



**ENERGY STAR®**  
**Residential Ceiling Fans**  
**Draft 1 Version 4.0**

**Stakeholder Webinar and Discussion**

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## Webinar Participation

- Please mute yourself when you are not speaking (use local mute or dial \*6)
- Feel free to ask questions at any time
- We will also have time for questions or comments at the end



# Agenda

- 1** Introduction
- 2** Scope and Definitions
- 3** Certification Criteria
- 4** Next Steps
- 5** Discussion

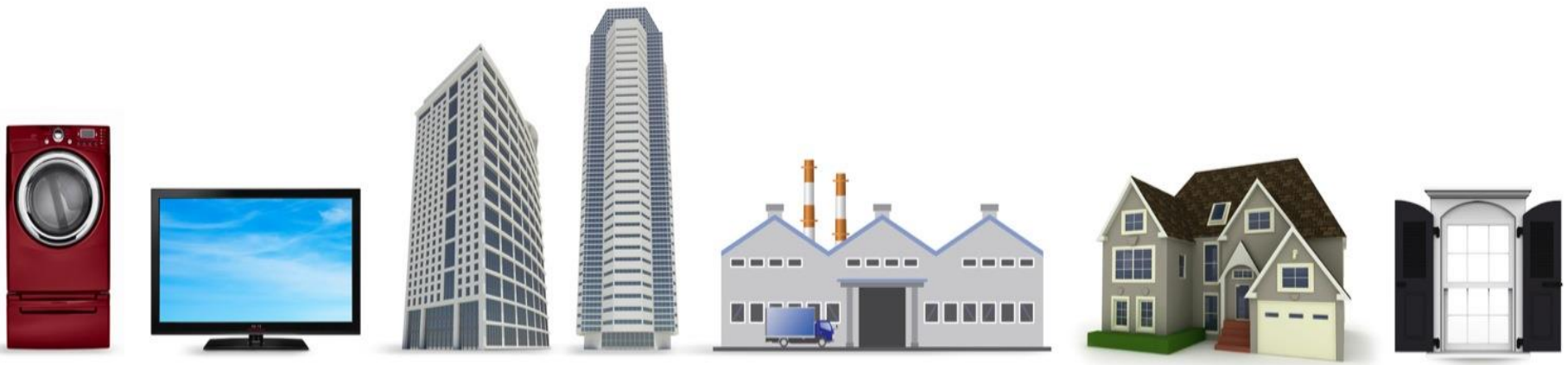


1	<b>Introduction</b>
2	Scope and Definitions
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EPA's ENERGY STAR identifies the most energy-efficient **products**, **buildings**, **plants**, and **new homes** – all based on the latest government-backed standards.

Today, every ENERGY STAR label is verified by a rigorous third-party certification process.





## Brand Preference and Loyalty

Of the **88% of households** that **recognize** the ENERGY STAR label:

