ENERGY STAR®
Room Air Conditioners

Draft 3 Version 3.0
Stakeholder Webinar

January 31, 2012

Agenda

Introduction – Welcome/Goals	Amanda Stevens, U.S. EPA
Room Air Conditioner Draft 3, Version 3.0: Summary & Discussion	
- Definitions, Requirements	Ryan Fogle, D&R Int'l
- "Connected"	Amanda Stevens, U.S. EPA Doug Frazee, ICF Int'l
Conclude & Next Steps	Amanda Stevens, U.S.EPA

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Introduction and Meeting Goals

- Highlight changes in the Draft 3 Version 3.0 specification
  - New definition for Electromechnical room ACs
  - Revisions to Energy Saver Mode and Filter Reminder Criteria
  - Revised proposal for “Connected”
    - Seeking further input to inform structure of Demand Response criteria
- Address stakeholder questions
  - Questions/feedback welcomed throughout presentation
- Review next steps and updated timeline

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Definitions

- Electromechanical Room Air Conditioner (RAC):
  - New definition developed to support proposed revisions and clarifications for Energy Saver Mode and Filter Reminder
  - An existing industry definition was not identified; therefore, a definition was developed based on stakeholder input:

    A RAC that measures room temperature with a thermostat that undergoes a physical change (dimensional, phase change, etc.) relative to temperature, and utilizes mechanical rotary, switch, or similar user controls for cooling output, fan speed, desired temperature, or other features.
- EPA welcomes feedback on this proposed definition

EER Criteria

*Proposed allowance discussed later in webinar

Units Without Reverse Cycle		
	ENERGY STAR EER (with louvered sides)	**ENERGY STAR EER (without louvered sides)**
Less than 6,000 Btu/hr	11.2	10.4
6,000 to 7,999 Btu/hr		
8,000 to 13,999 Btu/hr	11.3	9.8
14,000 to 19,999 Btu/hr	11.2	
20,000 Btu/hr or more	9.8	
Units With Reverse Cycle		
< 14,000		9.8
≥ 14,000		9.2
< 20,000	10.4	
≥ 20,000	9.8	
Casement Units		
Casement-only	10.0	
Casement-slider	10.9	

Energy Saver Mode

- Energy Saver Mode was clarified, in response to stakeholder questions and feedback:
  - RAC must default to Energy Saver mode each time the product is turned on.
  - This default mode could be overridden by consumer, but the override must reset each time the RAC is turned on, i.e., Energy Saver Mode re-activated
  - Electromechanical RACs (meeting definition proposed in Section 1) must have an Energy Saver Mode but default requirement is not applicable

- Specified fan cycling was amended
  - Stakeholder feedback on Draft 2 noted that for larger RACs generally used in larger rooms, additional fan run time may be necessary to accurately monitor room temperature
  - The same maximum ratio of 1 minute fan-on to 5 minutes fan-off was retained, but additional flexibility has been added so manufacturers can use shorter, longer, or variable fan-on durations as fan run time doesn't exceed 17% of the total cycle time

Filter Reminder

- Filter reminder criteria was amended to not apply to electromechanical RACs
  - Stakeholder feedback indicated that filter reminders are not feasible for electromechanically controlled RACs

- No further changes proposed to the Filter Reminder criteria

Significant Digits & Rounding

- Revised language to reference DOE RAC rounding procedures found in 10 CFR 430.23(f), better harmonizing with DOE regulatory requirements

- Added language specifying that compliance with ENERGY STAR EER levels be evaluated using EER values rounded to the nearest 0.1 Btu per watt-hour

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ENERGY STAR Products

- EPA, through the ENERGY STAR program, has long encouraged development of “intelligence” in products, while enabling emissions reductions that persist over the long-term
  - Deep sleep in set-top boxes
  - Power management for monitors
- EPA sees opportunity to apply the ENERGY STAR program’s longstanding commitment to the consumer as various aspects of “smart grid” are extended to end-use products
  - Consumer value is longstanding brand promise

