



# ENERGY STAR® Commercial Refrigerators and Freezers

## Version 5.0 Discussion Guide

Stakeholder Meeting (Part 2)

February 9, 2021





## Webinar Participation

- Please mute yourself when you are not speaking (use local mute or dial \*6)
- Feel free to ask questions at any time

Submit written comments to [cfs@energystar.gov](mailto:cfs@energystar.gov) by **February 23, 2021**

The screenshot displays a webinar control interface. At the top, there is a menu with 'File', 'View', and 'Help'. Below this is an 'Audio' section with a 'Sound Check' indicator. Two options are available: 'Computer audio' (selected) and 'Phone call'. A microphone icon is shown with the word 'MUTED' in orange. Below this, there are dropdown menus for 'Transmit (Plantronics Savi 7xx-M)' and 'Receive (Plantronics Savi 7xx-M)'. A volume bar is visible. The current speaker is identified as 'Talking: Liz Davis'. A 'Questions' panel is open, showing a text input field with the placeholder '[Enter a question for staff]' and a 'Send' button. A sidebar on the left contains several icons, with the 'Mute' icon (a hand with a slash) highlighted by a red box. The bottom of the interface displays 'Webinar Housekeeping' with the ID '608-865-371' and the 'GoToWebinar' logo.



## Poll Question #1

Which Stakeholder group do you identify as?

- Manufacturer
- Certification Body
- Restaurant or Commercial Operator (e.g., grocery store)
- Utility or EEPS
- Consultant
- Trade Association (please type in chat box to organizer)
- Other (please type in chat box to organizer)



## Poll Question #2

What are your expectations for this webinar?

- To voice questions concerning possible new levels to CRE already in scope
- To increase my understanding of the new possible CRE scope expansions
- To learn about the ENERGY STAR program for products
- Other



## Meeting Agenda

### 1. Introductions

### 2. Current Specification

### 3. Criteria Revisions to Existing Product Categories

### 4. Test Method Discussions

a) Refrigerated Preparation and Buffet Tables

b) Chef Bases or Griddle Stands

c) Blast Chillers and Freezers

### 5. Closing - Next Steps & Questions



## Introductions

**Tanja Crk, EPA**

[Crk.Tanja@epa.gov](mailto:Crk.Tanja@epa.gov)

Product Manager

**Jasmin Melara, ICF**

[Jasmin.Melara@icf.com](mailto:Jasmin.Melara@icf.com)

Product Developer

**Adam Spitz, ICF**

[Adam.Spitz@icf.com](mailto:Adam.Spitz@icf.com)

Product Developer

**Brian Ward, ICF**

[Brian.Ward@icf.com](mailto:Brian.Ward@icf.com)

Senior Adviser, CFS Industry

**Stephanie Johnson, DOE**

[Stephanie.johnson@ee.doe.gov](mailto:Stephanie.johnson@ee.doe.gov)

Project Manager

**Troy Watson, Guidehouse**

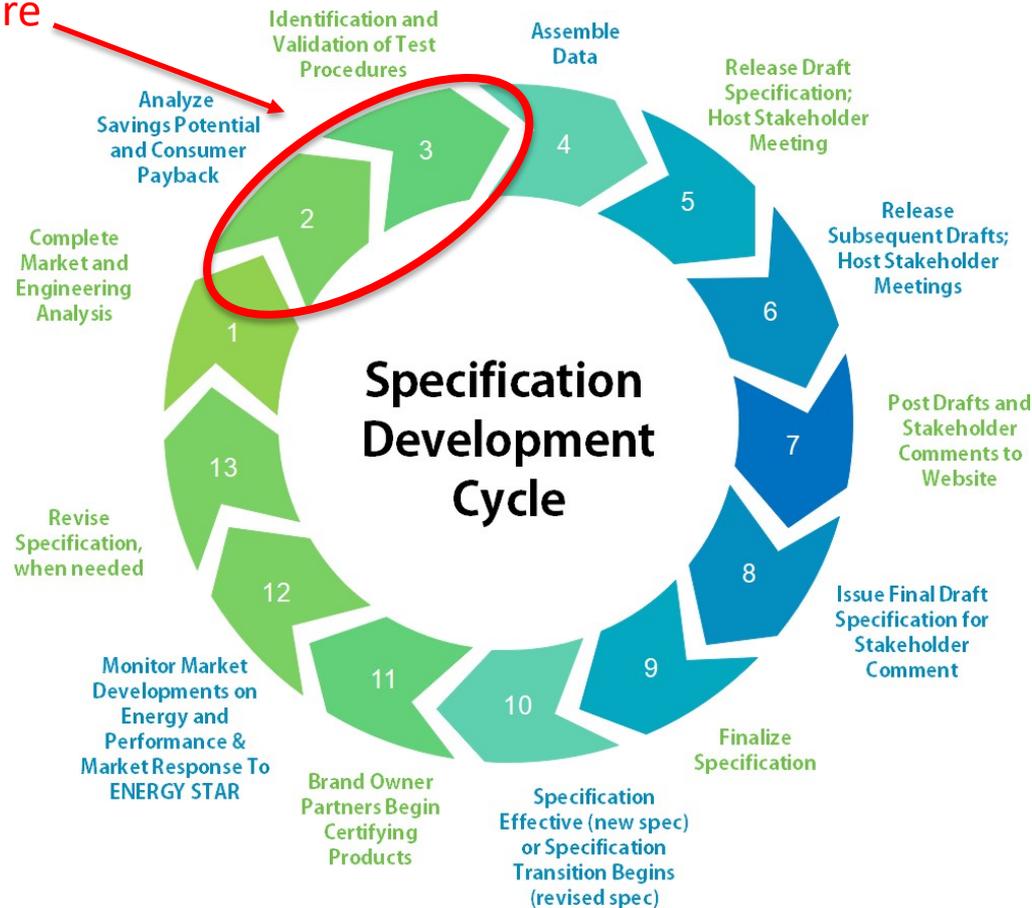
[troy.watson@guidehouse.com](mailto:troy.watson@guidehouse.com)

