



ENERGY STAR[®]

Room Air Cleaners Version 2.0 Discussion Guide

Stakeholder Webinar
November 13, 2018

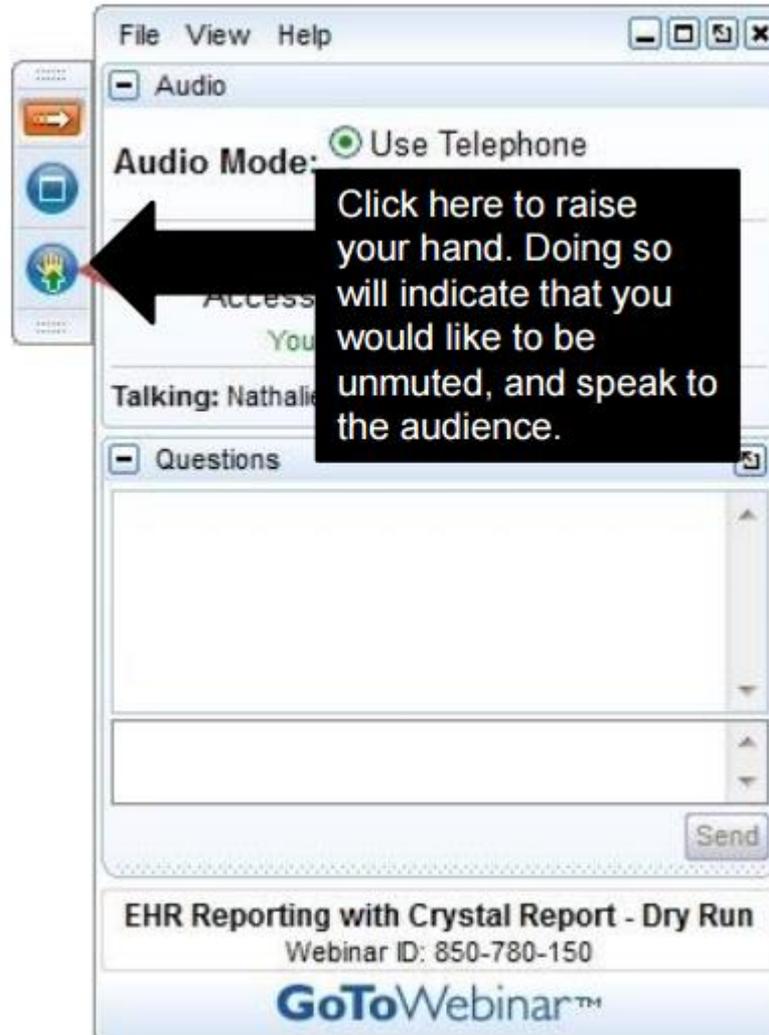


Meeting Details

- Slides and related materials will be available on the Room Air Cleaner Product Development Web page:
 - www.energystar.gov/RevisedSpecs
 - *Follow link to “Version 2.0 is in Development” under “Room Air Cleaners”*
- Audio provided via teleconference:
 - Call in:** +1 (877) 423-6338 (U.S.)
+1 (571) 281-2578 (International)
 - Code:** **773-366 #**
 - Phone lines will remain open during discussion
 - Please mute line unless speaking
 - Press *6 to mute and *6 to un-mute your line



Using GoToWebinar





Introductions

Time	Topic
3:00–3:10	Introductions, Overview of Specification Development Process, Background History, and Market Assessment
3:10–3:20	Update from EPA Indoor Environments Division
3:20–4:15	Version 2.0 Specification Considerations <ul style="list-style-type: none"> - Scope - Qualified Product Assessment - Technological Advancements - Product Size - Network-Connected Products - Smoke and Pollen CADR - Filer Performance - Fan Noise - Standby Power
4:15–4:45	Test Method
4:45–5:00	Timeline and Open Discussion



Introductions

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U.S. Environmental Protection Agency

Stephanie Johnson

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U.S. Environmental Protection Agency

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Nadav Singerman

Navigant



Webinar Goals

- Introduce stakeholders to EPA/DOE team
- Refresh stakeholders on ENERGY STAR principles and specification development process
- Engage with stakeholders on concepts and questions shared in the Discussion Guide
- Share expected next steps and schedule



