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

OFFICE OF
AIR AND RADIATION

July 8, 2021

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 2021 and proposed recognition criteria for 2022. Stakeholders are invited to provide written comments on these proposed criteria no later than August 15, 2021 to MostEfficient@energystar.gov.

ENERGY STAR Most Efficient 2021

As of June 2021, 3,361 models from 203 ENERGY STAR partners meet the ENERGY STAR Most Efficient 2021 recognition criteria. The number of models and partners per category is noted in the following table:

Product Category	**Models**	**ENERGY STAR Partners**
Ceiling Fans	268	18
Central Air Conditioners and Air Source Heat Pumps	247	10
Clothes Dryers	23	7
Clothes Washers	48	6
Compact Freezers (new)	11	5
Compact Refrigerators (new)	98	23
Computer Monitors	384	25
Dehumidifiers	175	27
Dishwashers	101	9
Freezers	4	2
Furnaces	159	7
Geothermal Heat Pumps	611	10
Refrigerators	540	44
Room Air Conditioners	16	4
Ventilating Fans	166	22
Windows and Sliding Glass Doors	510	46
Total*	**3361**	**203**

*Total ENERGY STAR partners that meet the ENERGY STAR Most Efficient 2021 recognition criteria are calculated by removing duplicate partners that may appear in more than one product category. Therefore, unlike the Total Models count, the total ENERGY STAR Partners count does not represent the sum of its column.

ENERGY STAR Most Efficient enjoys robust utility support and is leveraged by 29 energy efficiency program sponsors, serving over 7 million households (or roughly 18.5 million consumers). These rebate programs feature one or more product categories covered by ENERGY STAR Most Efficient 2021 and reflect a diverse geographic spread, including two water utilities in California.

ENERGY STAR Most Efficient is also being 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 more than 75% of the appliance market, with 935 stores in current program sponsors' service areas. In 2021, there are 15 efficiency program sponsors participating in ESRPP currently serving nearly 16% of U.S. households. The ESRPP is striving for large-scale market participation – serving more than 30% of the US population – a key milestone in the ESRPP vision to transform the market for energy efficient consumer products.

EPA provides consumers with the information they need about recognized products. In addition to highlighting ENERGY STAR Most Efficient 2021 products, our website includes images of models, as well as real-time information on retail pricing and where to locate and buy these models. Super-efficient compressors, available in select ENERGY STAR Most Efficient refrigerators, are also recognized via the ENERGY STAR Emerging Technology award. Currently, 19 models from four different brands have received the Emerging Technology Award for advanced adaptive compressors with use of low global warming potential refrigerants and foams.

2022 Product Categories and Recognition Criteria

The proposed recognition criteria for 2022 are based on an analysis of currently certified ENERGY STAR models and the engineering analysis the Department of Energy (DOE) conducts for covered products. This analysis indicates that for many categories, existing recognition criteria remain reflective of the "best of the best." As a result, EPA is extending the 2021 efficiency criteria into 2022 for clothes washers, dehumidifiers, dryers, furnaces, geothermal heat pumps (GHP), vent fans, and windows. EPA has proposed revised criteria for boilers, central air conditioners and heat pumps, ceiling fans, computer monitors, refrigerator-freezers, and room air conditioners. EPA will release a proposal for dishwashers in the coming months. Televisions will not be recognized in 2022.

Ceiling Fans: EPA proposes to update the criteria for all ceiling fans to recognize differentiation that has emerged in the market now that the industry has adjusted to the new Federal minimum efficiency criteria. The proposed levels apply to all standard, hugger, and low-mount high-speed small diameter fans, and approximately 6% of all fans certified by DOE meet the proposed level. These fans offer approximately 67% savings over a DOE minimum efficiency fan. EPA welcomes feedback on the proposal, specifically if there are product categories or advanced features that offer excellent overall energy performance but that would not meet the proposed criteria. To support such comments, stakeholders are encouraged to share available data on the energy saving advantages of these categories and/or advanced features.

Clothes Washers: EPA proposes to maintain the current Most Efficient 2021 criteria for all clothes washer types. The ENERGY STAR Most Efficient list includes 18 base models from 6 brands, providing consumers with a good selection of models with superior energy and water efficiency.

Computer Monitors: EPA proposes to update the Most Efficient criteria to recognize more efficient models that have emerged in the market since EPA last updated the criteria in 2020. 10% of ENERGY STAR models meet the proposed Most Efficient criteria for 2022, for an average savings of 30% over conventional models.

Dehumidifiers: EPA proposes to maintain the current Most Efficient recognition criteria into 2022. 130 portable models meet these rigorous criteria, offering consumers significant savings of 22% over conventional models. 8 whole-home dehumidifiers meet the criteria with a savings of 25% over conventional models.

Dishwashers: In light of the ongoing revision of the ENERGY STAR Dishwasher specification, EPA will make a determination on proposed changes to the Most Efficient criteria in the coming months.