Associate Director



# ENERGY STAR Specification Development Process

We are here





## Guiding Principles That Drive Specification Revisions

- Revisions are driven by the need to continuously recognize and differentiate top performing products on the market:
  - New or revised test methods
  - Significant increase in ENERGY STAR market penetration, [46% as of [2019 USD Report](#)]
  - Change in Federal minimum efficiency standards
  - Technological advancements
  - Product performance or quality concerns



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## Commercial Refrigerators and Freezers Specification Timeline

Historic effective dates:

- V1.0 – 2001
- V2.0 – 2009 and 2010
- V3.0 – 2014
- V4.0 – 2017

Timeline for V5.0:

- Discussion Guide published – December 22, 2020
- Discussion Guide Webinar (Part 1) – February 2, 2021
- **Discussion Guide Webinar (Part 2) – February 9, 2021**
- Discussion Guide Comments Due – February 23, 2021

[Product Development Website](#)



# Commercial Refrigerators and Freezers V4.0 Scope

## 2) Scope:

A. Included Products: Products that (1) meet the definitions of a Commercial Refrigerator, Freezer, and Refrigerator-Freezer, or Commercial Hybrid; and (2) fall under the eligible equipment class designations in Section 2.A.a-h, or a combination of equipment classes herein, are eligible for ENERGY STAR certification:

- a) Horizontal Closed Solid Self-Contained Low Temperature (HCS.SC.L),
- b) Horizontal Closed Solid Self-Contained Medium Temperature (HCS.SC.M),
- c) Horizontal Closed Transparent Self-Contained Low Temperature (HCT.SC.L),
- d) Horizontal Closed Transparent Self-Contained Medium Temperature (HCT.SC.M),
- e) Vertical Closed Solid Self-Contained Low Temperature (VCS.SC.L),
- f) Vertical Closed Solid Self-Contained Medium Temperature (VCS.SC.M),
- g) Vertical Closed Transparent Self-Contained Low Temperature (VCT.SC.L), and/or
- h) Vertical Closed Transparent Self-Contained Medium Temperature (VCT.SC.M).

Examples of product types that are eligible for qualification include: reach-in, roll-in, or pass-through units; merchandisers; under-counter units; hybrid units; milk coolers; back bar coolers; bottle coolers; glass frosters; deep well units; beer-dispensing or direct draw units; and bunker freezers.

# Commercial Refrigerators and Freezers V4.0 Criteria

## 3) Qualification Criteria:

### A. Maximum Daily Energy Consumption (MDEC) Requirements:

Table 1: ENERGY STAR Requirements for Commercial Refrigerators, Freezers, and Refrigerator-Freezer <sup>2</sup>		
Product Volume (in cubic feet)	Refrigerator	Freezer
<b>Vertical Closed</b>		
<i>Solid</i>	VCS.SC.M*	VCS.SC.L
0 < V < 15	0.022V+0.97	0.21V+0.9
15 ≤ V < 30	0.066V+0.31	0.12V+2.248
30 ≤ V < 50	0.04V+1.09	0.285V-2.703
50 ≤ V	0.024V+1.89	0.142V+4.445
<i>Transparent</i>	VCT.SC.M	VCT.SC.L
0 < V < 15	0.095V+0.445	0.232V+2.36
15 ≤ V < 30	0.05V+1.12	
30 ≤ V < 50	0.076V+0.34	
50 ≤ V	0.105V-1.111	
<b>Horizontal Closed</b>		
<i>Solid or Transparent</i>	HCT.SC.M, HCS.SC.M	HCT.SC.L, HCS.SC.L
All volumes	0.05V+0.28	0.057V+0.55

\* DOE Equipment Class designations relevant to ENERGY STAR eligible product scope

- (1) Equipment family code (HCS= horizontal closed solid, HCT=horizontal closed transparent, VCS= vertical closed solid, VCT=vertical closed transparent),
- (2) Operating mode (SC=self-contained), and
- (3) Rating Temperature (M=medium temperature (38 °F), L=low temperature (0 °F)).