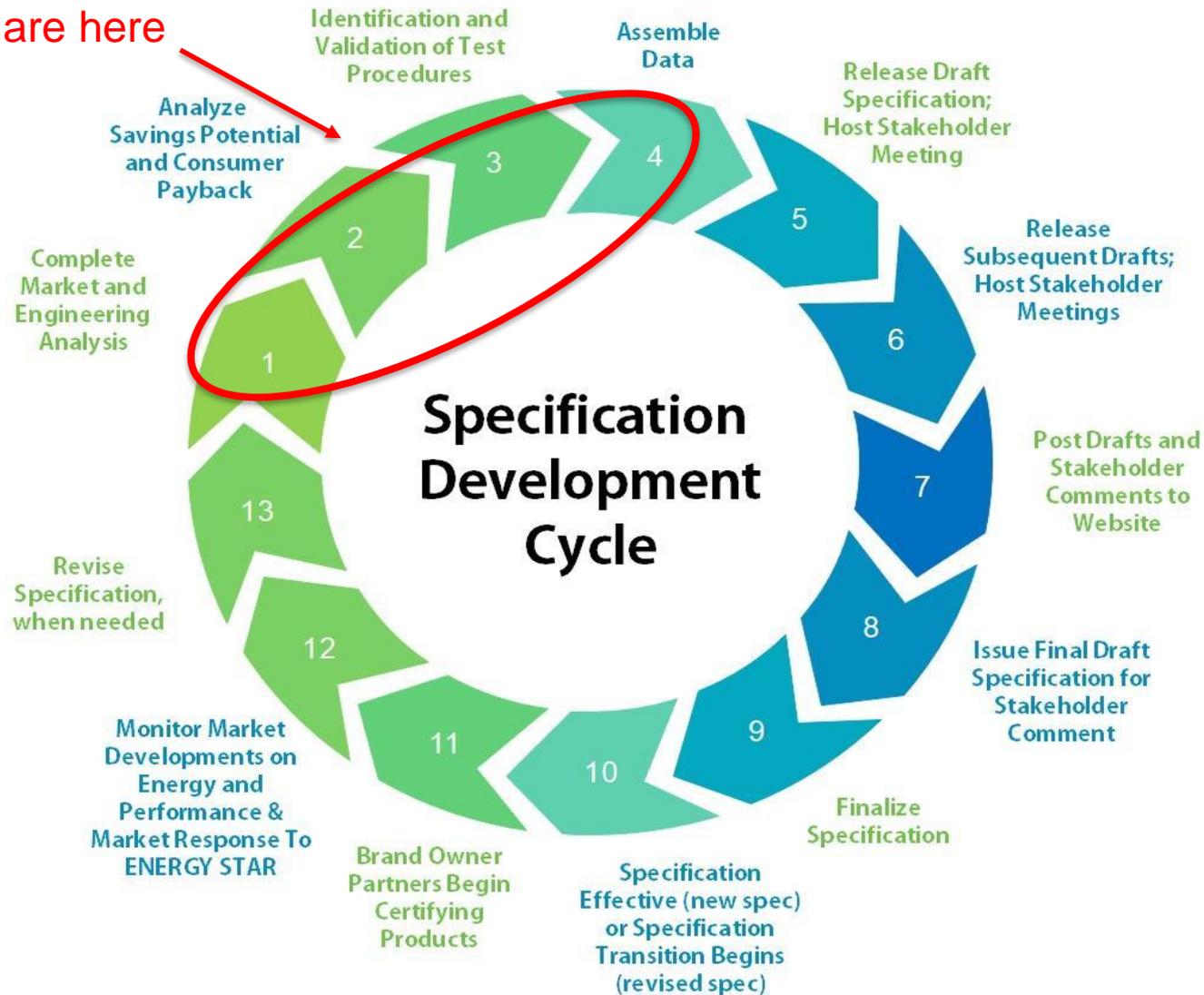


Specification Development

- When developing or revising a specification, EPA balances:
 - The need to keep pace with evolution among leading products and continue to effectively differentiate for consumers.
 - Production cycles, other factors important to the industry.
- Key elements of the stakeholder process:
 - Consistency, transparency, inclusiveness, responsiveness, and clarity.
- For more information on revising or establishing an ENERGY STAR product specification see [EPA's Standard Operating Procedure](#)



We are here





ENERGY STAR Guiding Principles

- ENERGY STAR criteria are designed to balance a varied set of objectives, including:
 - Significant energy and/or water savings
 - Product performance maintained or enhanced
 - Purchasers can recover investment in increased efficiency within a reasonable time period
 - Efficiency can be achieved by more than one manufacturer
 - Energy/water consumption can be measured and verified with testing
 - Label provides meaningful differentiation
- For more information see [ENERGY STAR Products Program Strategic Vision and Guiding Principles](#)



**ENERGY STAR® Products Program
Strategic Vision and Guiding Principles**

Strategic Vision

The ENERGY STAR product labeling program reduces greenhouse gas emissions by removing barriers in the market that deter consumers and businesses from easily identifying the financial and environmental benefits of purchasing the most energy-efficient product model that otherwise meets their needs. Historically, these barriers have included confusion about what constitutes an energy-efficient product, difficulty identifying which products are highly efficient and a lack of appreciation of the value efficient products offer. In particular, the program seeks to reduce greenhouse gas emissions using the following approach:

- Establishing a common, objective basis for defining what constitutes high efficiency for a particular product type
- Providing the market with an easy way (i.e. the ENERGY STAR label) to identify products that qualify
- Helping build and sustain demand for highly efficient products through education and outreach and by ensuring that the products deliver on consumer expectations

Program Design

The ENERGY STAR product labeling program overlays the consumer perspective as part of an ongoing process to identify and promote products that reduce greenhouse gas emissions by meeting the highest energy conservation standards. These standards (aka performance specifications) are established to recognize products that: are cost-effective from the purchaser standpoint; offer at least equivalent functionality and features as standard products; and are proven and broadly available.

As the market responds to consumer demand for ENERGY STAR qualified products in a particular category, sales of highly efficient products increase, locking in more and more energy savings and environmental benefits over the life of those units. In the process, because of technological advances and/or reduced production costs, opportunities present themselves to raise the bar over time in terms of what constitutes a highly efficient product in a given category. In conjunction with the steady progress this approach delivers, the U.S. Environmental Protection Agency (EPA) will continue to explore ways to leverage the ENERGY STAR platform to bring generational change through initiatives such as ENERGY STAR's Most Efficient and the ENERGY STAR Emerging Technology Award.

EPA uses a systematic framework built on a foundation of transparency and collaboration with a range of stakeholders to: (1) assess the feasibility of applying the ENERGY STAR label to a product category; (2) develop performance specifications that must be met in order to earn the label; and (3) reassess performance specifications as market conditions change. This process relies on rigorous market, engineering, and pollution savings analyses as well as input from other programs in EPA, industry and other stakeholders.

