



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR®

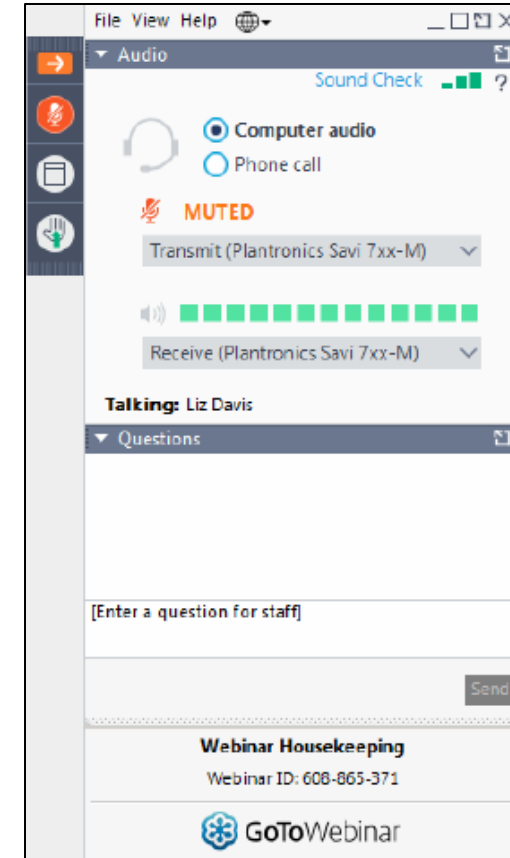
Most Efficient 2023 Update and 2024 Proposed Criteria



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Using GoTo Webinar and Audio Controls

- Audio Provided via teleconference:
 - United States: +1 (562) 247-8421
 - Access Code: 393-116-943
 - Webinar ID: 519-718-267
- Phone lines will be muted at the start of the presentation
- Please leave your line on mute unless speaking during the call for questions
- Press *6 to unmute your line and when you are finished with your question or comment, press *6 to mute





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Most Efficient 2024 Introductions

- **Doug Anderson**, U.S. Environmental Protection Agency
- **Abigail Daken**, U.S. Environmental Protection Agency
- **Katharine Kaplan**, U.S. Environmental Protection Agency
- **James Kwon**, U.S. Environmental Protection Agency
- **Steve Leybourn**, U.S. Environmental Protection Agency
- **Taylor Jantz-Sell**, U.S. Environmental Protection Agency
- **Jeremy Dommu**, U.S. Department of Energy



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Most Efficient

- An extension of the **trusted** ENERGY STAR brand
- Recognizing the **most efficient** products among those that qualify for ENERGY STAR in a given year
- Target audience: environmentally conscious, early adopters
- Represents the “**best of the best**” in energy efficient products
- Each year, we review our criteria and raise the bar as needed to ensure ENERGY STAR Most Efficient is awarded to only the top performers



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Most Efficient 2023 Update: Recognizing the Best from Range of Partners (June)

Product Category	Product Count	Partner Count
Air Conditioners and Heat Pumps	35	3
Ceiling Fans	163	15
Clothes Dryers	34	8
Clothes Washers	62	6
Computer Monitors	130	21
Dehumidifiers	330	49
Dishwashers	288	37
Freezers	20	11
Geothermal Heat Pumps	348	23
Refrigerators	750	66
Room Air Cleaners	53	19
Room Air Conditioners	75	14
Ventilating Fans	112	26
Windows/Sliding Glass Doors/Skylights	517	48
Totals	2,651	343



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Most Efficient 2023 Update: Utility Collaboration

- ENERGY STAR Most Efficient enjoys robust utility support :
 - Leveraged by 17 energy efficiency program sponsors, serving over 5.3 million households (or roughly 13.8 million consumers).
 - These rebate programs feature one or more product categories covered by ENERGY STAR Most Efficient 2023 and reflect a diverse geographic spread.
- ENERGY STAR Most Efficient leveraged for retailer incentives as part of the ENERGY STAR Retail Products Platform (ESRPP), an innovative, nationally coordinated, market transformation initiative.
 - ESRPP retailers represent 1,243 appliance storefronts in program sponsors' service areas.
 - In 2023, there are 15 efficiency program sponsors participating in ESRPP serving 21.3% of U.S. households.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Most Efficient 2023 Update: Consumer Education

- EPA provides consumers with information about recognized products through a filter on the popular ENERGY STAR Products Finders.
- In 2023, EPA began hosting ENERGY STAR and ENERGY STAR Most Efficient Product Finders for CAC/ASHPs.
- EPA also launched consumer friendly ENERGY STAR Product Finder for Windows, Doors, and Skylights; intend to feature ENERGY STAR Most Efficient models here in 2024.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Most Efficient Categories in 2024

- ASHP
- Ceiling and Ventilating Fans
- Clothes Washers
- Computer Monitors
- Dehumidifiers
- Dishwashers
- Dryers
- Geothermal Heat Pumps
- Refrigerators, Freezers, and Compact Products
- Room Air Cleaners
- Room Air Conditioners
- Windows and Sliding Glass Doors



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Draft 2024 ENERGY STAR Most Efficient Recognition Criteria and Rationale





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Residential Windows, Sliding Glass Doors (SGD), and Skylights

- **2024 Proposal:**

- Changes proposed for Windows and SGDs

Most Efficient 2023

Climate Zone	U-factor	SHGC
Northern	≤ 0.20	≥ 0.20
North-Central	≤ 0.20	≤ 0.40
South-Central	≤ 0.20	≤ 0.25
Southern	≤ 0.20	≤ 0.25



Proposed Most Efficient 2024

Climate Zone	U-factor	SHGC
Northern	≤ 0.20	≥ 0.20
North-Central	≤ 0.20	≤ 0.40
South-Central	≤ 0.20	≤ 0.23
Southern	≤ 0.21	≤ 0.23
	≤ 0.22	≤ 0.21

- ← Change to = V7
- ← Change to allow more flexibility

- Remove Performance Grade requirement from criteria
- Changes proposed for Skylights and Tubular Daylighting Devices (TDDS)
 - No changes proposed for thermal performance criteria
 - Remove Performance Grade requirement from criteria



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Residential Windows, Sliding Glass Doors (SGD), and Skylights

- 2024 Proposal:**

- Changes proposed for Windows and SGDs

Most Efficient 2023

Climate Zone	U-factor	SHGC
Northern	≤ 0.20	≥ 0.20
North-Central	≤ 0.20	≤ 0.40
South-Central	≤ 0.20	≤ 0.25
Southern	≤ 0.20	≤ 0.25



Proposed Most Efficient 2024

Climate Zone	U-factor	SHGC
Northern	≤ 0.20	≥ 0.20
North-Central	≤ 0.20	≤ 0.40
South-Central	≤ 0.20	≤ 0.23
Southern	≤ 0.21 ≤ 0.22	≤ 0.23 ≤ 0.21

Change to = V7
Change to allow more flexibility

Should be an =

- Remove Performance Grade requirement from criteria
- Changes proposed for Skylights and Tubular Daylighting Devices (TDDS)
 - No changes proposed for thermal performance criteria
 - Remove Performance Grade requirement from criteria



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Residential Windows, Sliding Glass Doors (SGD), and Skylights

- **2024 Proposal:**

- Residential Windows and Sliding Glass Doors
 - Northern and North-Central Zones – no changes proposed
 - South-Central Zone – Lower SHGC proposed
 - Southern Zone – Two equivalent energy performance levels proposed
 - Performance Grade – Proposal to remove requirement
- Residential Skylights and Tubular Daylighting Devices (TDDs)
 - No change in thermal performance criteria for Skylights and TDDs is proposed
 - Performance Grade – proposal to remove requirement

- **Rationale:**

- Windows and SGDs
 - Align South-Central Zone SHGC with V7
 - Expand the number of Southern Zone products
 - PG - Simplify criteria to reduce burden on manufacturers and reviewers
- Skylights and TDDs – PG – Simplify criteria to reduce burden on manufacturers and reviewers



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Residential Windows and Sliding Glass Doors

To consider expanding the products available in the Southern and South-Central Zones, EPA reviewed the energy savings data from the V7 analysis and found U-factor equivalent energy performance trade-offs in the Southern Zone but not the South-Central Zone. The higher U-factor trade-offs in the Southern Zone may provide an opportunity to expand the number of products available in that Zone.