B. Determination of Refrigerated Volume: The refrigerated volume (V) of a refrigerator or freezer shall be calculated in accordance with the DOE test procedure at 10 CFR §431.64.



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# Existing DOE CRE Classes in ENERGY STAR Scope

★ = V4.0 class

RC = remote condensing

SC = self-contained

Vertical Closed Transparent	VCT		RC	Refrigerators & Freezers
			SC★	
Vertical Closed Solid	VCS		RC	Refrigerators & Freezers
			SC★	
Horizontal Closed Transparent	HCT		RC	Refrigerators & Freezers
			SC★	
Horizontal Closed Solid	HCS		RC	Refrigerators & Freezers
			SC★	
Service Over Counter	SOC		RC	
			SC	

Source: Table adapted from 2014 DOE TSD



# Existing DOE CRE Classes in ENERGY STAR Scope

★ = V4.0 class  
46% market penetration

RC = remote condensing

SC = self-contained

Existing categories that present the greatest savings opportunity

Vertical Closed Transparent	VCT		RC
			SC★
Vertical Closed Solid	VCS		RC
			SC★
Horizontal Closed Transparent	HCT		RC
			SC★
Horizontal Closed Solid	HCS		RC
			SC★
Service Over Counter	SOC		RC
			SC

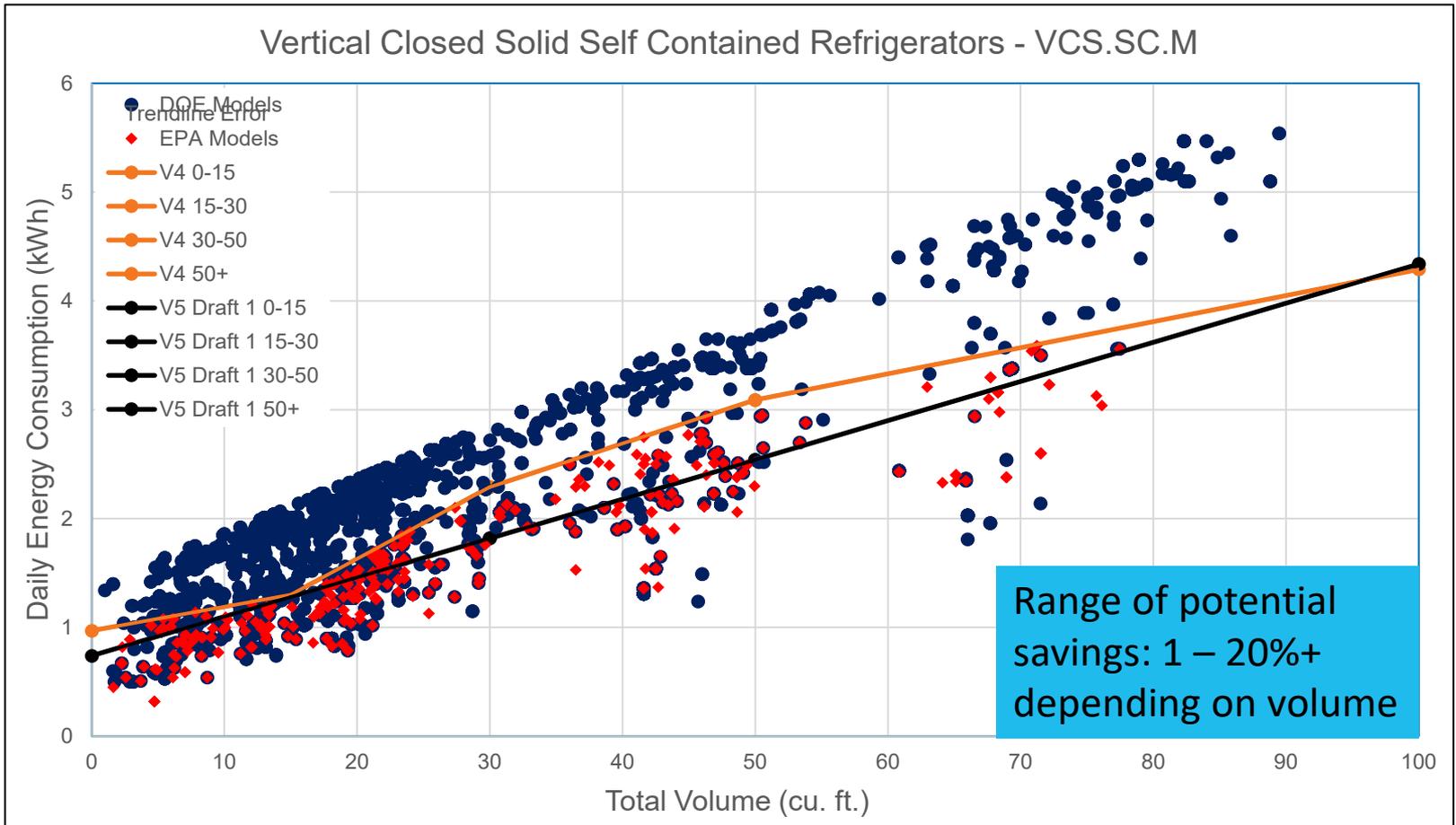
Refrigerators

Refrigerators & Freezers

Source: Table adapted from 2014 DOE TSD