Dryers: EPA proposes to maintain the Most Efficient 2021 criteria. The ENERGY STAR Most Efficient list includes 19 base models from 8 brands, representing both heat pump and hybrid heat pump technologies. EPA encourages partners to complete optional fields for technology type and refrigerant when certifying products to make it easier for utilities to incentivize these technologies in the market.

Central Air Conditioners and Heat Pumps and Ductless Air Conditioners and Heat Pumps:
EPA proposes changes to the criteria for central air conditioners and heat pumps, in line with the Version 6.0 specification revision. Overall, the efficiency criteria continue to recognize a select group - less than 1% of the AHRI listings - of extremely efficient products with features facilitating quality installation and maintenance. The system status and messaging criteria have been updated to require that products must meet three out of six listed installation criteria, as is required for Version 6.0 products. Two additional changes have been proposed to the system status and messaging criteria – a requirement that a product must store the past ten (10) faults until they are cleared, and that a product must have the capability to directly contact a service professional when a fault arises, given the consumer permits the communication. These two criteria are in line with capabilities seen on recent Most Efficient applications and provide clarity on the features required.

The efficiency criteria for single packaged heat pumps were raised so that the levels are in line with the Version 6.0 criteria for that product category. EPA has also added a category for Most Efficient Cold Climate heat pumps. Cold climate heat pumps will be required to meet the Version 6.0 criteria, including the low ambient temperature criteria, in addition to the system status and messaging criteria, to be recognized as Most Efficient. For ductless air conditioners and heat pumps, no changes are proposed beyond the system status and messaging criteria.

As new products may choose to certify to Version 6.0 early with the Appendix M1 test method and criteria that will be effective in 2023, EPA has provided equivalent levels in both Appendix M and Appendix M1 metrics. ENERGY STAR central air conditioners and heat pumps currently certified to Version 5.0 may add Most Efficient 2022 recognition if they meet the criteria. Note that after January 1, 2022, all new products certified to ENERGY STAR must do so under Version 6.0 and via the Appendix M1 pathway.

Geothermal Heat Pumps: EPA proposes to maintain the current criteria for geothermal heat pumps, with small changes to the system status and messaging criteria. The current criteria continue to recognize a select group of extremely efficient products (3.9% of the AHRI list) with features facilitating quality installation and maintenance. Geothermal heat pumps are exempt from the installation criteria, but new applications for Most Efficient will need to comply with the additional requirements for length of fault history and communication with a service professional.

Furnaces: EPA also proposes to maintain the current requirements for furnaces as the AFUE requirement offers great differentiation, is aligned with CEE Tier 3, and a small subset of products are recognized - just 1.6% of all products. New applications for Most Efficient will need to comply with the additional requirements for length of fault history and communication with a service professional.

Boilers: EPA will recognize boilers as ENERGY STAR Most Efficient in 2022. The proposed level was selected to recognize gas-fired heat pump boilers and is aligned with the Consortium for Energy Efficiency's Advanced Tier for residential gas boilers. EPA has referenced the CSA ANSI Z21.40.4 Performance Testing and Rating of Gas-Fired, Air Conditioning and Heat Pump Appliances, understanding that the standard is under revision. Once the standard is available for testing, boilers will be able to be recognized as Most Efficient 2022. Information on the development and timing of this test method would be appreciated. Partners should note that the Annual Fuel Utilization Efficiency (AFUE) measured by this test method is not directly comparable to the AFUE measured by the federal test method for residential boilers.

Refrigerators-Freezers: EPA proposes to revise the criteria for side-by-side, bottom freezer, and compact refrigerator product types in 2022 to greater than or equal to 30% above the Federal Minimum. Currently available refrigerator technologies such as innovative refrigerants and advanced variable speed compressors as well as improvements in the manufacturing techniques and materials for insulation yield significant efficiency improvements. There are 37 base models from 18 brands that are able to meet the proposed criteria for side-by-side and bottom freezers, which is represents 6% of the market for these product types. For compact refrigerators, there are 52 base models from 23 brands that meet the proposed criteria and represents 5% of the market. While there is currently strong ENERGY STAR Most Efficient representation among top freezer models, EPA is not proposing to move the level, as they remain the lowest energy consuming standard-size refrigerator-freezers.

Room Air Conditioners: EPA proposes to revise the recognition criteria to greater than or equal to 35% better than the Federal Standard in 2022. Available models doubled from last year and there are currently 14 base models from 6 brands meeting the proposed criteria, which represents 3% of the market.

Televisions: Due to the ongoing revision of the ENERGY STAR Version 9.0 specification for televisions, EPA is not proposing ENERGY STAR Most Efficient criteria for 2022

Ventilating Fans: EPA has maintained the 2021 criteria for ventilating fans. The current efficiency criteria are met by an appropriate subset of ENERGY STAR products; however, a very small number of those fans are currently recognized as ENERGY STAR Most Efficient. This is due to a lack of reported data for the noise criteria as measured at 0.25 in wtg. static pressure for bathroom/utility fans. EPA encourages partners to submit these data and contact EPA with questions regarding how to do so. EPA continues to monitor range hoods but has not seen sufficient differentiation to propose Most Efficient recognition for them.