ES Southern Zone Energy Savings (GJ)

	0.21 SHGC	0.23 SHGC	0.25 SHGC
U = 0.20	4.0	3.8	3.5
U = 0.21	3.8	3.6	3.3
U = 0.22	3.6	3.4	3.1
U = 0.23	3.4	3.2	2.9
U = 0.24	3.2	3.0	2.7

Same
Energy

Same
Energy

ES South-Central Zone Energy Savings (GJ)

	0.21 SHGC	0.23 SHGC	0.25 SHGC
U = 0.20	4.8	4.9	4.9
U = 0.21	4.5	4.5	4.6
U = 0.22	4.1	4.2	4.2
U = 0.23	3.8	3.8	3.9
U = 0.24	3.4	3.5	3.5



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Computer Monitors



2024 Proposal:

Total Energy Consumption (E_{TEC}) in kilowatt-hours per year shall be calculated as follows:

$$E_{TEC} = 8.76 \times (0.35 \times P_{ON} + 0.65 \times P_{SLEEP})$$

Where:

P_{ON} = measured On Mode power in watts; P_{SLEEP} = measured Sleep Mode power in watts;

Total Energy Consumption (E_{TEC}) shall be less than or equal to Maximum allowable Total Energy Consumption in kilowatt-hours per year calculated as follows:

$$E_{TEC_MAX} = (1.9 + (0.12 \times A) + [3.1 \times (r + C)]) \times eff_{AC_DC}$$

Where:

$$eff_{AC_DC} = \begin{cases} 1.00 & \text{for AC-powered monitors} \\ 0.85 & \text{for DC-powered monitors} \end{cases}$$

A = viewable screen area in square inches;

r = Total Native Resolution in megapixels; and

$$C = \begin{cases} 4.07 & \text{if } A < 180 \text{ in}^2 \end{cases}$$

$$C = \begin{cases} 3.43 & \text{if } 180 \text{ in}^2 \leq A < 220 \text{ in}^2 \end{cases}$$

$$C = \begin{cases} 5.67 & \text{if } A \geq 220 \text{ in}^2 \end{cases}$$



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.



Computer Monitors

- Balanced pass rate of 5-6% across size categories used in criteria.
- On average, ENERGY STAR Most Efficient models use 15.7 kWh/year (TEC) less than a non-ENERGY STAR Most Efficient model.
- Of the 5% of models meeting 2024 ENERGY STAR Most Efficient criteria, an average savings of 38% will be realized.

Size Category	Area	Monitors in Dataset	Monitors Meeting ESME 2024	% Meeting ESME 2024	Average TEC of Non-ESME 2024 (kWh)	Average TEC of ESME 2024 (kWh)	Savings (ESME TEC Average - Non-ESME TEC Average in kWh)	% Savings (Savings / Non-ESME TEC Average)
1	< 180 sq. in.	80	4	5%	26.0	12.8	13.2	51%
2	180 - 220 sq.	125	7	6%	38.0	29.3	8.7	23%
3	> 220 sq. in.	823	41	5%	59.7	34.5	25.2	42%
All	All	1028	52	5%	41.2	25.5	15.7	38%

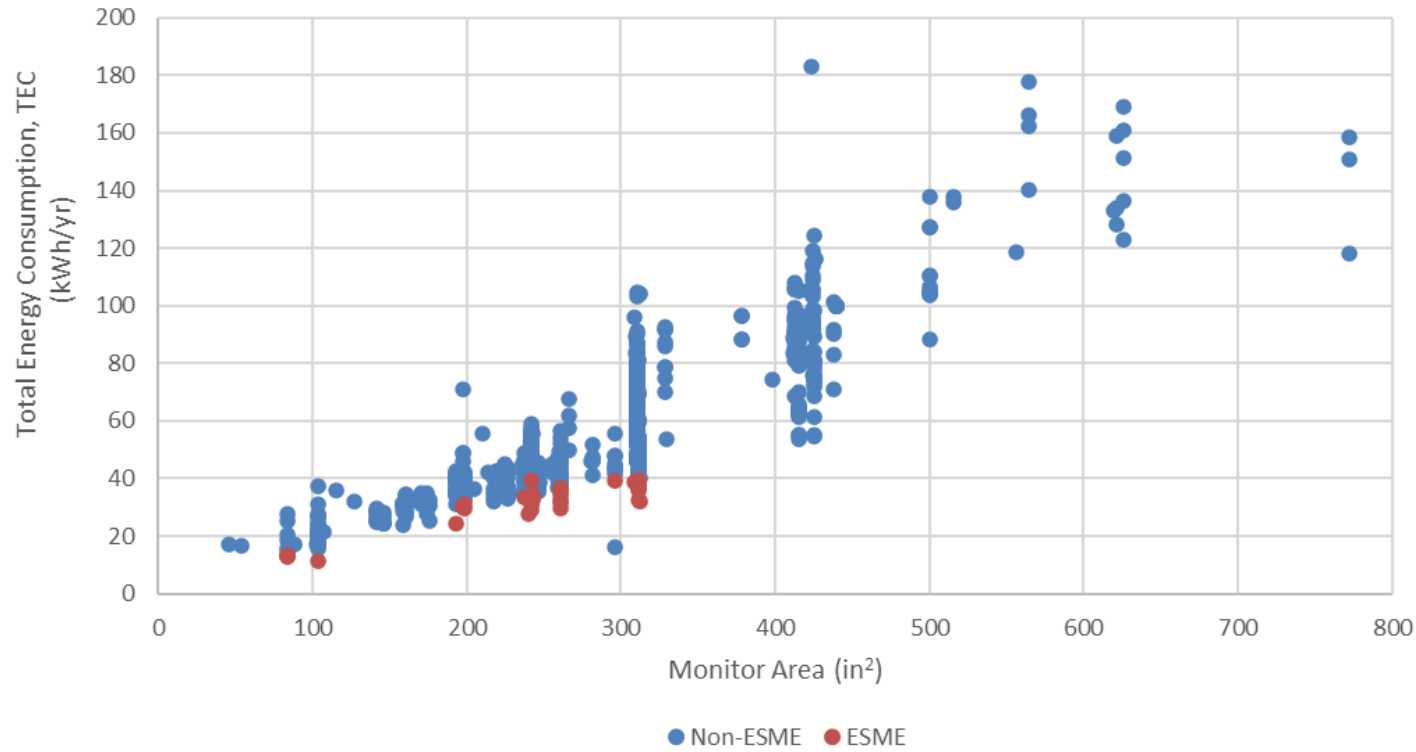


SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Computer Monitors



Monitor TEC (kWh/yr) versus Area (in²)



- Non-ENERGY STAR Most Efficient 2024
- ENERGY STAR Most Efficient 2024



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Cleaners

- **2024 Proposal:**

- Revise Room Air Cleaners (RACLs) criteria for PM_{2.5} and maintain current ESME 2023 levels