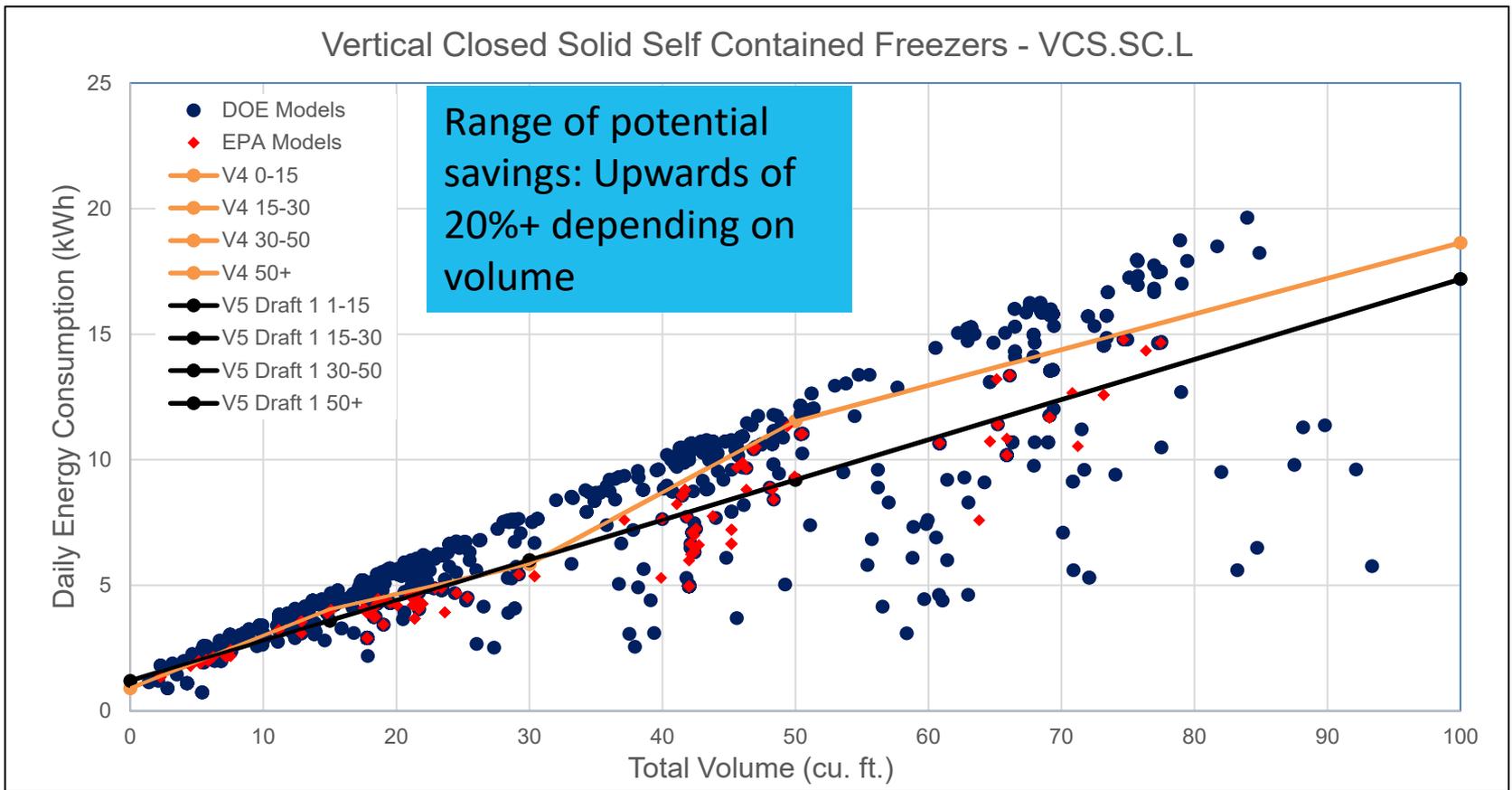


# ENERGY STAR Refrigerator – VCS.SC.M





# ENERGY STAR Freezer – VCS.SC.L





## ENERGY STAR V5.0 Potential Pass Rates – VCS.SC.M and VCS.SC.L

DOE Equipment Class	VCS.SC.M		VCS.SC.L	
	Total Pass	% ENERGY STAR Passing	Total	% ENERGY STAR Passing
0 < V < 15	63	81%	14	71%
15 <= V < 30	100	58%	22	64%
30 <= V < 50	64	52%	30	50%
50 <= V	28	50%	19	58%
<b>All</b>	<b>255</b>	<b>61%</b>	<b>85</b>	<b>59%</b>

Note: Only unique models counted. Known duplicate models were removed.



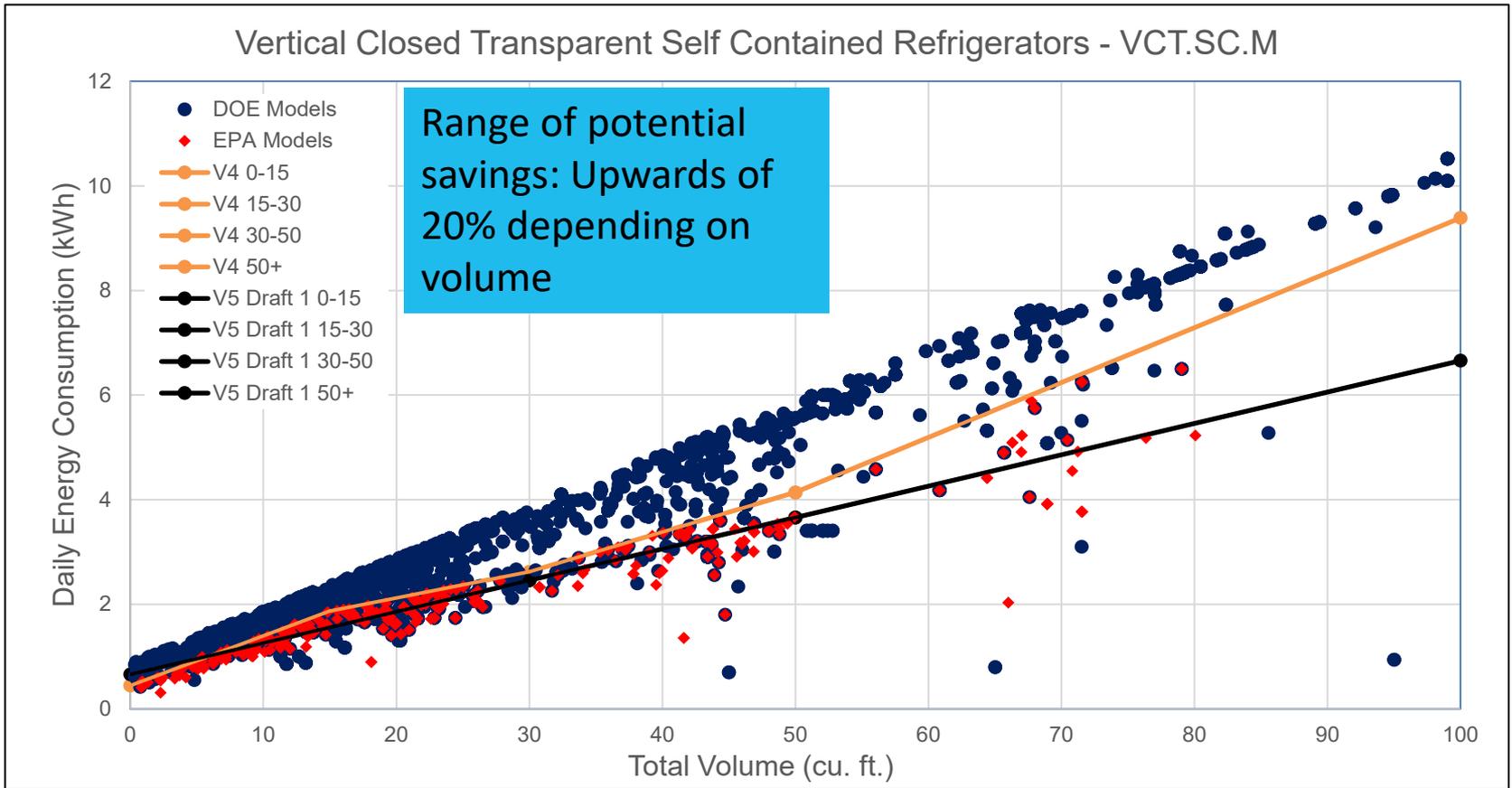
## ENERGY STAR V5.0 Potential Pass Rates – VCS.SC.M and VCS.SC.L