Windows and Sliding Glass Doors: No changes are proposed for the 2022 residential window or sliding door recognition criteria. While high performance Most Efficient window products are widely available, they are still a relatively small slice of total market with 494 window product lines and 16 sliding glass door product lines recognized.

The proposed ENERGY STAR Most Efficient 2022 criteria for the full suite of products are 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 accompanying this letter.

<table>
<tr><th>Category</th><th>ENERGY STAR Most Efficient 2022 Recognition Criteria</th></tr>
<tr><td>Boilers</td><td>AFUE 120% or higher, per ANSI Z21.40.4 Performance Testing and Rating of Gas-Fired, Air Conditioning and Heat Pump Appliances</td></tr>
<tr><td>Ceiling Fans</td><td>Efficiency as per 10 CFR 430 Subpart B, Appendix U (cfm/W)
<table>
<tr><th>Ceiling Fan Type</th><th>Blade Span (D)*
(inches)</th><th>Ceiling Fan Efficiency
(CFM/W)**</th></tr>
<tr><td rowspan="2">Standard, Hugger, and Low-Mount HSSD Ceiling Fans</td><td>D ≤ 36”</td><td>≥ 1.44D + 83.86</td></tr>
<tr><td>D > 36”</td><td>≥ 5.26D - 53.66</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>
</table>
<table>
<tr><td>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>
</table>

Ducted Central Air Conditioners and Air Source Heat Pumps

System status and messaging capabilities, installation criteria, variable capacity

Product type	SEER	EER	HSPF
Split AC	18	13.0	
Packaged AC	16	12.0	
Split HP	18	12.5	9.6
Packaged HP	16	12.0	8.5
Cold Climate HP	16	11.5	10.0

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.

Dehumidifiers*

Product must meet the following applicable minimum Integrated Energy Factor (IEF)[2]:

Type, Size	Integrated Energy Factor (IEF)[2]
Portable, capacity ≤ 25.00 pints/day	≥ 1.70
Portable, capacity 25.01 to 50.00 pints/day	≥ 1.90
Portable, capacity > 50.00 pints/day	≥ 3.40
Whole Home, case volume ≤ 8.0 ft3	≥ 2.22
Whole Home, case volume > 8.0 ft3	≥ 3.40

Ductless AC and Heat Pumps*

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, installation criteria, variable capacity.

Geothermal Heat Pumps*

System status and messaging capabilities; variable capacity except water-to-water models.

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
DGX-to-Water	15	3.1

Computer Monitors

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;

$$E_{TEC_{MAX}} = (1.9 + (0.12 \times A) + [3.1 \times (r + C)]) \times eff_{AC\_DC}$$

Where:

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

A= viewable screen area in square inches;
r = Total Native Resolution in megapixels; and

$$C = \begin{cases} 0 & \text{if } A < 180 \text{ in}^2 \\ -0.2 & \text{if } 180 \text{ in}^2 \leq A < 220 \text{ in}^2 \end{cases}$$

<table>
<tr><td></td><td>−1.0 if $A \geq 220$ in^2</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>≥ 3.70</td></tr>
<tr><td>Electric</td><td>≥ 4.30</td></tr>
<tr><td>Gas</td><td>≥ 3.80</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>Electric</td><td>≥ 3.93</td></tr>
<tr><td>Gas</td><td>≥ 3.48</td></tr>
</table></td></tr>
<tr><td>Furnaces*</td><td>AFUE 97% or higher; system status and messaging capabilities.</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.

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 freezer product types must be at least 15% 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.</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 35% better than the DOE Federal Minimum Standard.

Products must also be at or below a maximum sound level of 45 dB(A) for the lowest operational setting.</td></tr>
<tr><td>Ventilating Fans*</td><td>Bathroom/utility fans: Efficacy at high speed (cfm/W): ≥10
In line fans: Efficacy at high speed (cfm/W): ≥5
In-line Ventilating Fan tested with a filter in place (6≤MERV<13): ≥4.7
In-line Ventilating Fan tested with a filter in place (MERV≥13): ≥3.8
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>
</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).

Residential Windows and Sliding Glass Doors*	U-factor ≤ 0.20 in all Zones SHGC in Northern Zone ≥ 0.20 SHGC in North-Central Zone ≤ 0.40 SHGC in South-Central and Southern Zones ≤ 0.25 North American Fenestration Standard/Specification (NAFS) Performance Grade ≥15

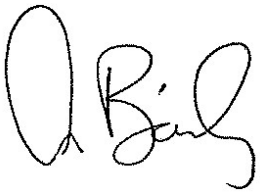
**Proposed criteria carried over from 2021 for these categories with no changes.*

EPA will provide additional information regarding the roll out of ENERGY STAR Most Efficient 2022 recognition with the finalization of these criteria.

EPA will hold a stakeholder webinar on **July 29, 2021 from 1:00-3:00pm EDT** to discuss the proposed 2022 recognition criteria. To participate in this webinar, please register here by July 29th. **Please share written comments no later than August 15, 2021 with MostEfficient@energystar.gov**. 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