- **Rationale:**

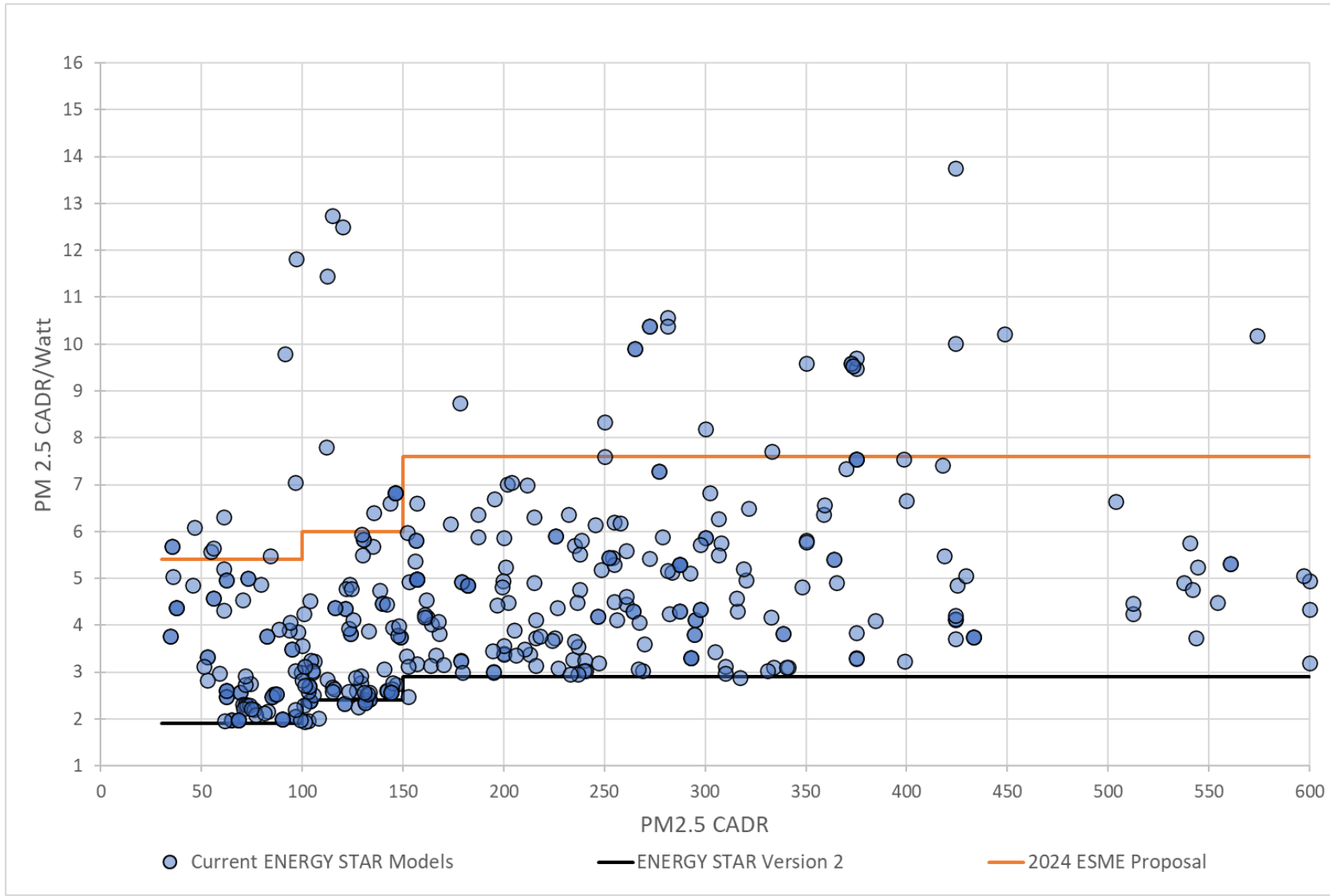
- DOE will reference PM_{2.5}
- Changing the metric to align with DOE will avoid confusion and reduce burden for manufacturers
- ENERGY STAR and ENERGY STAR Most Efficient list continue to grow
 - 549 base models from 138 brands certified as ENERGY STAR Version 2.0, up from 392 base models from 96 brands last year
 - 58 base models from 29 brands meet the ENERGY STAR Most Efficient criteria
- Tremendous growth in shipments over the past few years due to COVID and wildfires
- A RACL meeting the ENERGY STAR Most Efficient proposals saves approximately 70% in energy compared to ENERGY STAR Version 1.2, the level used in numerous state standards
- ENERGY STAR Retail Products Platform (ESRPP) currently incentivizes RACLs at this level for their advanced tier

PM _{2.5} CADR Bins	Minimum PM _{2.5} CADR/W
$30 \leq \text{PM}_{2.5} \text{ CADR} < 100$	5.4
$100 \leq \text{PM}_{2.5} \text{ CADR} < 150$	6.6
$150 \leq \text{PM}_{2.5} \text{ CADR}$	7.6



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Cleaners





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Cleaners – Product Count & Savings

- EPA used the current ENERGY STAR model count as a baseline for total model counts because currently, there is no public source for total model counts in the U.S.
- 8.9% of all ENERGY STAR models would meet the proposed Most Efficient criteria.
- Using ENERGY STAR Version 1.2 as baseline, the savings are significant at 324 kWh/yr saving \$42 in operating costs annually.

Product Count	Number of Models	% of all Models	Number of Brands
Estimated Total Models (Baseline)	549	100%	--
Version 2.0 ENERGY STAR	549	100%	138
2024 Most Efficient Criteria	49	8.9%	25

Product Class Weighted Savings	Annual Energy Savings (kWh/yr)	% Better than Baseline (%)	Annual Cost Savings (\$)
Version 1.2 ENERGY STAR (Baseline)	--	--	--
2024 Most Efficient Criteria Proposal	314	74%	\$42