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Promote “Connected” for Immediate & Long Term Value

- End-use products use bi-directional communications can interface with the Home Area Network (HAN), enabling new energy-saving opportunities, for example:
  - Enhanced energy awareness; disaggregate household energy use down to product level – personalized and actionable information!
  - Diagnostics and alerts to minimize periods of reduced efficiency (important convenience factor too)
- Enable consumers to take advantage of future programs and rate designs that help them to tailor their energy use to when its cheaper or cleaner
- Consumers **must** retain ultimate control over product

Building upon Recommendations in “Smart Appliance” Petition

- Coalition of appliance manufacturers and efficiency advocates submitted “Smart Appliance” petition to ENERGY STAR in early 2011
- Requests EPA and DOE consider “smart” functionality for:
  - Refrigerators/Freezers
  - Clothes Washers
  - Clothes Dryers
  - Room Air Conditioners
  - Dishwashers
- Groups have requested “smart” appliances be eligible for an allowance against minimum performance levels

Proposed Approach

- For “connected” products that deliver both consumer-oriented enhancements and demand response functionality, EPA is considering two complementary approaches:
  - Highlighting functionality on the ENERGY STAR Qualified Product List (QPL)
  - Allowance towards energy requirement (for RACs, minimum EER)
    - NOTE: Products must be qualified using *TBD* ENERGY STAR Test Method to utilize allowance

Proposed Allowance

- EER shall be greater than or equal to EER_{MIN}:

Equation 1. Calculation of Minimum EER

$$EER_{MIN} = EER_{BASE} - EER_{Adder\ Connected}$$

Where,

- EER_{BASE} is the base EER specified in Table 1, 2 or 3
- $EER_{Adder\_Connected}$ is the EER connected allowance per Table 4

EER Allowance

Table 4: Connected Allowance[1, 2]

Product Type	$EER_{Adder\_Connected}$
All RAC types covered in Tables 1, 2 and 3	0.05 x minimum EER_{BASE}

[1] Product must demonstrate "connected" functionality as specified in Section 4 and in accordance with Section 5. Note: As noted in Section 5, to use the allowance the RAC must be qualified using final and validated ENERGY STAR test method (not yet developed; see discussion in Section 5)

[2] Calculated allowance shall be rounded down to nearest tenth of an EER before being applied in Equation 1

Overview of “Connected” Criteria

A. Home Energy Management (HEM) functionality
   - Energy consumption reporting
   - Remote management
   - Operational status & alerts

B. Demand Response (DR) functionality
   - *In Draft 3, seeking further from stakeholders to inform structure of criteria*

C. Communication Standards, Open Access & Info to Consumers

HEM Functionality

- Energy Consumption Reporting
  - Must be capable of communicating self energy-consumption
  - Reporting intervals of 15m or less
  - No accuracy specified, but accuracy of reporting must be made available to interested parties
- Remote Management
  - Similar functionality to consumer controls on the product
  - Product not required to respond to requests that would compromise product performance or safety
- Status, Settings & Messages
  - User settings (e.g., mode, setpoint) and operational status (e.g., fan, compressor status, room temperature)
  - Energy-related messages/alerts
  - DR status (normal, delay load, etc.)

HEM Functionality – Feedback?

EPA is interested in stakeholder feedback on:

- Energy Consumption reporting
  - Reporting interval
  - Units, watt-hours?
  - Accuracy specified only to interested 3rd parties
- Remote Management
  - Energy saving applications
  - Savings through enhanced control
- DR Status & Energy Alerts
  - On product or over a communication link?
  - Energy messaging: unusual consumption, energy budgeting, others?

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Demand Response (DR) Functionality

- Draft 3 does not contain proposed DR functionality. Instead, DR opportunity is discussed in a notebox, framing several ways in which DR criteria might be structured.