DOE Equipment Class	VCS.SC.M		VCS.SC.L	
	Total Pass	% CCMS Passing	Total Pass	% CCMS Passing
0 < V < 15	517	22%	182	16%
15 <= V < 30	687	16%	266	17%
30 <= V < 50	294	19%	197	23%
50 <= V	233	11%	204	31%
<b>All</b>	<b>1,731</b>	<b>18%</b>	<b>849</b>	<b>22%</b>

Note: Only unique models counted. Known duplicate models were removed.



# ENERGY STAR Refrigerator – VCT.SC.M





## ENERGY STAR V5.0 Potential Pass Rates – VCT.SC.M

DOE Equipment Class	VCT.SC.M	
	Total	ENERGY STAR % Passing
<b>Total Volume (cu ft)</b>		
<b>0 &lt; V &lt; 15</b>	99	59%
<b>15 &lt;= V &lt; 30</b>	69	38%
<b>30 &lt;= V &lt; 50</b>	60	62%
<b>50 &lt;= V</b>	19	47%
<b>All</b>	<b>247</b>	<b>53%</b>

Note: Only unique models counted. Known duplicate models were removed.



## ENERGY STAR V5.0 Potential Pass Rates – VCT.SC.M

DOE Equipment Class	VCT.SC.M	
	Total	CCMS % Passing
<b>Total Volume (cu ft)</b>		
<b>0 &lt; V &lt; 15</b>	469	14%
<b>15 &lt;= V &lt; 30</b>	549	12%
<b>30 &lt;= V &lt; 50</b>	378	9%
<b>50 &lt;= V</b>	387	5%
<b>All</b>	<b>1,783</b>	<b>10%</b>

Note: Only unique models counted. Known duplicate models were removed.



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## Test Method Discussion for New Product Categories

- ENERGY STAR V4.0 specification references:
  - 10 CFR Part 431 Subpart C, 10 CFR Part 431.64, and 10 CFR Part 431.66(e)(2)
- EPA is exploring opportunities to further expand CRE scope to other categories, including:
  - refrigerated preparation and buffet tables;
  - chef bases/griddle stands; and,
  - blast chillers/freezers



## Test Method Discussion for New Product Categories

- Are energy performance data or market reports publicly or otherwise available for consideration, and if so, what test method is the basis for such data?
- Are there typical use schedules that manufacturers recommend for estimating yearly savings?
- What is the anticipated lifetime for these units?



## Test Method Discussion for New Product Categories

- What is an appropriate source or estimate of units shipped in the U.S. each year?
- Are there any emerging technologies, best practices for efficient product design, or any other trends for these product categories that ENERGY STAR should consider?