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Clothes Washers

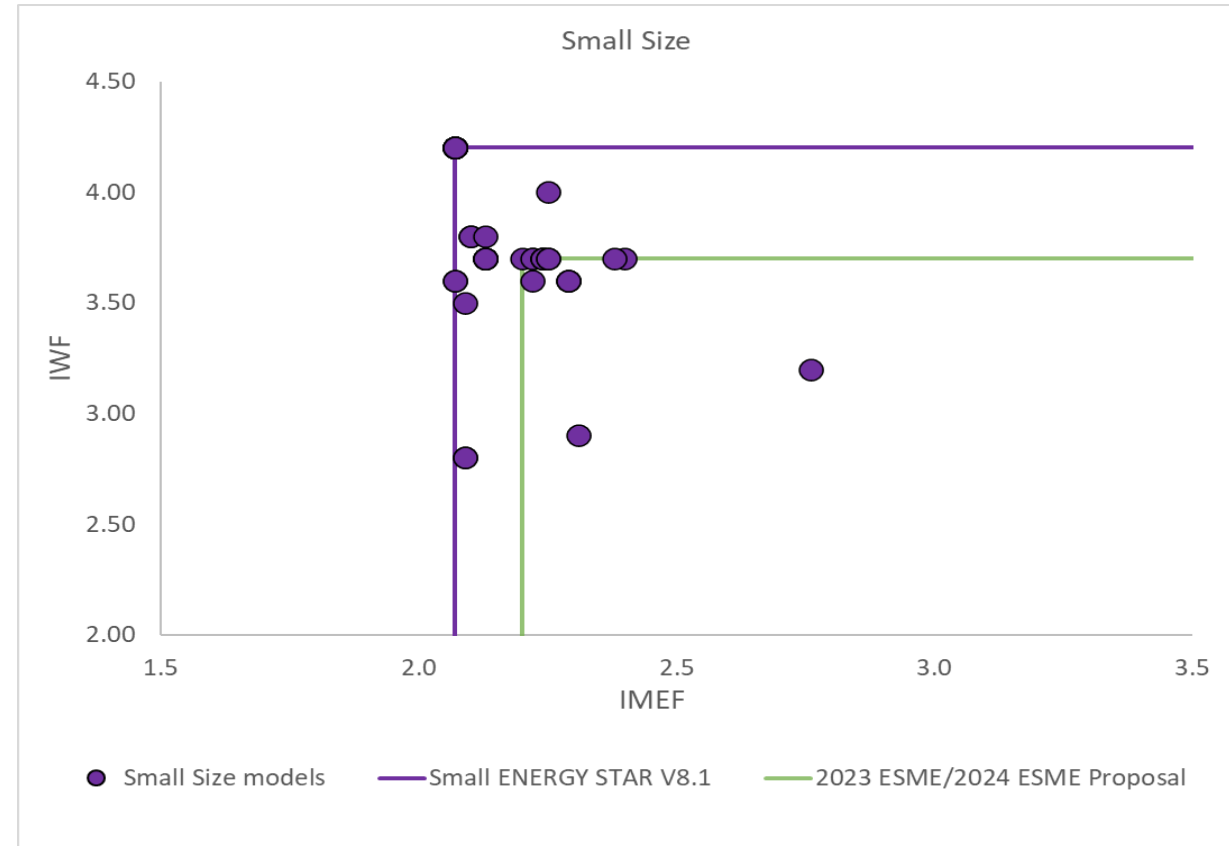
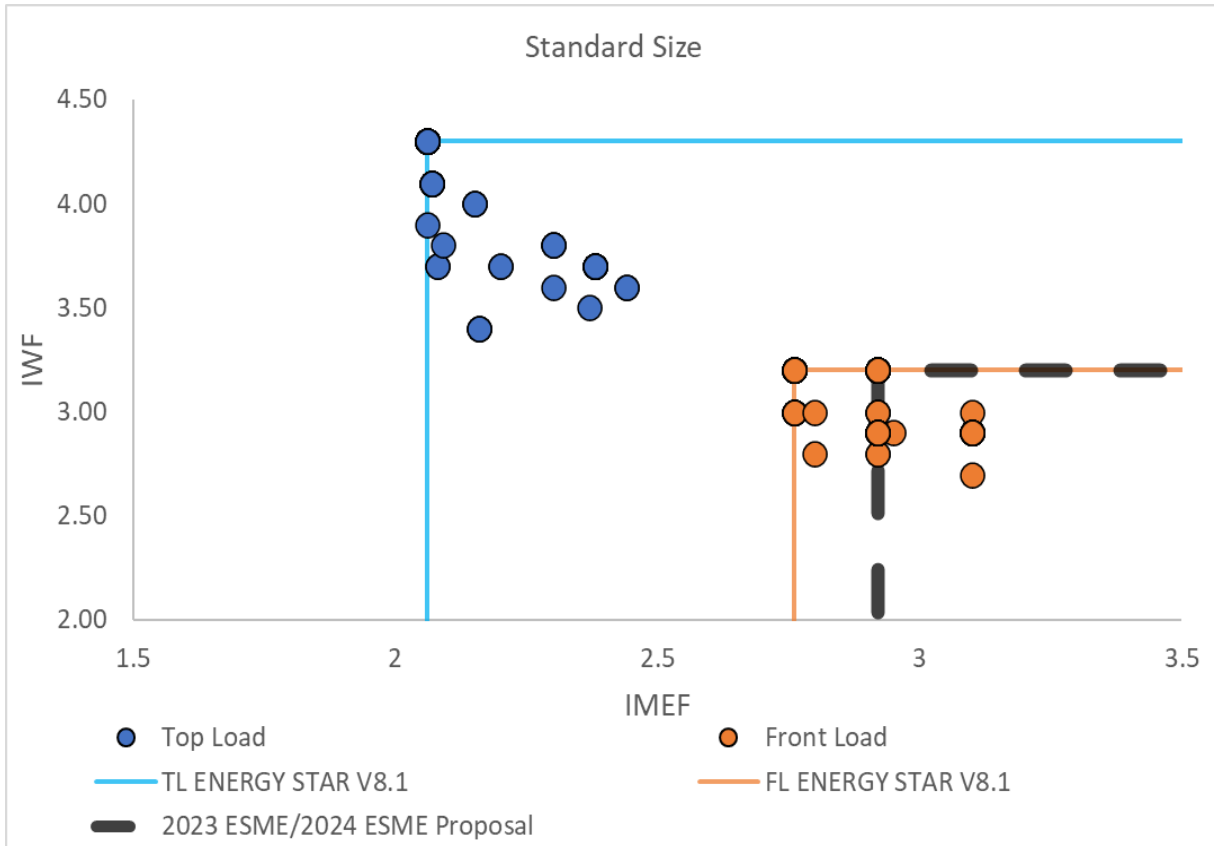


- **2024 Proposal:**
 - Maintain current energy and water criteria for clothes washers:
 - ≤2.5 cu-ft: $IMEF \geq 2.2$, $IWF \leq 3.7$
 - >2.5 cu-ft: $IMEF \geq 2.92$, $IWF \leq 3.2$
 - Total Cleaning Score (CS_t) ≥ 85
 - Laundry centers must meet the ENERGY STAR Most Efficient criteria for both washers and dryers
- **Rationale:**
 - The number of models/brands remain steady from previous year
 - 41 models (14%) from 5 brands (Bosch, Electrolux, Kenmore, LG, and Samsung)
 - Criteria continues to provide significant average energy and water savings:
 - Large volume: 43% less energy and 46% less water than a conventional model
 - Small volume: 24% less energy and 37% less water than a conventional model
 - The ENERGY STAR Retail Products Platform (ESRPP) currently incentivizes washers at this level for their advanced tier



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Clothes Washers





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Clothes Dryers



- **2024 Proposal:**
 - Revise current criteria for all dryer product types

Cycle Setting	Product Type	CEF _{BASE} (lbs/kWh)
Normal	Compact Ventless Electric (240V)	≥ 5.5
	Compact Electric (120V)	≥ 6.3
	Electric (all other)	≥ 5.2
Normal, Maximum Dryness	Compact Ventless Electric (240V)	≥ 2.68
	Compact Electric (120V)	≥ 3.80
	Electric (all other)	≥ 3.93

- The criteria requires testing at 2 cycles/settings:
 - Testing at Normal Cycle, Max Temp, Medium Dry (per DOE Test Method requirements)
 - Testing at Normal Cycle, Max Temp, Max Dry (per ENERGY STAR Most Efficient requirements)



