ENERGY STAR®
Stakeholder Meeting

September 1, 2016
Automatic Commercial Ice Makers V3.0
Meeting Agenda

• Welcome & Brief Introductions
• ENERGY STAR Commercial Ice Makers
  – Background on Equipment Classes
  – Landscape of Version 2.0
  – Intent of the Revision
  – Activities to Date
  – Discussion of Scope
• Additional Questions & Discussion
• Next Steps
Equipment Classes

- Ice makers are divided into equipment classes based on physical characteristics that affect commercial application, equipment utility, and equipment efficiency.

- **Ice Making Process**
  - Batch
  - Continuous

- **Equipment Configuration**
  - Ice-making Head
  - Remote Condensing (With remote compressor and without remote compressor)
  - Self-contained

- **Condenser Cooling**
  - Air-cooled
  - Water-cooled

- **Capacity Range**
  - Up to 4,000 lbs ice/24 hrs
Current Specification: ENERGY STAR Commercial Ice Makers Version 2.0

- **ENERGY STAR Version 2.0 Product Category**
  - Effective date: February 1, 2013

- **Scope of Included Products (Version 2.0)**
  - Air-cooled, batch and continuous type
  - Ice Making Head (IMH); Remote Condensing Unit (RCU) or Split System Unit; Self-Contained Unit (SCU)

- **Ongoing Data Assembly**
  - Sources include:
    - ENERGY STAR Qualified Products List (QPL)
Guiding Principles That May Impact Timing of Specification Revisions

- Significant increase in ENERGY STAR market penetration
- Change in Federal minimum efficiency standards
- Technological advancements
- New or improved test procedure
- Concern about consumers not realizing expected energy savings
- Product performance or quality concerns
Objectives for V3.0 Specification

• Increase Energy Performance Levels
  – Reduce the maximum Energy Consumption Rate (kWh/100 lbs ice)
  – Evaluate the potential to amend Potable Water Use limits (gal/100 lbs ice)

• Consideration of DOE Federal Minimum Standard
  – Effective January 28, 2018
  – Align terms and definitions with DOE’s final rule
  – Federal minimum standards meet or exceed Version 2.0 levels for most products and most sizes
  – Impacts near all equipment classes
Remote Condensing Unit (RCU) Terminology

• **DOE Definitions**
  – Remote compressor means a type of automatic commercial ice maker in which the ice-making mechanism and compressor are in separate sections.
  – Remote condensing means a type of automatic commercial ice maker in which the ice-making mechanism and condenser or condensing unit are in separate sections.

• **Proposed Changes to Version 3.0**
  – Align with DOE Equipment Class Definitions
  – For clarification, DOE determined that rack-only RCUs are not defined as ice makers under the statute and are not included in the rulemaking
    • EPA intends to use the same approach for determining scope of eligible products
Characterizing Scope of Products

• ENERGY STAR Version 2.0
  – Included Products: “RCUs designed for connection to remote rack compressors that are alternately sold (with the same model number) with a dedicated remote condensing unit are also eligible”
  – Excluded Products: “RCU units that are designed only for connection to remote rack compressors are not eligible”

• Discussion Question:
  – Given DOE definitions on previous slide, is there a way to update this and provide more clarity on the eligibility criteria?
Proposed Approach for Determining V3.0 Levels

• **Building the Dataset**
  – EPA plans to develop a data set that is based on products that will meet DOE 2018 levels (all other products will be removed from consideration)
    • Based on information from the ENERGY STAR Qualified Products List & AHRI Directory of Certified Product Performance

• **Determining Performance Levels**
  – EPA plans to use a non-linear formula to show the relationship between energy use
    • Similar approach to V2.0
    • In contrast, DOE uses a piece-wise linear function with different formulas for different capacity ranges

• **Discussion Questions:**
  – Are there other sources we should be considering?
  – Does our dataset reflect the best of what will be available in 2018?
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Batch-Type Ice Making Head (IMH)
Energy Consumption Rate vs Ice Harvest Rate

- Measured Energy Use (kWh/100 lbs/ice)
- Harvest Rate (lbs ice/day)

- Performance Data
- Power (V2.0 Level)
- Linear (DOE 2018 0-299)
- Linear (DOE 2018 300-799)
- Linear (DOE 2018 800-1499)
- Linear (DOE 2018 1500-2500)
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Continuous-Type Ice Making Head (IMH)
Energy Consumption Rate vs Ice Harvest Rate

- Measured Energy Use (KW/100 lbs ice)
- Harvest Rate (lbs ice/day)