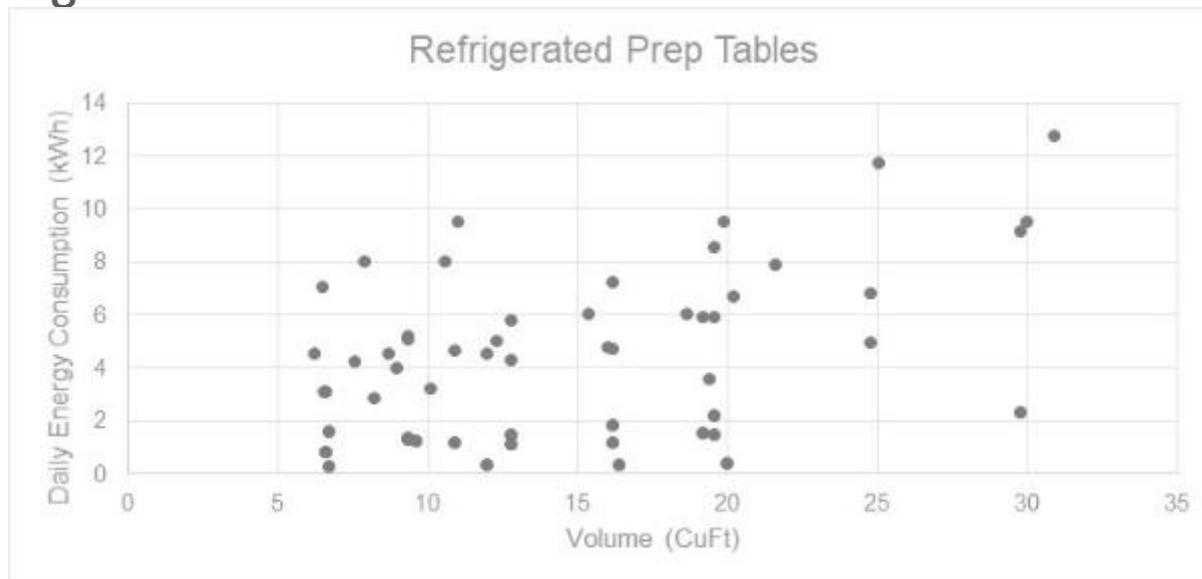


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## Refrigerated Preparation and Buffet Tables

- ASTM F2143-16 *Standard Test Method for Performance of Refrigerated Buffet and Preparation Tables*
- California Appliance Regulations Certification database relies on a previous test standard, ASTM F2143-01
  - Includes more than 60 models from multiple manufacturers
  - Significant variation





## Refrigerated Preparation and Buffet Tables – Discussion Questions

How should preparation tables and buffet tables be classified and defined to distinguish them from other currently covered equipment categories?

Are the performance profiles and operating conditions different enough such that the two product types should be more clearly distinguished from one another?



## Refrigerated Preparation and Buffet Tables – Discussion Questions

Does ASTM test method F2143-16 provide a repeatable and reproducible method for assessing representative energy performance of refrigerated preparation and buffet tables?

Are any other industry test methods available that would be more appropriate for measuring the energy performance of refrigerated preparation and buffet tables?



## Refrigerated Preparation and Buffet Tables – Discussion Questions

Is ASTM F2143-16 representative of typical use for this equipment? Specifically, are the following aspects and requirements appropriate for testing:

- a) Pan characteristics
- b) Unloaded refrigerated storage compartments
- c) Installation clearances
- d) Door/cover opening periods
- e) Storage temperatures and control settings
- f) Ambient test conditions



## Refrigerated Preparation and Buffet Tables – Discussion Questions

What is the appropriate capacity metric for refrigerated preparation and buffet tables?

For models with refrigerated pans and storage compartments, can a single capacity metric be applied or are separate capacities (one for the pans and one for the refrigerated storage compartment) needed to accurately characterize the representative capacity that would affect energy performance?



## Refrigerated Preparation and Buffet Tables – Discussion Questions

Are more energy performance data per ASTM F2143-16 or other relevant test methods available for consideration?

Would multiple equipment classes be required within this category to address unique equipment configurations (e.g., refrigerated storage compartments, presence of a pan cover)?



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## Chef Bases and Griddle Stands

- Category excluded from DOE's energy conservation standards (10 CFR 431.66(f))
- California Appliance Regulations Certification database
  - Includes a categorization for work-top tables
- Considering adopting the existing DOE CRE test procedure for this product category
  - Would this strategy be appropriate for this category?



## **Chef Bases and Griddle Stands – Discussion Questions**

What is the time per day that cooking equipment is active on this equipment?

What are typical temperatures of the cooking equipment when active?



## Chef Bases and Griddle Stands – Discussion Questions

What, if any, modifications to the current DOE CRE test procedure would be appropriate for testing chef bases and griddle stands to better represent real-world use conditions?

- a) Ambient conditions
- b) Loading requirements
- c) Door opening schedule



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## Blast Chillers and Freezers

- ASHRAE SPC 220 and ASTM test methods are under development
- Potential range of efficiencies among products remains unknown
- Considering adopting the eventual ASHRAE 220 standard with potential amendments for this product category
- Criteria development could remain on hold



## Blast Chillers and Freezers – Discussion Questions

The ENERGY STAR program is interested in better understanding the overall blast chiller and blast freezer market.

- Estimates on number of units installed in the US
- Annual units shipped



## Blast Chillers and Freezers – Discussion Questions

What are the unique features of blast chillers and blast freezers that would help characterize and differentiate this equipment from other pull-down temperature applications such as beverage coolers?



## Blast Chillers and Freezers – Discussion Questions

- What are appropriate starting conditions, loading methods and other necessary specifications for a potential test method to verify the pull-down performance of blast chillers and blast freezers?
- Is there any supporting data on energy performance of loaded and unloaded pull-down periods?
- What is the energy consumption associated with pull-down operation for blast chillers and blast freezers, including the time spent in both pull-down conditions and steady-state operation?



## Blast Chillers and Freezers – Discussion Questions

What capacity and energy consumption metric would be appropriate for blast chillers and blast freezers? Should it account for both pull-down and steady state operation?