May 2012

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ENERGY STAR Room Air Cleaner (RACL) History

- At AHAM request, EPA spoke with stakeholders at an AHAM and EPA-organized meeting in 2003 to consider developing an ENERGY STAR RACLs specification
- EPA finalized the V1.0 RACLs specification in 2004
 - The energy efficiency performance requirements have remained unchanged
- Currently, there are 44 manufacturers participating, with about 60 brands, and 235 total products



ENERGY STAR® Program Requirements for Room Air Cleaners

Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for room air cleaners. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. Prior to associating the ENERGY STAR name or mark with any product, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for room air cleaners. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform room air cleaner testing. A list of EPA-recognized laboratories and Certification Bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
4. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR qualified room air cleaners.
 - 5.1. The ENERGY STAR mark must be clearly displayed on the top/front of the product, on product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed.
 - 5.2. Partner shall adhere to the following product-specific commitments regarding use of the ENERGY STAR certified mark on qualified products:
 - 5.2.1. An ENERGY STAR disclaimer label, which includes the following statement, shall be placed on the product packaging of ENERGY STAR qualified air cleaners:

"This product earned the ENERGY STAR by meeting strict energy efficiency guidelines set by the US EPA. US EPA does not endorse any manufacturer claims of healthier indoor air from the use of this product."

The minimum required dimensions for the vertical and horizontal disclaimer labels are 1.5" x 3.5" and 3.5" x 1.5". The graphic shall be scalable if the partner wishes to enlarge it for larger product packaging surfaces. This disclaimer graphic will be available for partners to download on the ENERGY STAR Web site with other ENERGY STAR marks.

ENERGY STAR Program Requirements for Room Air Cleaners – Partner Commitments 1



ENERGY STAR Retail Products Platform (ESRPP)

- A collaborative midstream initiative of ENERGY STAR, energy efficiency program sponsors, retailer partners, and other key stakeholders that is facilitated by EPA.
- It offers a gateway for energy efficiency programs to capture energy savings for specific product types at a significantly lower cost than current programs incur.
- Room air cleaners are included in the ESRPP program, and ESRPP utilities offer incentives for selling more efficient room air cleaners.
 - Utilities have included requirements incenting higher levels of efficiency and have seen a response in the market
 - 64% of ENERGY STAR qualified models can meet a significantly higher level of efficiency
- ESRPP is a great tool in the marketplace and the ENERGY STAR levels should be revised to be a better tool for retail products platform partners.

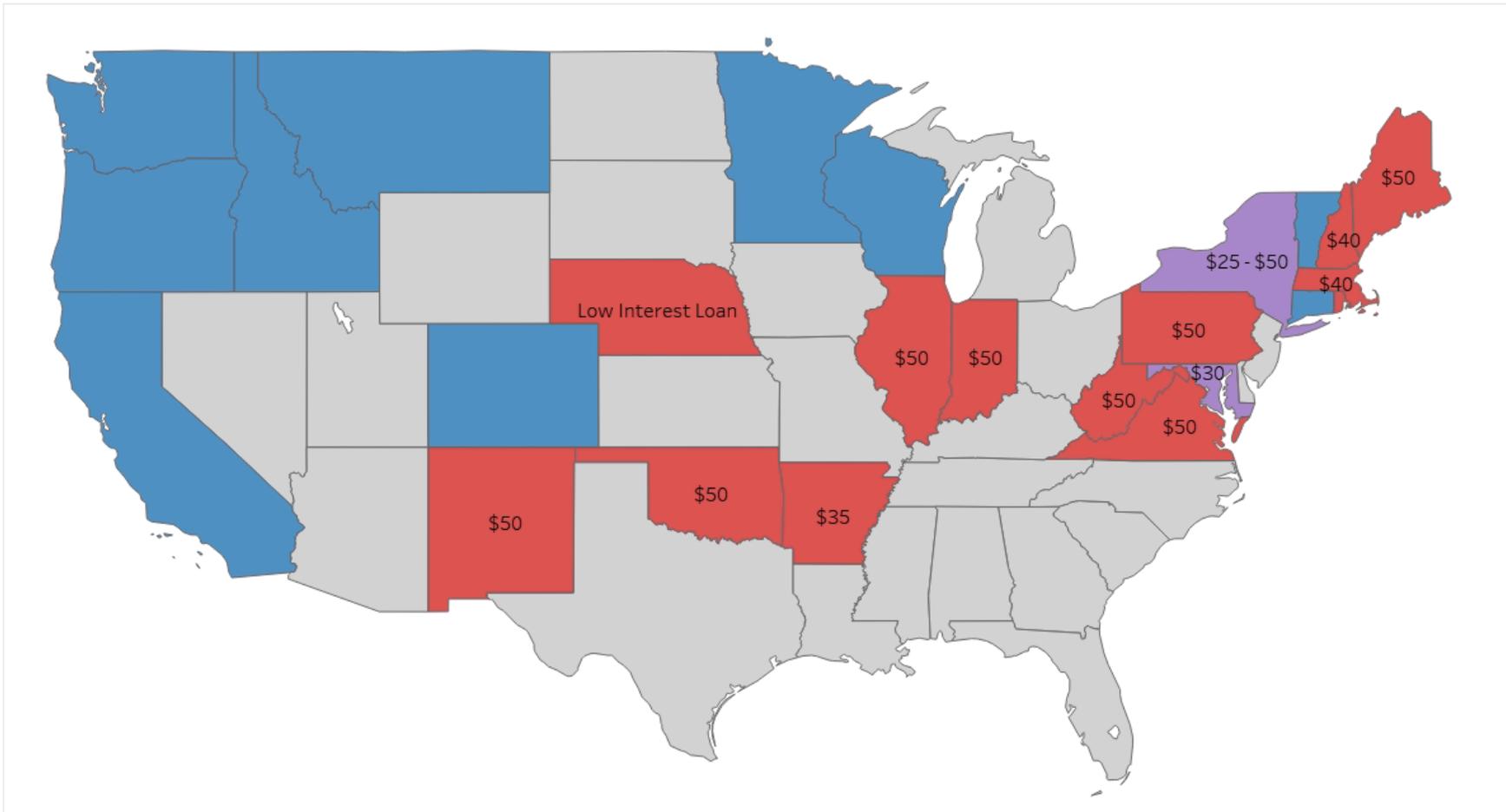
EPA is seeking information on the following:

- Are there other market trends that EPA should consider for room air cleaners?