**77% purchased** an ENERGY STAR-labeled product in the past year

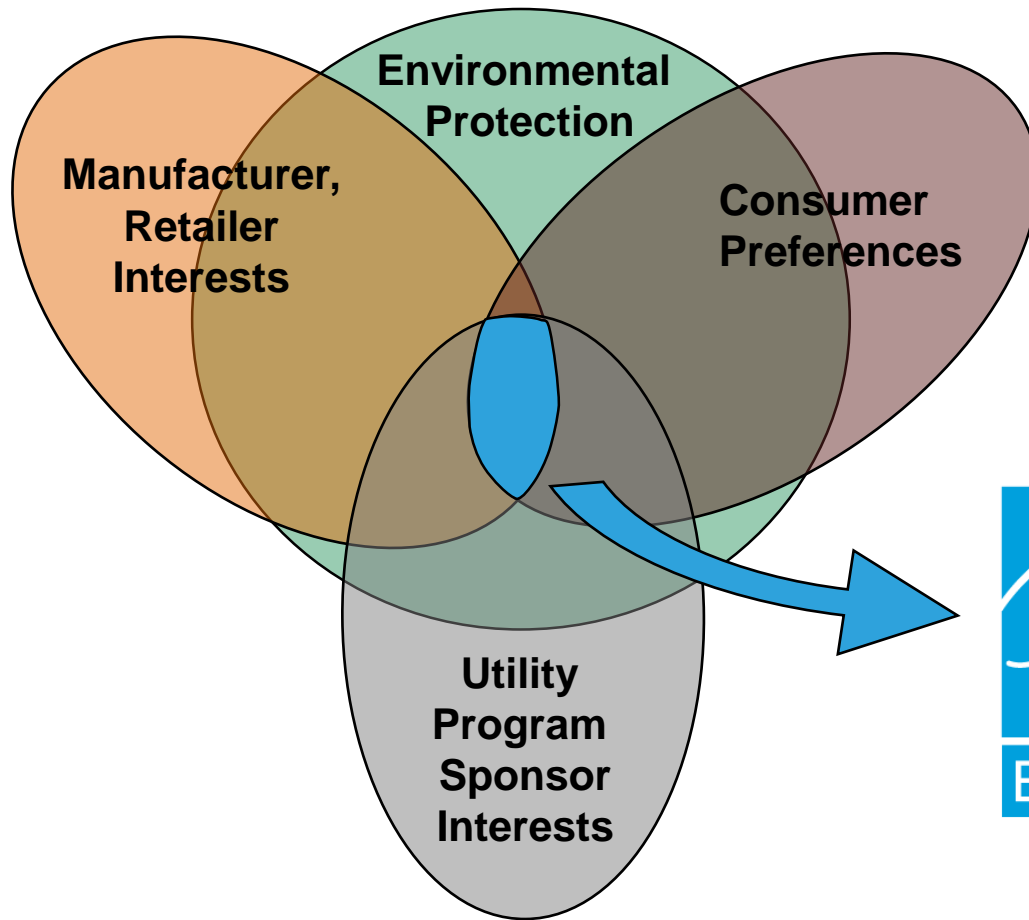
**78%** that purchased an ENERGY STAR-labeled product were **likely to recommend** ENERGY STAR-labeled products to a friend

**33%** were **extremely likely to recommend** ENERGY STAR-labeled products

Source: CEE National Household Survey for 2015



# ENERGY STAR's Focus



- Cost-effective
- No sacrifice in performance
- Government-backed
- Consumer is Key**



# Specification Development Cycle





# Important Process Elements

- Consistency
- Transparency
- Inclusiveness
- Responsiveness
- Clarity



## Guiding Principles for Specification Development

1. Significant energy savings can be realized on a national basis
2. Product performance can be maintained or enhanced with increased energy efficiency
3. Purchasers recover their investment in increased energy efficiency within a reasonable period of time
4. Energy-efficiency can be achieved through several technologies
5. Product energy consumption and performance can be measured and verified with testing
6. Labeling would effectively differentiate products and be visible for purchasers



## Drivers for Revision

- Time: Performance criteria in effect since April 1, 2012
- Lack of differentiation: In the most commonly sold configurations, 40-50% of models meet ENERGY STAR criteria
- Opportunity for further savings: There is now opportunity for differentiation of products above the current ENERGY STAR level
- New or upcoming Federal test method, metric and standards
- Align with DOE ceiling fan light kit test methods where applicable



## Adoption of Integrated Efficiency Metric

- July 25, 2016 final rule to amend test method for ceiling fans – mandatory for representation of efficiency on January 23, 2017
- Integrated efficiency metric (cfm/W); new ceiling fan categories
- DOE minimum ceiling fan standards (compliance date January 21, 2020) are either the same as or more stringent than current ENERGY STAR criteria



## Key Changes

- Somewhat expanded scope
- Definitions aligned with CFR
- Airflow efficiency requirements increased
- Optional connected criteria
- Lighting requirements changed little, but incorporated into specification