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Clothes Dryers

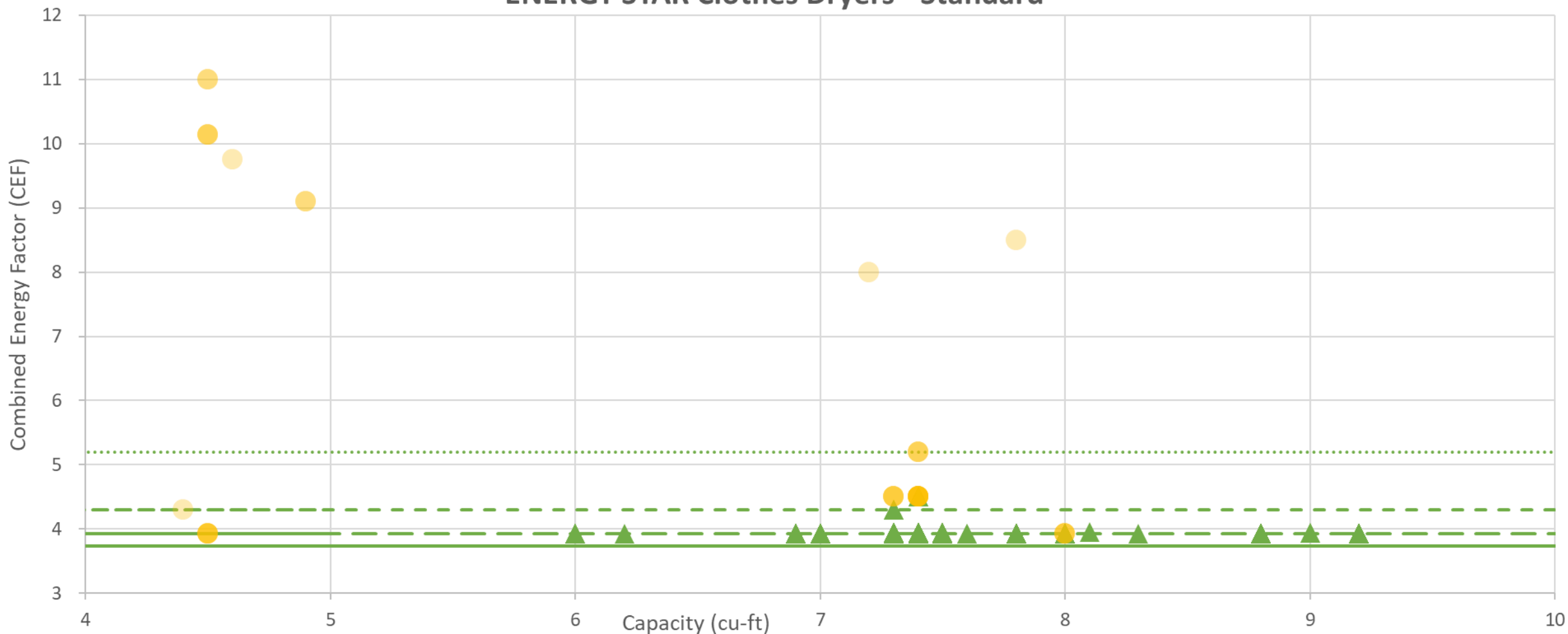


- **Rationale:**
 - Currently revising ENERGY STAR criteria for clothes dryers
 - Version 2.0 specification update expected in 2024
 - The number of models/brands remain steady from previous year
 - 27 base models from 9 brands (Asko, Beko, Blomberg, Bosch, LG, Midea, Miele, Samsung, Whirlpool) meet criteria
 - Revising criteria for clothes dryers will provide a significant jump in savings over federal minimum
 - This proposal will save 61% in energy for standard-sized electric models vs 28% with currently
 - For compact models it will save 47-62% in energy vs 30-51% currently
 - ESRPP currently incentivizes ENERGY STAR Most Efficient dryers for their advanced tier
- **Additional info:**
 - Heat pump or hybrid heat pump technologies and refrigerants are identified on the QPL
 - EPA encourages partners to complete these optional field during certification; enables utilities to easily incentivize



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Clothes Dryers - Standard



▲ Vented Electric Standard - CEF

● Ventless Electric Standard - CEF

— Fed. Std. Vented Electric - Standard

— ENERGY STAR Electric - Standard

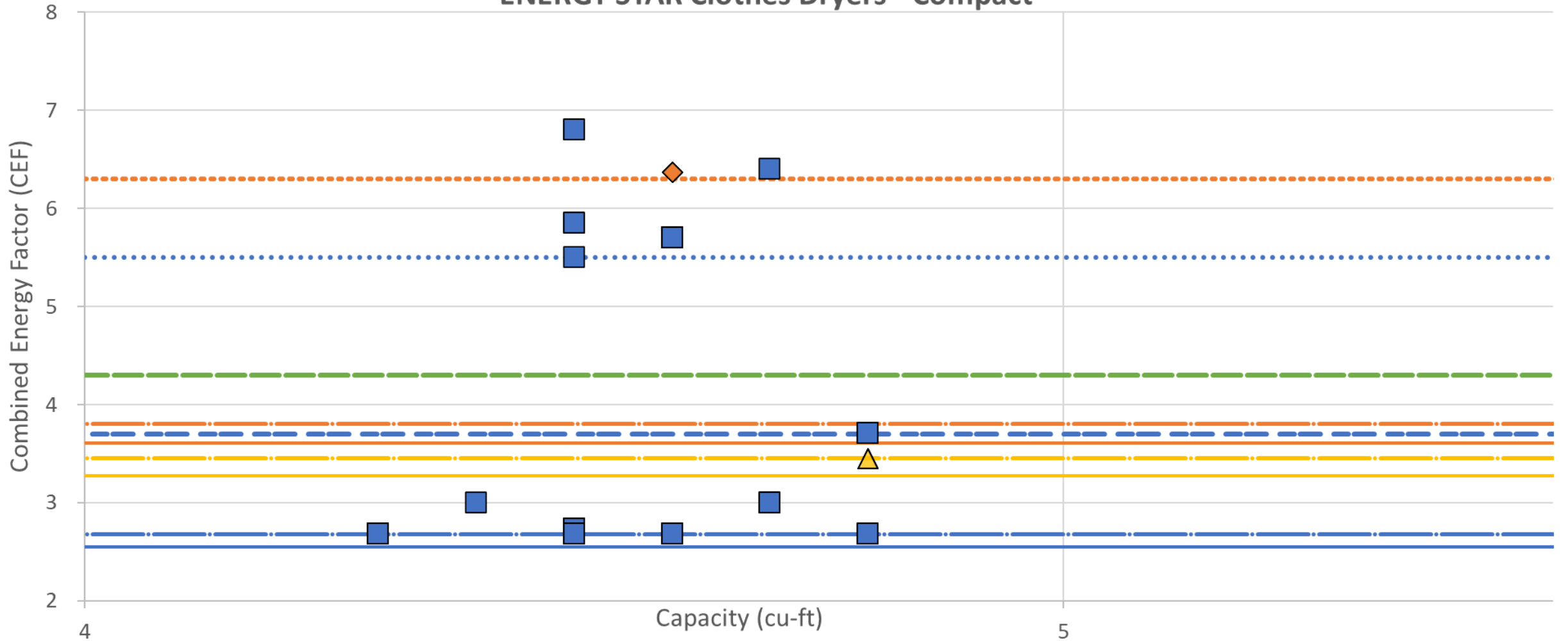
- - 2023 Most Efficient - Electric

..... 2024 ESME Proposal - Electric (all other)



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

ENERGY STAR Clothes Dryers - Compact



- ◆ Ventless Electric Compact 120V - CEF
- △ Vented Electric Compact 240V - CEF
- Ventless Electric Compact 240V - CEF
- Fed. Std. Vented Electric - Compact 120V
- Fed. Std. Vented Electric - Compact 240V
- Fed. Std. Ventless Electric - Compact 240V
- ENERGY STAR Ventless Electric - Compact 120V
- ENERGY STAR Vented Electric - Compact 240V
- ENERGY STAR Ventless Electric - Compact 240V
- 2023 Most Efficient - Electric
- 2023 Most Efficient - Compact Ventless Electric 240V
- 2024 ESME Proposal - Ventless Compact Electric 240V
- 2024 ESME Proposal - Ventless Compact Electric 120V



