≤ $PM_{2.5}$ CADR < 150</td><td>6.6</td></tr><tr><td>150 ≤ $PM_{2.5}$ CADR</td><td>7.6</td></tr></table></td></tr>
<tr><td>Room Air Conditioners</td><td>Product must have a Combined Energy Efficiency Ratio (CEER) that is greater than or equal to the values in the table below.
<table><tr><th>Product Classes</th><th>Minimum Percent Better than the Federal Standard (%)</th></tr><tr><td>1, 2, 6, and 7</td><td>35%</td></tr><tr><td>8b and 15</td><td>46%</td></tr><tr><td>3, 5a, 5b, 8a, 9, 10, 11, 12, 13, 14, 16</td><td>47%</td></tr><tr><td>4</td><td>50%</td></tr></table>
Products must also be at or below a maximum sound level of 45 dB(A) for the lowest operational setting.

Products with heating capability must report the heating mode efficiency based on the TBD ENERGY STAR Heating Mode Test for Room Air Conditioners.</td></tr>
<tr><td>Ventilating Fans</td><td>• Bathroom/Utility Room:
• Efficacy at high speed ≥ 10.1 cfm/W
• Reported sound level (sones): ≤ 4.0 at 0.25 in. w.g. at high speed.
• Inline Fan Efficacy
• Single-port: 6.5 cfm/W</td></tr>
</table>

<table>
<tr><td></td><td>

- Multi-port: 4.0 cfm/W Bathroom and Utility Room Fans must provide a sound level ≤ 4.0 sones at 0.25 inches of water gauge external static pressure at high speed.

</td></tr>
<tr><td>Residential Windows and Sliding Glass Doors</td><td>Products must meet these new performance requirements. Changes occur in the SHGC requirements for the South-Central Zone and the U-factor and SHGC requirements of the Southern Zone.
<table>
<tr><th>Climate Zone</th><th>U-factor</th><th>SHGC</th></tr>
<tr><td>Northern</td><td>≤ 0.20</td><td>≥ 0.20</td></tr>
<tr><td>North-Central</td><td>≤ 0.20</td><td>≤ 0.40</td></tr>
<tr><td>South-Central</td><td>≤ 0.20</td><td>≤ 0.23</td></tr>
<tr><td>Southern</td><td>≤ 0.21
= 0.22</td><td>≤ 0.23
≤ 0.21</td></tr>
</table>
Note: SHGC = Solar Heat Gain Coefficient.</td></tr>
</table>

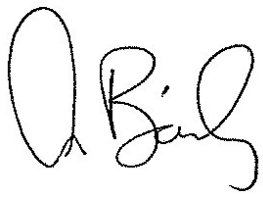
**Proposed criteria carried over from 2023 for these categories with no changes.*

EPA will provide additional information regarding the roll out of ENERGY STAR Most Efficient 2024 recognition with the finalization of these criteria.

EPA will host a webinar to discuss these proposals with stakeholders on July 26, 2023, from 1-3pm EDT. Please register here. This document as well as the criteria documents can be found here. Please share written comments no later than August 21, 2023, with MostEfficient@energystar.gov. Unless the commenter asks otherwise, all comments will be posted to the ENERGY STAR Most Efficient criteria development page. EPA plans to finalize these recognition requirements in the coming months.

Thank you for your support of the ENERGY STAR program.

Sincerely,



Ann Bailey, Director
ENERGY STAR Product Labeling