Rebates for ENERGY STAR

- Currently, 14 states have downstream rebates and 12 have mid-stream rebates



Available Incentives

■ Downstream

■ RPP

■ RPP & Downstream

■ None

Update from EPA Indoor Environments Division

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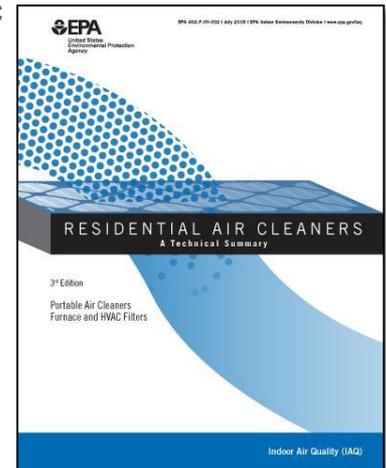
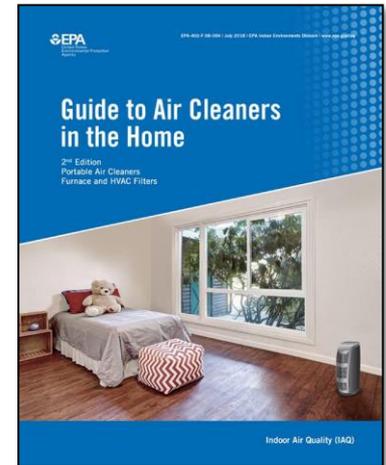
EPA, Office of Radiation and Indoor Air, Indoor Environments Division

The Indoor Environments Division implements non-regulatory programs to reduce public health risks from poor indoor air quality

New: Updated Voluntary Guidance on Air Cleaners:

- *Guide to Air Cleaners in the Home* – guidance for the general public
- *Residential Air Cleaners, A Technical Summary* – for residential housing design professionals, public health officials, and IAQ professionals

<https://www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home>





Version 2.0 Specification Considerations

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Scope

- In the Version 1.2 specification, all products that meet the definition of a Room Air Cleaner are included in scope, with the exception of:
 - Combination products
 - Ozone generators
- In addition, EPA has learned that some room air cleaners can emit harmful byproducts (e.g., air freshener)

EPA is proposing to exclude these products

EPA is seeking information on the following:

- Are there other product types EPA should consider excluding based on health concerns?
- How can EPA verify that products that emit contaminants are excluded?