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Refrigerators

- **2024 Proposal – Top Freezers**
 - Maintain criteria for Top Freezers
 - $\geq 10\%$ more efficient than the Federal minimum
 - Optional reporting of refrigerant type
- **Rationale:**
 - Top Freezers remain the lowest energy-consuming standard-size refrigerator-freezer product type
 - Criteria recognizes 234 base models from 54 brands
 - ESRPP currently incentivizes refrigerators at this level for their advanced tier





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

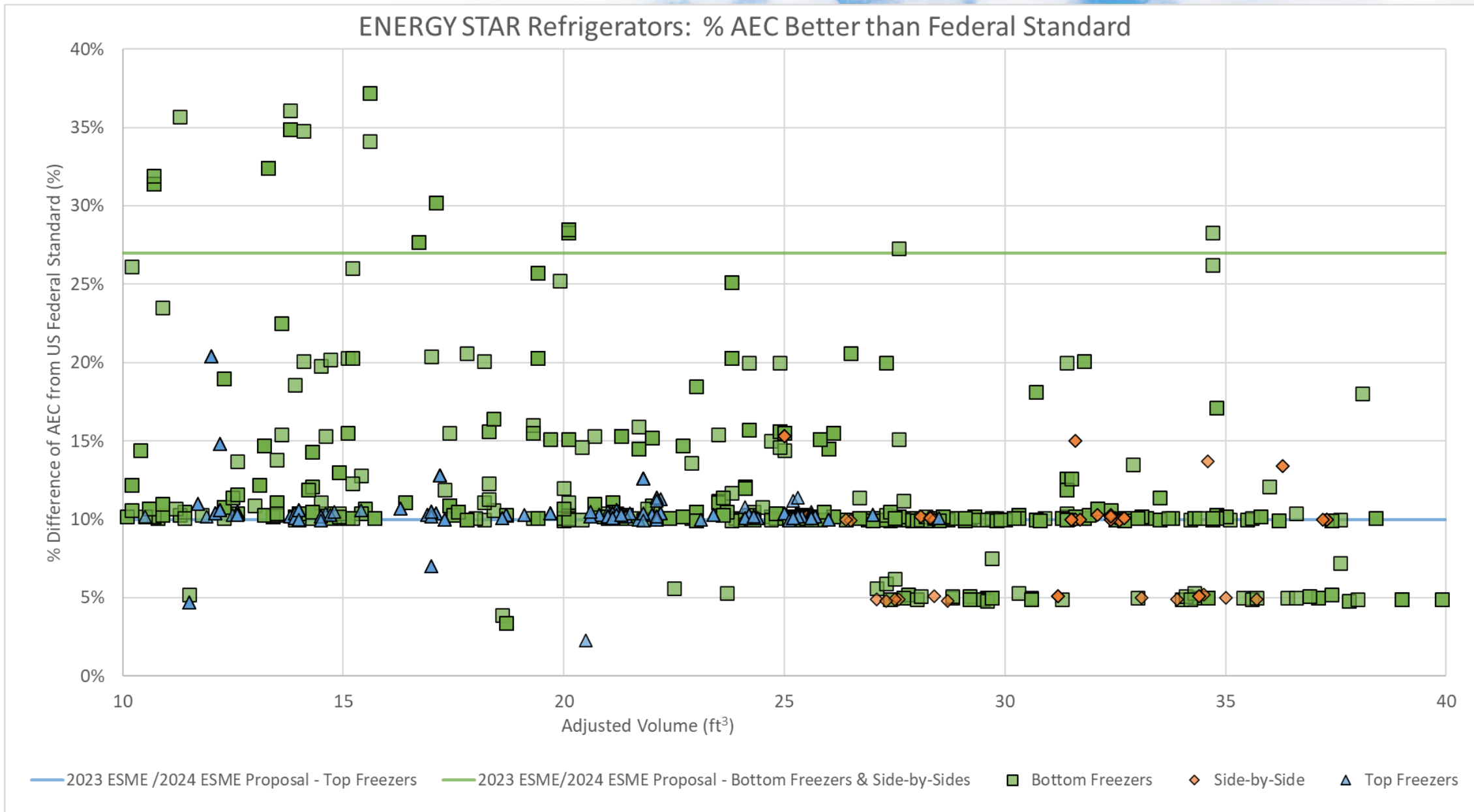
Refrigerators

- **2024 Proposal – Side-by-Side and Bottom Freezers**
 - Maintain the criteria for Side-by-Side and Bottom Freezer product types
 - $\geq 27\%$ more efficient than the Federal minimum
 - Optional reporting of refrigerant type
- **Rationale:**
 - Currently, there are 28 base models (4.3% of Bottom Freezer base models) from 10 brands that are ENERGY STAR Most Efficient, which is up from 8 base models from 6 brands last year
 - No Side-by-Side models meet ENERGY STAR Most Efficient
 - ESRPP currently incentivizes refrigerators at this level for their advanced tier
 - EEPS have shown high interest in incenting refrigerators at these advanced levels