How can the various operating states and modes of blast chillers and blast freezers best be represented in the test procedure (or is there a typical operating state or mode)?



## Blast Chillers and Freezers – Discussion Questions

What are the typical ambient conditions experienced by blast chillers and blast freezers?

What are the typical usage settings for blast chillers and blast freezers and how do different set-point modes affect energy performance?



## Blast Chillers and Freezers – Discussion Questions

For units with multiple target temperature settings within the refrigerator or freezer temperature range, which setting is appropriate for testing?

For units with settings that affect the pull-down duration, should the fastest or slowest setting (or any other setting if more than two settings are provided) be used for testing?

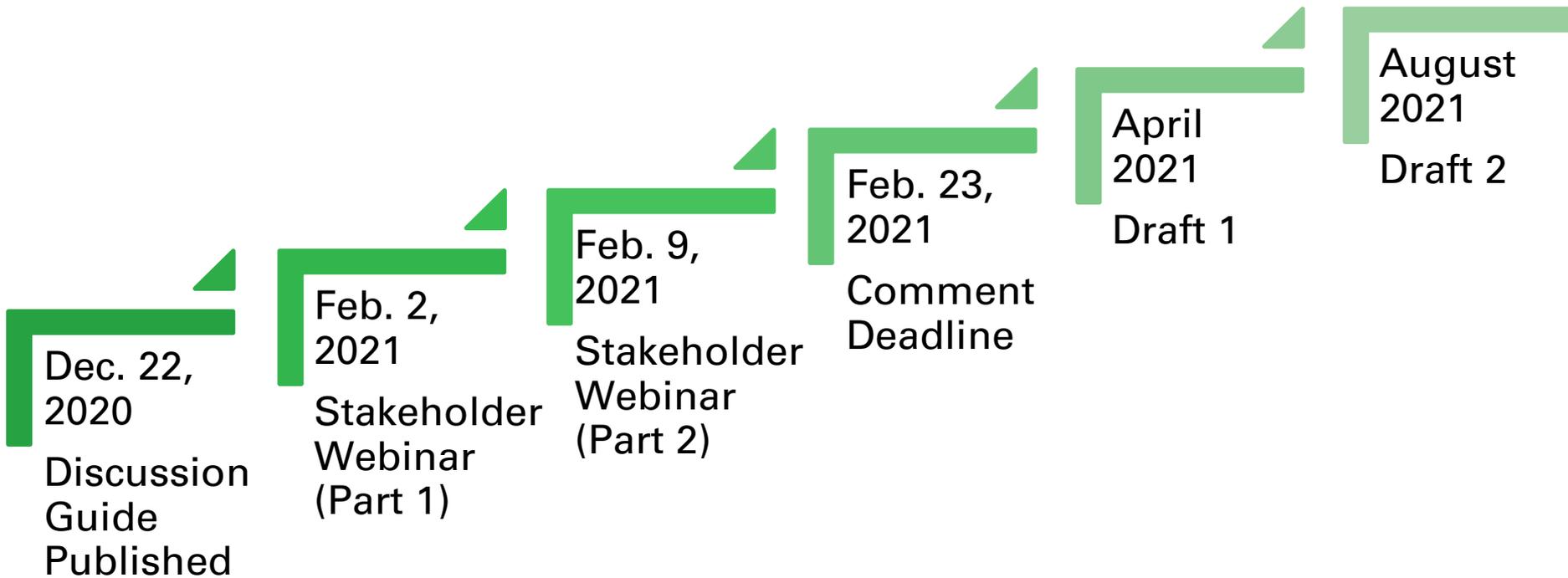


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## Next Steps



Follow the development process on the [product development webpage](#)



## Questions

### Specification Questions:

**Tanja Crk**

[Crk.Tanja@epa.gov](mailto:Crk.Tanja@epa.gov)

202-650-7522

**Adam Spitz**

[Adam.Spitz@icf.com](mailto:Adam.Spitz@icf.com)

916-231-7685

**Jasmin Melara**

[Jasmin.Melara@icf.com](mailto:Jasmin.Melara@icf.com)

202-862-2950

### Test Method Questions:

**Stephanie Johnson**

[stephanie.johnson@ee.doe.gov](mailto:stephanie.johnson@ee.doe.gov)

202-287-1943

**Troy Watson**

[troy.watson@guidehouse.com](mailto:troy.watson@guidehouse.com)

202-481-8427

### Market Questions:

**Brian Ward**

[Brian.Ward@icf.com](mailto:Brian.Ward@icf.com)

224-622-4068

Stakeholders are encouraged to provide written comments for consideration to [cfs@energystar.gov](mailto:cfs@energystar.gov) by February 23, 2021.