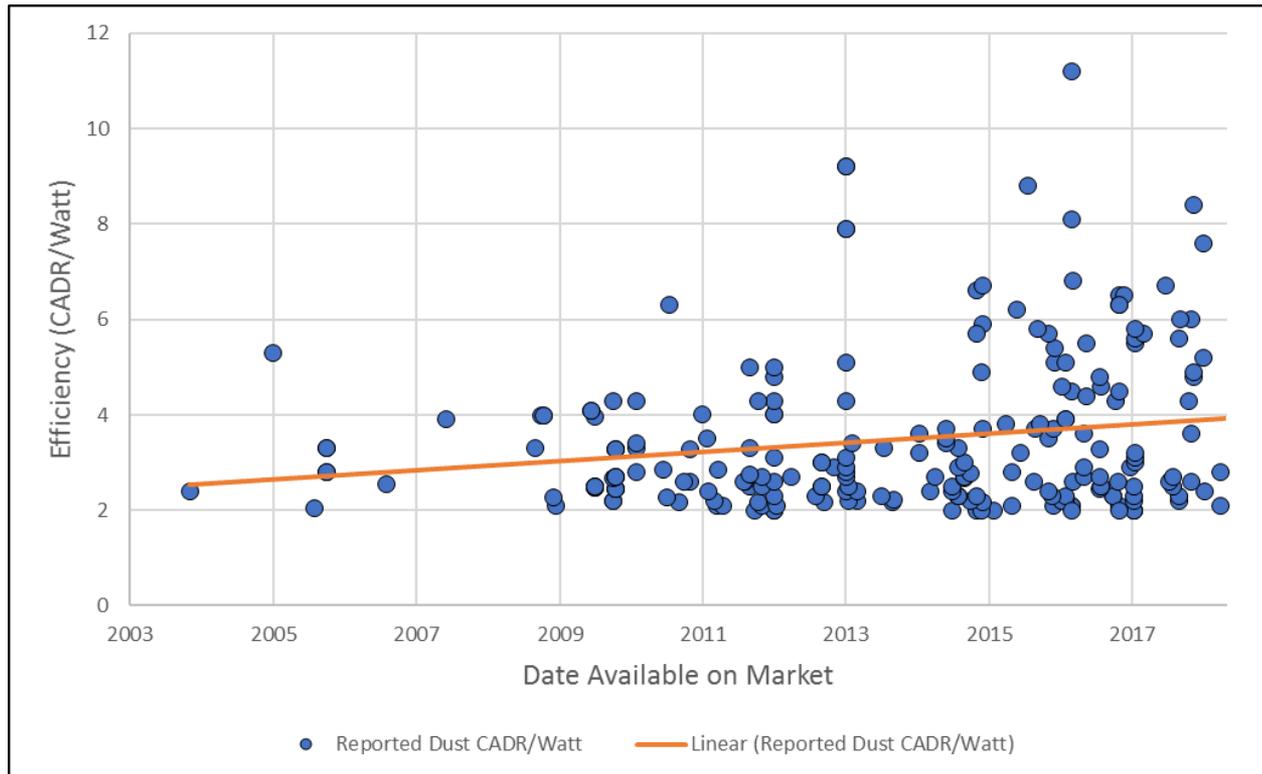
Technological Advancements

- Clean Air Delivery Rate (CADR) is the industry metric for determining product performance – measured in cubic feet per minute (CFM)
 - The larger the CADR, the greater the capacity to deliver clean air
- CADR/Watt is the metric for energy efficiency in the ENERGY STAR specification
 - The current criteria is set at 2.0 CADR/Watt
- EPA reviewed the performance data of ENERGY STAR qualified products to determine how efficiency improved since the Version 1.0 was released in 2004



Technological Advancements

- Trend of more efficient products on the market over time
- The trendline begins around 2.0 CADR/Watt in 2004 and ends near 4 CADR/Watt for products released in 2018, with some products even performing over twice the average efficiency





Technological Advancements

- Through research and recent conversations with stakeholders, EPA learned that:
 - The primary source of reduced energy consumption, and improvement in efficiency is the motor. Stakeholders noted that significant energy gains in the motor can be attributed to:
 - A shift from alternating current (AC) motors to direct current (DC) motors
 - A shift to more efficient AC motors
 - Certain products on the ENERGY STAR qualified product list can significantly surpass ENERGY STAR criteria because they use a combination of technologies to optimize fan speed

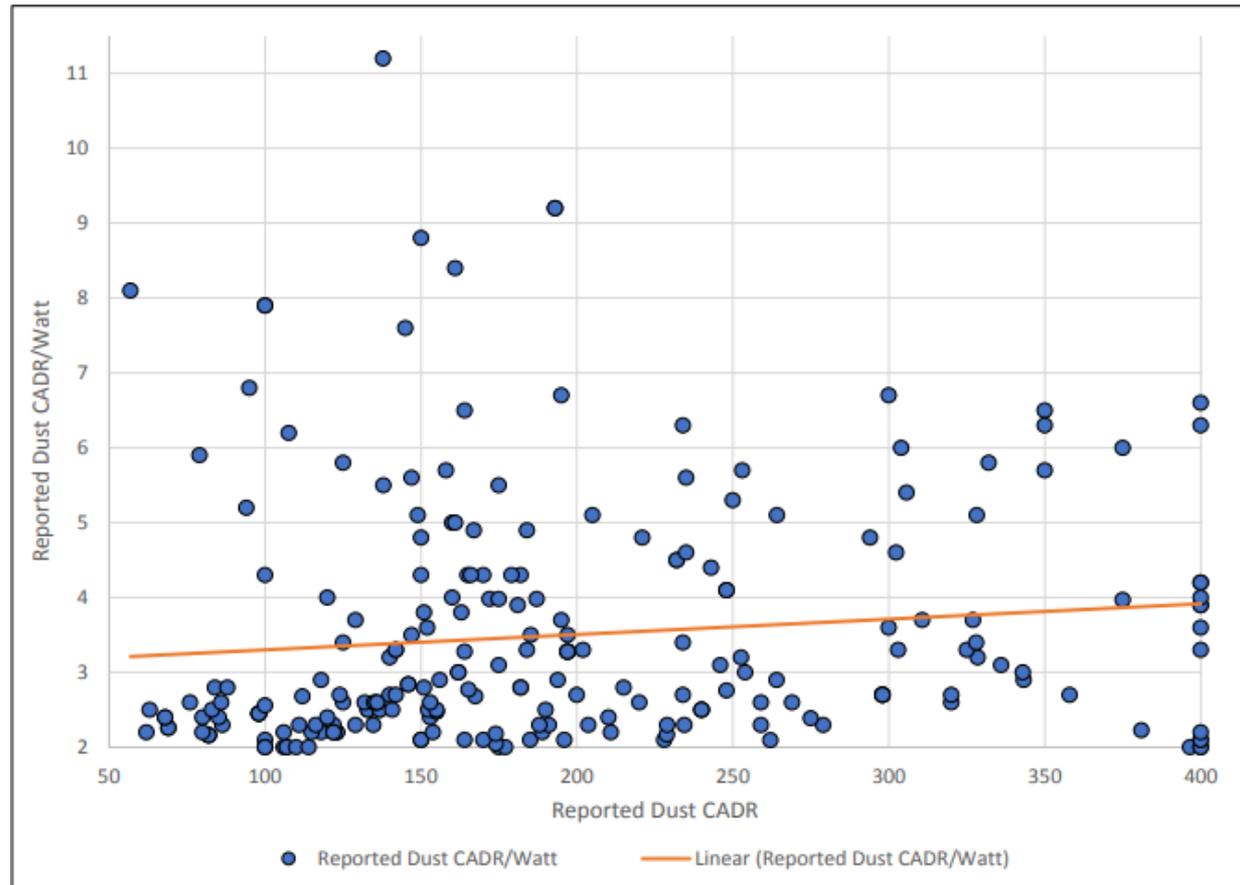
EPA is seeking information on the following:

- EPA welcomes stakeholder data on efficiency of non-ENERGY STAR products.
- EPA is seeking feedback on other advancements that have resulted in increased efficiency



Efficiency and Product Size

- In consideration of the differences in efficiency distribution by product size and potential differences in consumer utility, EPA is considering evaluating efficiency criteria based on a product's size
- Currently available products with larger CADR sizes are on average more efficient. At the same time, all of the products with the highest efficiency have a smaller CADR size





Efficiency and Product Size

- EPA recreated the typical size bins used by utilities participating in ESRPP, to determine the average efficiency for each bin:

Size Bins	# Products per Bin	Average Efficiency (CADR/Watt)
CADR < 100	25	2.88
$100 \leq \text{CADR} < 150$	56	3.36
$150 \leq \text{CADR} < 200$	65	3.68
CADR ≥ 200	89	3.63
Total	235	3.50

EPA is seeking information on the following:

- What motivates consumer purchases for specific sizes?
- What drives higher efficiency in larger units?
- Should EPA consider different boundaries for the CADR-size bins, if those listed above?