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

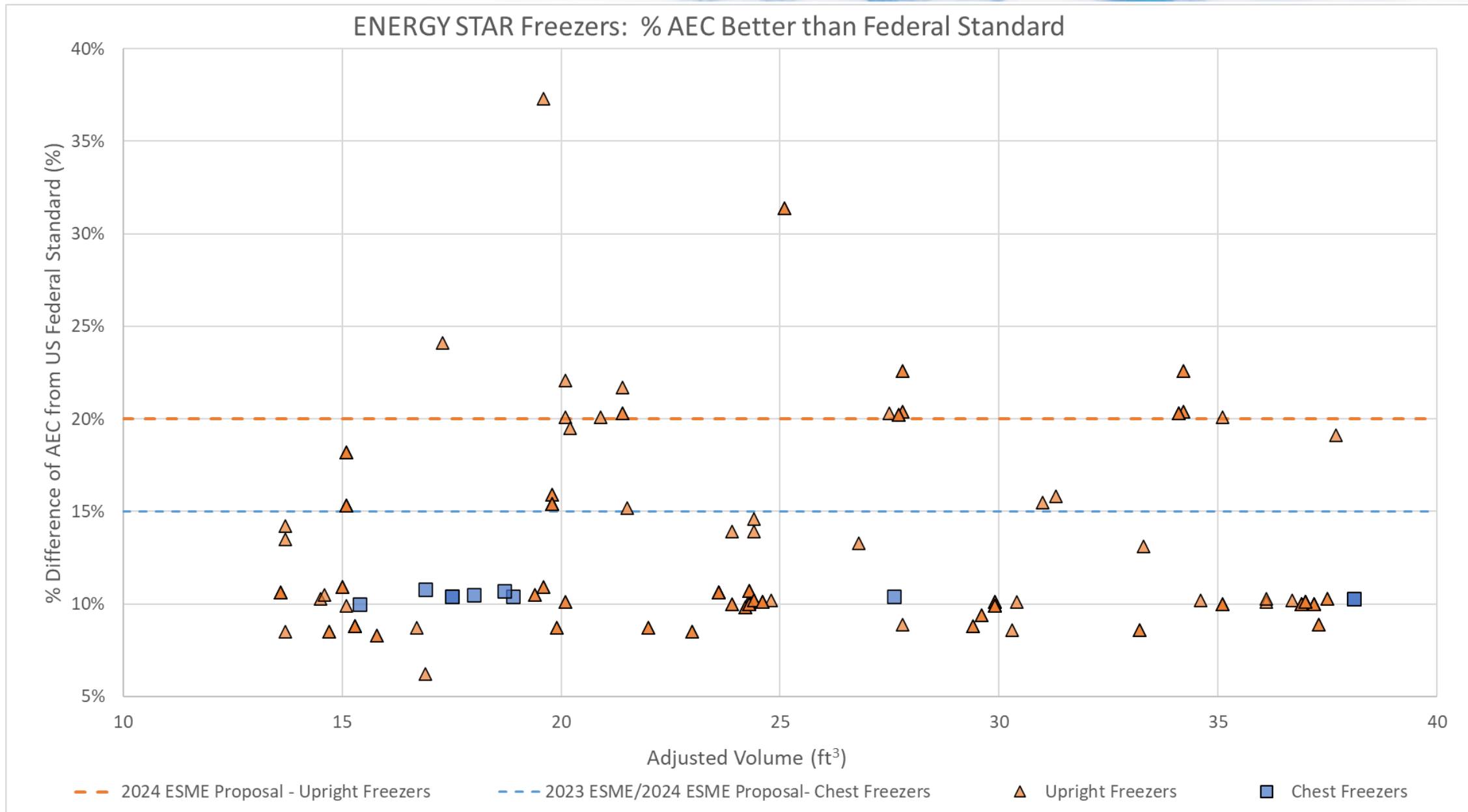
Freezers

- **2024 Proposal:**
 - Revise criteria for standard-size Upright Freezers and maintain criteria for Chest Freezers
 - $\geq 20\%$ more efficient than the Federal minimum for Upright Freezers
 - $\geq 15\%$ more efficient than the Federal minimum for Chest Freezers
 - Optional reporting of refrigerant type
- **Rationale:**
 - The number of models/brands increased from the previous year
 - Currently, there are 15 base models (18%) from 8 brands that are ENERGY STAR Most Efficient, which is up from 12 base models from 5 brands last year
 - There are 6 base models (7%) from 5 brands that would meet the ENERGY STAR Most Efficient proposal
 - ESRPP currently incentivizes freezers for their advanced tier





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.





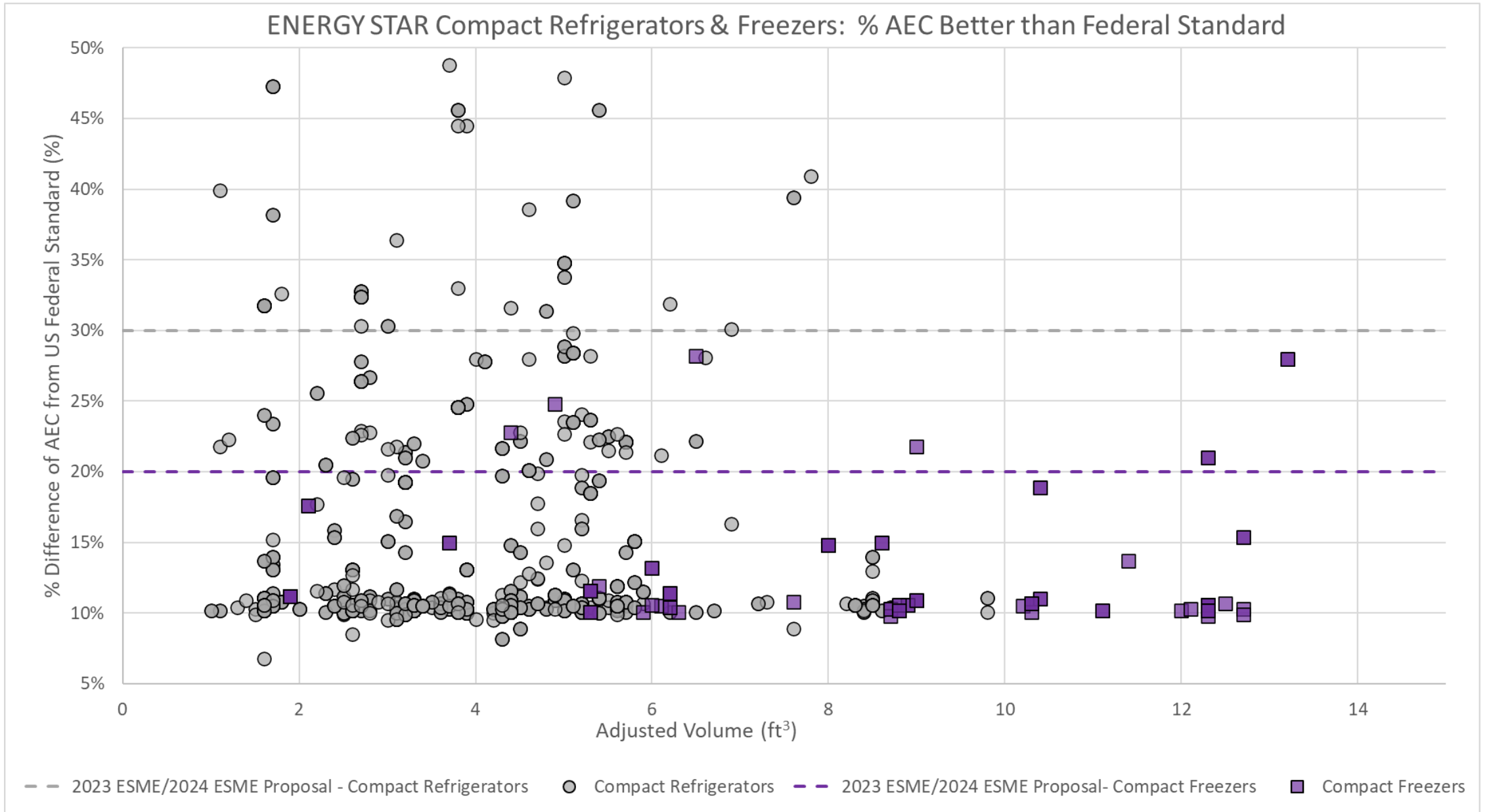
SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Compact Refrigerators and Freezers

- **2024 Proposal:**
 - Maintain criteria for compact Refrigerators and Refrigerator-Freezers
 - $\geq 30\%$ more efficient than the Federal minimum for compact Refrigerators and Refrigerator-Freezers
 - Maintain criteria for compact Freezer product types
 - $\geq 20\%$ more efficient than the Federal minimum for compact Freezers
 - Optional reporting of refrigerant type
- **Rationale:**
 - The number of compact Refrigerator and Refrigerator-Freezer models/brands remain steady from last year.
 - 43 compact Refrigerator and Refrigerator-Freezer base models (4%) from 23 brands
 - 10 compact Freezer base models (4%) from 7 brands
 - ESRPP currently incentivizes ENERGY STAR Most Efficient compact refrigerators for advanced tier



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Conditioners



- **2024 Proposal:**
 - Revise the criteria for Room Air Conditioner (RAC) product types:
 - With V5.0 taking effect and proposed federal standards all setting higher bars for energy efficiency, there is the opportunity to highlight even more efficient models with ENERGY STAR Most Efficient for most categories.
 - The smallest product classes, (1,2, 6, and 7) maintain current ENERGY STAR Most Efficient levels which are greater than those in the proposed Federal Standards
 - Product must have a sound pressure level at or below 45 dB(A) for the lowest operational mode available
 - Demonstrate in accordance with an internationally recognized ISO or ANSI test procedure measuring sound pressure
 - Document adjustments and submit at the time of certification for each basic model
 - Required reporting for refrigerant type
- **Rationale:**
 - Recent Version 5.0 revision of the ENERGY STAR specification will be in effect in October, which will be near current ENERGY STAR Most Efficient levels
 - New Federal Standards going into effect 3 years from the publication of the Final Rule will be (in most cases) better than ENERGY STAR V5
 - Alignment of ENERGY STAR Most Efficient 2024 and the new Federal Standards (for most product classes) will highlight early adopters
 - ESRPP currently incentivizes ENERGY STAR Most Efficient RACs for their advanced tier



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Conditioners – Product Count & Savings

- With V5.0 and proposed federal standards all setting higher bars for energy efficiency, opportunity to highlight even more efficient models with ENERGY STAR Most Efficient for most categories.
- ESME will highlight early adopters of the new DOE standards going into effect 3 years from the final publication.
- The savings are significant at 178 kWh/yr saving \$22 in operating costs annually.