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## Scope – Included Products

- Products that meet the definition of a Residential Ceiling Fan:
  - Standard Ceiling Fans
  - Hugger Ceiling Fans
  - Low-Mount High-Speed Small-Diameter Ceiling Fans
    - Blade thickness  $\geq 1/8$  inch
    - Maximum tip speed limits for safety
- Ceiling Fan Light Kits
- This is a small scope expansion, to include fans with blade span up to 84”, and hugger fans





## Scope – Excluded Products

- Ceiling fans that are most often used in commercial and industrial settings:
  - High-Speed Small-Diameter Ceiling Fans (other than low mount)
  - Large-Diameter Ceiling Fans
- Very-Small Diameter, Highly-Decorative, and Belt-Driven Ceiling Fans
- CFLKs packaged with integrated bulbs with an ANSI-standard lamp shape and base type that have not been ENERGY STAR certified (e.g., A19 shape and E26 base type)
- CFLKs not packaged with a light source



## Definitions

- Where applicable, EPA has updated definitions to align with 10 CFR Part 430 Subpart A §430.2 and Subpart B, Appendices U and V1
- Updated definitions:
  - Product Family → Basic Model
  - Light Kit → Ceiling Fan Light Kit (CFLK)
  - Residential Ceiling Fan now includes distinctions for “Standard” and “Hugger”
  - Airflow Efficiency → Ceiling Fan Efficiency
  - Power Consumption now includes active and standby power in watts (for ceiling fans)



## Definitions

- New definitions (related to ceiling fans):
  - Belt-driven Ceiling Fan
  - Blade Span
  - High Speed
  - High-Speed Small-Diameter (HSSD) Ceiling Fan
  - Highly-Decorative Ceiling Fan
  - Low-Mount High-Speed Small-Diameter Ceiling Fan
  - Low Speed
  - Low-Speed Small-Diameter Ceiling Fan
  - Standby Mode Power
  - Very-Small-Diameter Ceiling Fan



## Definitions

- New definitions (related to ceiling fan light kits):
  - CFLK with Integrated Solid-State Lighting Circuitry
  - CFLK with Separable Light Source (“Separable”)
  - Inseparable Solid-State Lighting CFLK
  - LED Light Engine
  - Non-Standard Integrated LED Lamps
  - Other SSL Product
  - Solid-State Lighting



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## Proposed Airflow Criteria: Overview

- Ceiling Fan Efficiency proposed at the DC motor level
  - One efficiency level above DOE's standard level for 2020
- Products that can be matched with several blade options shall be tested and meet the airflow requirements with the blade option resulting in the highest energy consumption



## Draft 1 Proposed Airflow Criteria

Ceiling Fan Type	Minimum Efficiency <sup>†</sup> (cfm/W)	Minimum High Speed Airflow <sup>†</sup> (cfm)
Standard Ceiling Fan	$\geq 2.63 * D - 26.83$	$\geq 21.88 * D + 3096$
Low-Mount HSSD Ceiling Fan	$\geq 2.63 * D - 26.83$	$\geq 21.88 * D + 3096$
Hugger Ceiling Fan	$\geq 1.75 * D - 15$	$\geq 17.87 * D + 2456$

<sup>†</sup>D represents the fan diameter in inches



## Draft 1 Proposed Airflow Criteria

- Expect market shift to higher efficiency fans through 2020 in response to new standards
- EPA estimates that around 18% of ceiling fans already meet the levels proposed in this Draft 1
- Minimum high speed airflow requirements are maintained at a level similar to the current
- Hugger fan requirements reflect overall lower expected performance





## Proposed CFLK Criteria: Overview

- CFLKs face new DOE requirements → so it is clearer to integrate lighting requirements into one ceiling fan specification for ease of use
- Draft 1 introduced a new industry standard for light source flicker
- As before, two proposed options for certifying CFLKs
  - CFLKs can ship with appropriate ENERGY STAR certified light bulbs
  - Other CFLK configurations can certify based on additional testing.
- Fundamentally, test requirements are unchanged from Luminaires V2.0