Network-Connected Products

- EPA has learned that there are network-connected air cleaners that allow consumers to interact with the product via a mobile device or computer
- A portion of the models on the market have sensors that adjust performance based on room air cleaner conditions
- Products reacting to a demand response signal would take action to help relieve some demand on the electrical grid by temporarily reducing the product's energy consumption

EPA is seeking feedback/information on the following:

- The prevalence and efficacy of connected products in adjusting settings to respond to local air quality.
- The prevalence and efficacy of sensors that are used to monitor room conditions.
- The full consumer value offered by connected products in terms of health, comfort, and energy savings benefits.
- EPA received a request to consider optional connected/demand response criteria to give guidelines to partners on how their products respond to utility signals.
 - What would the grid benefits be?
 - Are there any health risks associated with decreasing product operation due to a demand response event?



Smoke and Pollen CADR

- The Version 1.2 criteria are based on dust CADR only, but the ANSI/AHAM AC-1-2015 test procedure measures CADR for smoke and pollen particles as well.
 - EPA has learned that AHAM and retailers use smoke CADR to estimate the appropriate room size for a given room air cleaner.

Room Size Calculator ✕

Step 1: Calculate Room Size
Input the dimensions (width, length) of the room you're determining the size of, then press the 'Enter' button.

X = square feet

Step 2: [Search for air cleaners that have a room size of at least](#)

Important information on selecting an air cleaner:
The AHAM seal (usually found on the back or the side of an air cleaner's box) will list three clean air delivery rate (CADR) numbers - one for tobacco smoke, one for pollen and one for dust. The CADR indicates volume of filtered air delivered by an air cleaner. The higher the tobacco smoke, pollen and dust numbers, the faster the unit filters the air.

Follow AHAM's 2/3 Rule:
You'll always want a unit with a tobacco smoke CADR at least 2/3 your room's area. For example, a 10' x 12' room - 120 square feet - would require an air cleaner with a tobacco smoke CADR of at least 80. If your room size is smaller, the unit will simply clean the air more often or faster. *If you have ceilings higher than 8', you'll want an air cleaner rated for a larger room.*

EPA is seeking feedback/information on the following:

- Addressing smoke and pollen particle types, in addition to dust, in the ENERGY STAR efficiency requirements to offer increased consumer value.
- Do consumers select products based on the CADR for a specific pollutant type?



Filter Performance

- The Version 1.2 Specification does not reference specific filter types. However, in EPA Indoor Environments Division's "Guide to Air Cleaners in the Home", it is noted that filter type does influence the performance of a room air cleaner.
- EPA researched filter types, and defined those most applicable to room air cleaners:
 - **HEPA** is defined in ANSI/AHAM AC-1-2015 as an air filter with greater than or equal to 99.97% removal of carcinogen, dioctyl phthalate, at 0.3 μm diameter. The fractional efficiency of such filters can be verified using Mil-Std-282 or IEST-RP-CC001.3.
 - *HEPA filters have been found in literature to generally be the most effective.*
 - **HEPA-type** filters range from any efficiency up to that achieved by HEPA filters.
 - **Charcoal or Active Carbon** filters are designed to remove gases, while the HEPA filters are intended to remove particles



Filter Performance

EPA is seeking stakeholder feedback on the following:

- For products that use a filter, EPA is considering requiring a specific filter type (i.e., HEPA) or a minimum filter efficiency to ship with products that qualify for ENERGY STAR.
 - Should EPA identify these using the ANSI/AHAM definition or another industry accepted definition?
- Are there filter types EPA should consider excluding from being shipped with ENERGY STAR products?
- Do most room air cleaner filters undergo efficiency testing, or is this typically only carried out for those that meet the HEPA standards?



Room Air Cleaner Fan Noise

- In EPA Indoor Environments Division's recently released "Guide to Air Cleaners in the Home", it is noted that noise generated by room air cleaners can be a concern for consumers, who have cited noise as a reason for decreasing the speed of their air cleaner or turning it off.
 - The Technical Summary associated with this guide states that room air cleaners achieve the best air cleaning performance at maximum fan speed, resulting in noise levels that may be too high for consumers.
 - EPA has reviewed the ANSI/AHAM AC-2-2006 Method for Sound Testing of Portable Household Electric Room Air Cleaners