- Performance Data
- Power (V2.0 Level)
- Linear (DOE 2018-0-309)
- Linear (DOE 2018-310-819)
- Linear (DOE 2018-820-4000)
ENERGY STAR Automatic Commercial Ice Machines
ENERGY STAR Automatic Commercial Ice Machines

Continuous-Type Remote Condensing Unit (RCU)
Energy Consumption Rate vs Ice Harvest Rate

- Performance Data
- Power (400-4000 V2.0 ENERGY STAR Level)
- Linear (DOE 2018 0-800)
- Linear (DOE 2018 800-4000)
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Batch-Type Self Contained Unit (SCU)
Energy Consumption Rate vs Ice Harvest Rate

- Measured Energy Use (kWh/100 lbs ice)
- Harvest Rate (lbs ice/day)

Legend:
- Performance Data
- V2.0 Level
- DOE 2018 0-109
- DOE 2018 110-199
- DOE 2018 200-450
- Power (V2.0 Level)
- Power (DOE 2018 0-109)
- Linear (DOE 2018 110-199)
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Continuous Self Contained Unit
Energy Consumption Rate vs Ice Harvest Rate

- Performance Data
- Power (V2.0 Level)
- Linear (DOE 2018 Power 2018 0-199)
- Linear (DOE 2018 Power 200-699)
Version 2.0 Potable Water Use Metric

Table 1: ENERGY STAR Requirements for Air-Cooled Batch-Type Ice Makers

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Applicable Ice Harvest Rate Range (lbs. of ice/24 hours)</th>
<th>Potable Water Use (gal/100 lbs. ice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMH</td>
<td>200 ≤ H ≤ 1600</td>
<td>≤ 20.0</td>
</tr>
<tr>
<td>RCU</td>
<td>400 ≤ H ≤ 1600</td>
<td>≤ 20.0</td>
</tr>
<tr>
<td></td>
<td>1600 ≤ H ≤ 4000</td>
<td>≤ 20.0</td>
</tr>
<tr>
<td>SCU</td>
<td>50 ≤ H ≤ 450</td>
<td>≤ 20.0</td>
</tr>
</tbody>
</table>

Table 2: ENERGY STAR Requirements for Air-Cooled Continuous-Type Ice Makers

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Potable Water Use (gal/100 lbs. ice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMH</td>
<td>≤ 15.0</td>
</tr>
<tr>
<td>RCU</td>
<td>≤ 15.0</td>
</tr>
<tr>
<td>SCU</td>
<td>≤ 15.0</td>
</tr>
</tbody>
</table>

Discussion Questions:
– Are there new technologies or advances in water efficiency that should be considered for Version 3.0?
Potential Scope Expansion for Version 3.0

• EPA is evaluating the feasibility and interest in expanding the scope to include additional commercial ice maker products

• Examples:
  – Water cooled ACIMs operating on a closed-loop system
  – Expand ice harvest ranges for batch-type ice makers
    • Test method availability
    • Performance data availability
    • Energy and water savings potential
    • Stakeholder interest

• Discussion Questions:
  – Are there specific product types or subcategories that we should consider for inclusion?
  – Is there anything else related to specific components or innovations that EPA should consider right now?
Consideration of New Requirements

• **Load Shifting Requirement or Recognition**
  – One important consideration for the energy consumption is the time of day and duration ice machines are on
  – EPA would like to add a requirement that ice machines be equipped with on-board controls that would allow operators to establish an ice making schedule during non-peak hours.

• **Discussion Questions:**
  – How should we write something like this into the specification to ensure energy savings are realized?
  – How to identify energy savings associated with producing ice during non-peak hours (i.e., cooler ambient conditions).
  – Will load shifting yield savings for all ACIM installation applications? (e.g., QSRs, full-service, cafeterias, banquet/hotel operations, etc.)

• **Refrigerant Type**
  – EPA would like to add refrigerant type as a reporting requirement
  – Information would be recorded during certification testing and made publicly available on the ENERGY STAR QPL
  – What information is currently available about performance of low-GWP refrigerants?
Additional Questions & Discussion
Next Steps & Timeline

- EPA to issue a Draft 1 Version 3.0 specification (September 2016)
- Pending stakeholder comments received in response to the Draft 1, EPA will determine if a subsequent Draft 2 will be issued; otherwise, Version 3.0 will go straight to a Final Draft
- Target: Finalize Version 3.0 before 2017
- Effective Date: On or before January 28, 2018
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