# Draft 1 Proposed CFLK Efficacy Criteria

CFLK Type	Minimum Efficacy (lumens/W)	Minimum Light Output (lumens)	Methods of Measurement and/or Reference Documents
CFLK with Separable Light Sources: ENERGY STAR Certified Lamps	See ENERGY STAR Lamps Specification	CFLK shall deliver a minimum total light output of 800 lumens	ENERGY STAR Lamps Specification in effect on the CFLK's model date of manufacture
CFLK with Separable Light Sources: Other	65.0		<p><b>DOE Test Method</b> (Fluorescent Circline and Compact Non-Integrated Lamp and Ballast Combinations)</p> <p><b>IES LM-82-12</b> (CFLKs with <u>LED light engines</u>) with energy efficiency measurements at room temperature determined in accordance with DOE test method</p> <p><b>IES LM-82-12</b> (CFLKs with <u>non-standard integrated LED lamps</u>) with energy efficiency measurements at room temperature determined in accordance with DOE test method.</p>
CFLK with Integrated SSL Circuitry	70.0		DOE Test Method; CFLK shall be evaluated based on luminaire photometry. Values shall be derived from the complete luminaire, including optical losses.



# Draft 1 Proposed CFLK Efficacy Criteria

## Supplementary Testing Guidance for Other SSL Products Using LED Light Engines

Laboratory test results shall be produced using the specific models of LED package, LED module or LED array and LED driver (i.e. LED light engine) that will be used in production.

In situ temperature measurement value shall be determined in accordance with ANSI/UL 153:2002 (Sections 124-128A), ANSI/UL 1574:2004 (Section 54), or ANSI/UL 1598-2012 (Sections 19.7, 19.10-16), as applicable.

Light output, input power and resulting efficacy at room temperature shall be determined in accordance with 10 CFR Part 429 and 430, Subpart B, Appendix V1; measurements at the in situ  $T_b$  value shall be determined in accordance with IES LM-82.

Product shall meet requirements at both temperatures.



## Option 1: Shipping with ENERGY STAR Certified Light Bulb(s)

Only five requirements to be met:

1. Packaged with ENERGY STAR certified light bulb(s).  
*All potential lamp models must be included in the CFLK certification.*
2. Shipped with lamps suitable for the CFLK type
3. Enclosed fixtures: additional thermal testing
4. Meet applicable safety ratings
5. Lamps packaging must be compliant



## Option 2 Performance Requirements: Continued

Minimum Rated Life (hours)	CFLK Type
10,000	Fluorescent
25,000	Indoor Separable CFLKs using LED Light Engines
35,000	Outdoor Separable CFLKs using LED Light Engines
50,000	CFLKs with Integrated Solid-State Lighting Circuitry



## Option 2 Performance Requirements: Continued

- Serviceability
  - Easily serviced by “qualified electrician”
    - Except for CFLKs shipping with ENERGY STAR certified lamps, light engines with integrated drivers (which are consumer replaceable), and CFLK with Integrated Solid-State Lighting Circuitry (which are not replaceable)
- Thermal Performance
  - Not exceed maximum recommended ballast or driver case temperature during *in situ* operation



## Option 2 Performance Requirements: Continued

- Safety
  - Comply with appropriate safety certifications
  - Connected products – functionality shall not override existing safety protections and functions
- Dimmability
  - Continuous dimming from 100% to 20% (except step dimming CFLKs)
  - $\leq 24$  dBA noise limit at minimum claimed light output measured at a distance of one meter or less
  - Dimmable SSL CFLKs shall meet NEMA SSL 7A and NEMA 77-2017 for compatibility and temporal light modulation limits