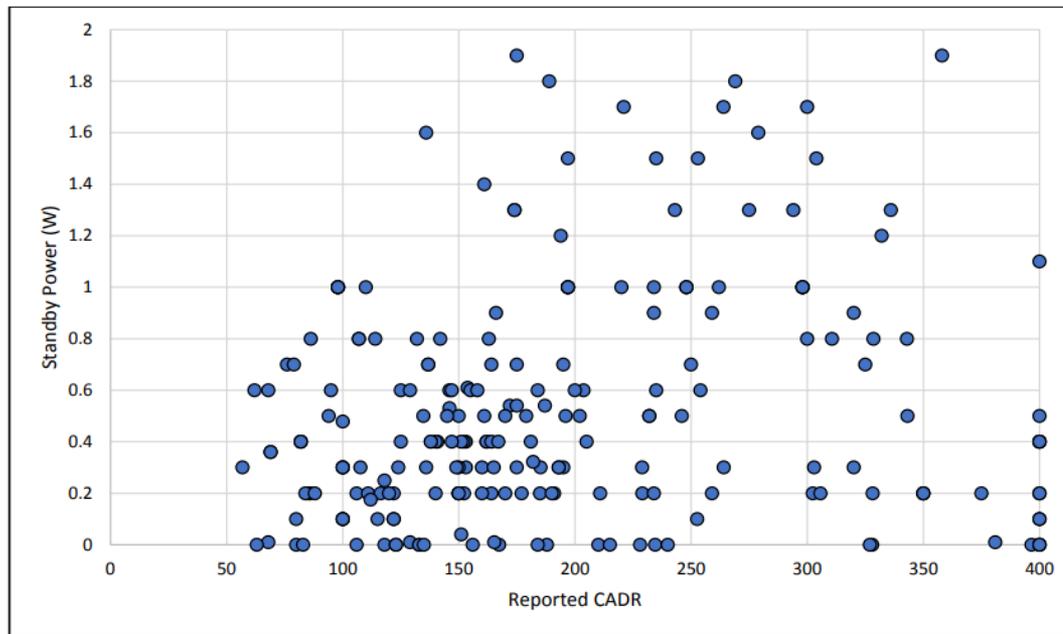
EPA is seeking information on the following:

- Do manufacturers include noise metrics on air cleaner product packaging?
- Is ANSI/AHAM AC-2-2006 the most appropriate method on which to base a floor for noise?
- Is there an appropriate sound performance floor for room air cleaners?
- EPA is interested in techniques manufacturers use to reduce the noise produced by room air cleaners and industry standards for measuring air cleaner noise.



Standby Power

- The standby power of products on the ENERGY STAR QPL demonstrates that products of all capacities far exceed the standby performance currently required by the ENERGY STAR specification. EPA is anticipating making this requirement more stringent.



EPA is seeking information on the following:

- What functions, if any, delivered in standby mode may be limited by a decreased standby limit?



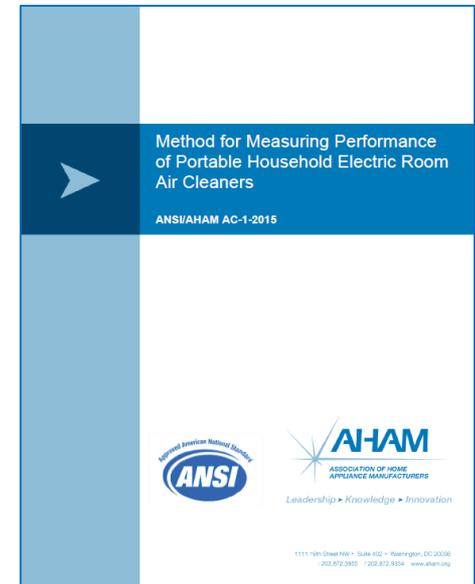
Test Method

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Test Method Discussion

- The current ENERGY STAR v1.2 Specification references **ANSI/AHAM AC-1-2006**, “Method for Measuring Performance of Portable Household Electric Room Air Cleaners,” to measure the clean air delivery rate (CADR, expressed in cubic feet per minute) per power consumption qualification criteria (**CADR/Watt**).
- ENERGY STAR performance criteria are based on the **dust removal** performance test in the ANSI/AHAM test method.
- EPA intends to update the test method reference to the more recent version, **ANSI/AHAM AC-1-2015**.





Test Method Discussion

- DOE and EPA are assessing the room air cleaner test method to determine whether the results are representative of typical consumer usage, and if opportunities are available to better differentiate more efficient products, while maintaining or minimizing the overall test burden.
- DOE and EPA have identified several areas for investigation for which additional analysis and testing may be warranted.
- DOE and EPA welcome feedback on these issues, and would welcome opportunities to collaborate with manufacturers in testing products, identifying key technologies, and selecting key models for testing.



Test Method Discussion

1. Contaminate Level
2. Contaminate Type
3. Control Speed
4. Test Duration
5. Filter Condition



1. Contaminate Level

Room air cleaners are currently tested in a relatively **heavily contaminated** room, which may not be representative of typical consumer usage conditions.

1. Would an adjustment in contaminate level be appropriate to potentially be more representative of typical consumer conditions?
2. Would it be feasible to vary contaminate levels depending on test unit features (e.g., size, power draw, other) that may indicate the expected contaminate level for that particular unit in the field?
3. Would multiple tests at different contaminate levels effectively differentiate the room air cleaner market?



2. Contaminate Type

ANSI/AHAM AC-1-2006 includes three tests that assess the performance of a room air cleaner with **dust**, **pollen**, and **cigarette** smoke. The current ENERGY STAR performance criteria are based only on the **dust** contamination performance.

1. Is dust contamination most representative of typical consumer usage? Should pollen and cigarette smoke, or a different contaminate not currently tested, also be considered for the ENERGY STAR performance criteria?
2. How does contaminate particle size impact test repeatability?
3. Would the simultaneous use of multiple contaminants within a single test room be repeatable and applicable to measure the full performance range of a product? How might that impact test burden?



3. Control Speed

Room air cleaners are currently tested at the **highest air cleaning mode setting**, which does not incentivize the development of more efficient controls, motors, and fans that could be designed to operate more efficiently at lower speeds (e.g., variable-speed operation that adapts to room conditions to reduce air flow once acceptable contamination levels are reached).