- Before issuing a Final Draft, EPA plans to follow up and provide stakeholders with a proposal of DR criteria

- EPA is seeking more feedback from stakeholders to inform development of these criteria

Demand Response (DR) Functionality (con't)

- Option A: Specifying energy reduction as a percentage reduction off of a baseline
  - Example: Delay Appliance Load response reduces RAC energy use by at least 25% relative to baseline for up to 4 hours
  - Note: Baseline would be energy use as characterized in DOE RAC test method
- Option B: Setpoint offset from consumer comfort setting
  - Example: Delay Appliance Load response increases RAC setpoint by 4° F
- Additional considerations: EPA wants to ensure comfort impacts associated with minimum responses is acceptable for consumers
  - Should either Option A or B include an automatic override?

Demand Response (DR) Functionality (con't)

- A stakeholder has also suggesting EPA consider an approach for DR criteria focused on informing devices of grid conditions. For example:
  - A RAC capable of receiving information from grid and responding to the information according to the preferences and configuration of the consumer
- EPA believes its appropriate that a specification contain some minimum level of response to a DR request
- Might a broader description of DR functionality be used along site a set of minimum capabilities (i.e., via Option A or B)?

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Demand Response (DR) Functionality – Feedback?

- Which option is preferred and why?
  - Load shed magnitude & consistency
  - Cost & complexity of qualification/verification
  - Comfort impact
  - Implementation flexibility
- Other approaches?
  - Price responsiveness
  - Less prescriptive / more flexible

Open Standards, 3rd Party Access & Interoperability

- DR communications must use standards identified by the NIST SGIP
- HEM communications standards are not specified, but manufacturers are required to release the following information to 3rd parties:
  - Accuracy of energy consumption reporting, and
  - Documentation that enables transmission, reception, and interpretation of:
    - Energy Consumption Reporting
    - Remote Management
    - Operational Status, User Settings, & Messages (if transmitted)

Open Standards, 3rd Party Access & Interoperability Feedback?

- Will the HEM communication flexibility afforded by the proposed criteria sufficiently assure open access and interoperability?
- What is the status of standardization activities for appliance remote management? Are common command sets coming?
- Are 3rd party information requirements sufficient to drive open access and interoperability?

Information to Consumers

- For “Connected” RACs that require a module or additional infrastructure:
  - Prominent informational shall be displayed at the point of purchase and in the product literature
- “Connected” RACs that require installation of communication module(s) to enable DR functionality:
  - Module(s) must be easily user installable, and
  - Must either ship with the product or be provided to consumers by the manufacturer in a reasonable amount of time

Information to Consumers Feedback?

- EPA recognizes that activation of networked products can be tricky
  - Do proposed criteria do enough to ensure that consumers are suitably informed and instructed both before and after the sale?
  - Are the proposed criteria likely to promote a simple upgrade path for DR interconnection?

- Who is the appropriate entity (or entities) to supply the DR communication module(s)? Proposed language specifies they be shipped by manufacturers or manufacturer's representative
  - Is there also interest from: Electric Utilities? HEMS or home control service providers? DR aggregators?

Verification of “Connected” Criteria

- Compliance with “Connected” functionality shall be through examination of product and/or product documentation

- Additionally, demand response functionality shall be certified using the TBD ENERGY STAR Test Method in order to be eligible for the allowance

Testing of “Connected” Room ACs

- DOE understands that AHAM is currently developing a test procedure for “connected” RACs
- Concurrently, DOE is conducting a market assessment and talking with stakeholders to learn more about “connected” RACs
- DOE plans to test products using the proposed AHAM test procedure, once available
- Consequently, DOE is looking for manufacturers that are willing to work with DOE on obtaining “connected” RACs for testing

Anticipated Timeline

January 23, 2012	Draft 3 specification distributed
January 31, 2012	Draft 3 Stakeholder webinar
February 20, 2012	Draft 3 comments due.
February/March 2012	Proposal for DR Criteria
April 2012	Final Draft Specification Distributed
April 2012	Final Version 3.0 Specification Published
January 30, 2013	Version 3.0 Specification Effective

- EPA welcomes all partner and stakeholder comments by **February 20, 2012**.
- Comments should be submitted in writing to appliances@energystar.gov

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Questions?

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