## Control and Standby Requirements

- For all products – Wired and Remote Controls, as before but now including mobile device applications as remotes
- Optional – meet Connected Functionality requirements to be identified as “Connected” on the ENERGY STAR Product Finder:
  - Open Access
  - Energy Consumption Reporting
  - Operational Status Reporting
  - Remote Management
  - Information to Consumers
  - Intended for products that can be accessed off-site or be integrated with other controls (e.g. home automation system, thermostat)





# Control and Standby Requirements

- Standby Power Consumption – reporting requirement

<b>ENERGY STAR Requirements</b>	<b>Methods of Measurement</b>
<p>Standby power consumptions of certified ceiling fans and ceiling fan light kits shall be reported separately.</p> <p>Laboratory test results shall detail standby power consumption to at least the tenth of a watt.</p>	<p>10 CFR Part 430, Subpart B, Appendix U</p>



## Minimum Warranty

- 10 years for the motor and associated driver electronics
- 1 year for all other non-lighting components
- CFLKs with replaceable drivers – written warranty which covers repair or replacement of defective parts of the CFLK housing, mounting hardware, optics, driver, and trim for at least 3 years from date of purchase (5 years for CFLKs with non-replaceable drivers)



## Product Certification

- CFLK Product Families:  
Certified products within a product family shall be identical to the tested, representative model with the exception of allowable variations which are consistent with Luminaires V2.0
- Solid-State Lumen Performance Data:  
Shall comply with the ENERGY STAR Requirements for the Use of LM-80 Data. *Minor update pending.*



## Product Certification

- Significant Digits and Rounding
  - Updated to reference 10 CFR Part 430, Subpart B, Appendix U for ceiling fan efficiency
  - Updated to reference 10 CFR Part 429, Subpart B §429.33 for ceiling fan light kit efficacy
- Ceiling Fan Sampling
  - Updated sampling language to align with current ENERGY STAR language for DOE-covered products; no substantive change



## Labeling and Packaging

- Ceiling Fans Sold without CFLKs
  - Shall provide information on product packaging or with product instructions regarding ENERGY STAR certified CFLKs that may be matched with the ceiling fan



## Labeling and Packaging

- Ceiling Fan Light Kit (sold with a fan or separately)
  - Packaging/marketing claims consistent with certification
  - Nominal color designation in units of Kelvin
  - CFLK shipped with lamps containing mercury – CFLK and lamp packaging must indicate mercury content
  - For outdoor CFLKs – indicate minimum starting temperature
  - Dimmable CFLKs – indicate dimming range
  - EPA recommends that a conspicuous ENERGY STAR certification mark is provided on the CFLK itself (not a requirement)



## Summary of Differentiation and Payback

- Model Percentage is estimated around 18% based on converted efficiencies
- Payback
  - Between 5 and 6 years for standard and hugger fans, with or without lighting, when compared to DOE baseline of conventional fans now
  - Slightly longer compared to 2020 standards, but actual costs then likely to be lower



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## Next Steps

- Written comments are due May 12, 2017
- At least one more draft before finalization
- EPA hopes to finalize in July, 2017
  - If further discussion is needed on connected criteria, will not delay finalization
  - Partners can certify to Version 4.0 as soon as it is finalized (i.e. using the new efficiency metric)
- Approximately 9 months from finalization, the product finder will **only** include products certified to Version 4.0.



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## Discussion

- Open to comments and questions
- Please raise your hand in the webinar control panel or write in a question
- The slides will be posted online
  - Slides, draft specification, and all other related materials can be found on EPA's Residential Ceiling Fans [product development webpage](#)



## Written Comments

- In addition to making verbal comments during today's meeting, stakeholders are strongly encouraged to submit written comments and data
  - *Comments will be displayed for public viewing unless otherwise specified by the commenter*
- Please send all comments to: [CeilingFans@energystar.gov](mailto:CeilingFans@energystar.gov)

**Comment Deadline**

**May 12, 2017**



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