1. What is the most appropriate control speed setting(s) for testing room air cleaners?



4. Test Duration

The rating period for testing room air cleaners is currently **20 minutes**. Some advanced filter technologies are more effective than traditional filters, yet their performance benefits are not captured in a 20-minute test, as they tend to filter air more slowly than other traditional technologies.

1. Would a longer rating test period for air cleaners incentivize the development and use of advanced filter technologies?



5. Filter Condition

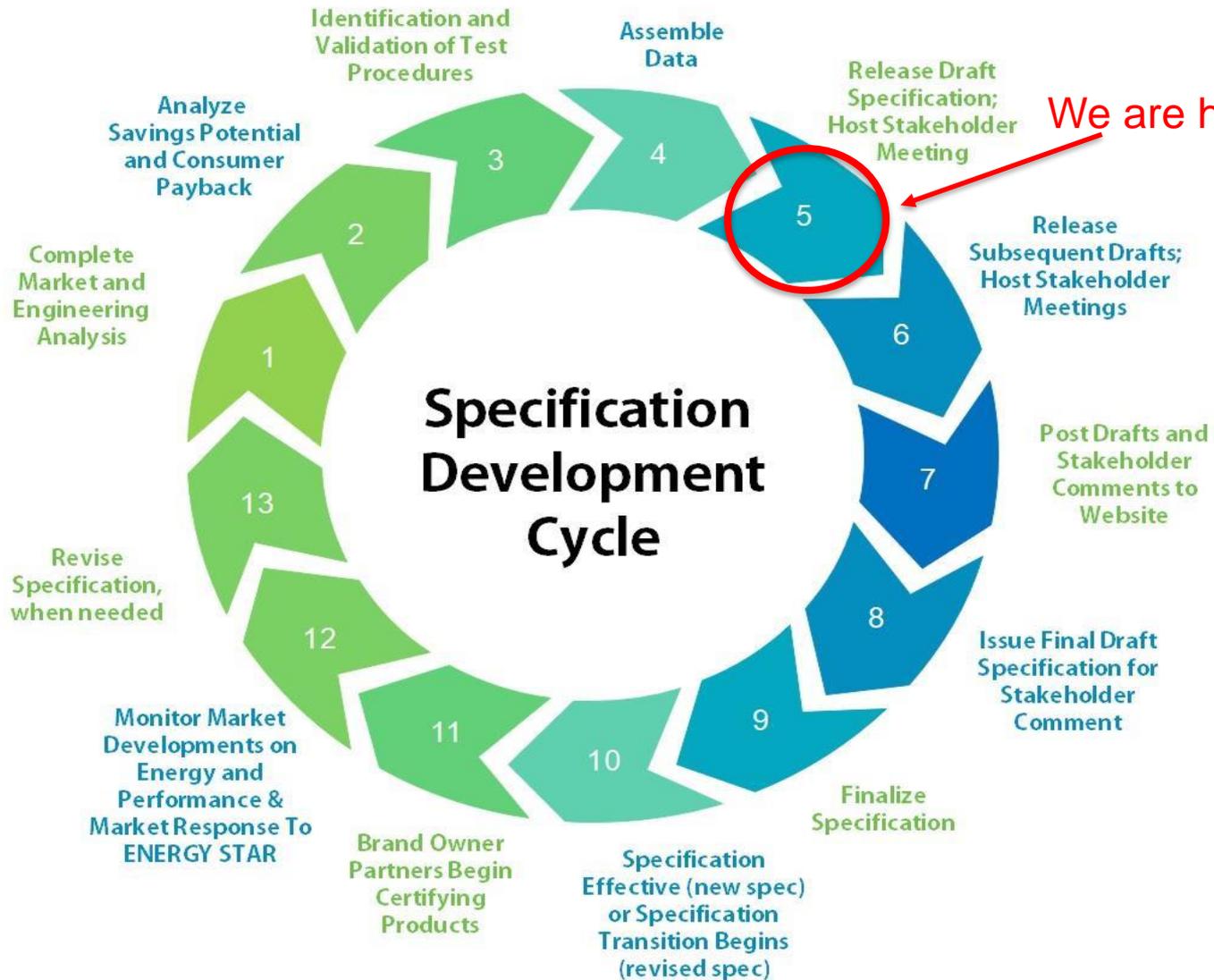
Room air cleaners are currently tested with a **new filter** installed prior to each test. This may not be representative of typical operation, where a filter may be used for extended periods of time, resulting in changes to the performance of the filter. Testing with a used filter could differentiate new technologies that can continue to operate efficiently after a significant period of time.

1. Should DOE and EPA consider a used filter test for room air cleaners? How does performance vary as filter usage time increases?



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Next Steps

Event	Date
<i>Version 2.0 Discussion Guide Published</i>	<i>October 18, 2018</i>
<i>Version 2.0 Discussion Guide Webinar</i>	<i>November 13, 2018</i>
Comments Due	November 27, 2018
Version 2.0 Draft 1 Specification	December 2018
Release Subsequent Drafts of Specification	Winter/Spring 2019
Publish Final Version 2.0 Specification	Summer 2019
Version 2.0 Specification Effective Date	Spring 2020



Webinar Wrap-up and Comment Deadline

- EPA and DOE appreciate today's opportunity to discuss the Discussion Guide.
- Again, comments are due on **November 27, 2018**.
- Please send all comments to:

roomaircleaners@energystar.gov

- Unless marked as confidential, all comments will be posted to the Room Air Cleaners product development page at [https://www.energystar.gov/products/spec/room air cleaners version 2 0 pd](https://www.energystar.gov/products/spec/room_air_cleaners_version_2_0_pd)



Open Discussion



Key Contacts

Specification Development

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Test Method

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Guide to Air Cleaners in the Home

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