Product Count	Number of Models	% of all Models	Number of Brands
Estimated Total Models (Baseline)	924	100%	88
Version 4.2 ENERGY STAR	654	71%	82
Version 5.0 ENERGY STAR	62	7%	20
2024 Most Efficient Criteria	6	1%	4

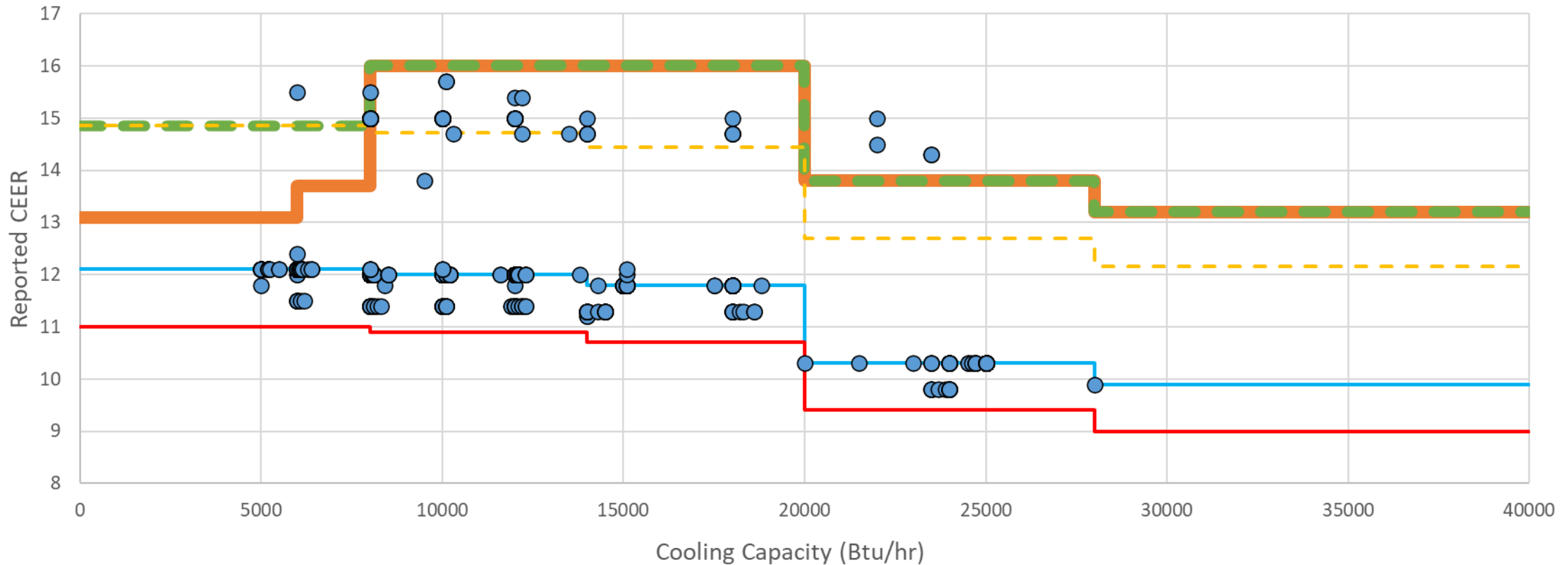
Product Class Weighted Savings	Annual Energy Savings (kWh/yr)	% Better than Baseline (%)	Annual Cost Savings (\$)
Federal Standard (Baseline)	--	--	--
2024 Most Efficient Criteria Proposal	178	29%	\$22



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Conditioners

Models Without Reverse Cycle & With Louvers



Proposed New Federal Standard

2024 ESME Proposal

2023 ENERGY STAR Most Efficient

Version 4.2 ENERGY STAR

Current Federal Standard

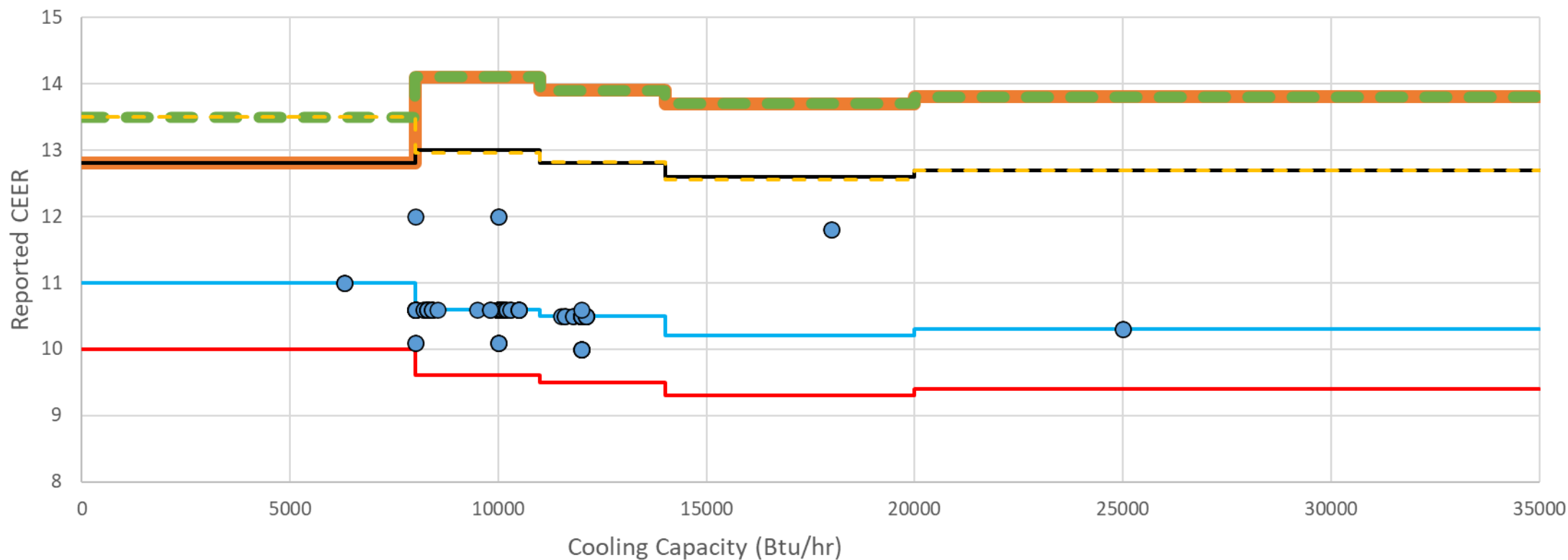
Models Without Reverse Cycle & With Louvers



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Conditioners

Models Without Reverse Cycle & Without Louvers



Proposed New Federal Standard

2024 ESME Proposal

Version 4.2 ENERGY STAR

2023 ENERGY STAR Most Efficient

Version 5.0 ENERGY STAR

Current Federal Standard

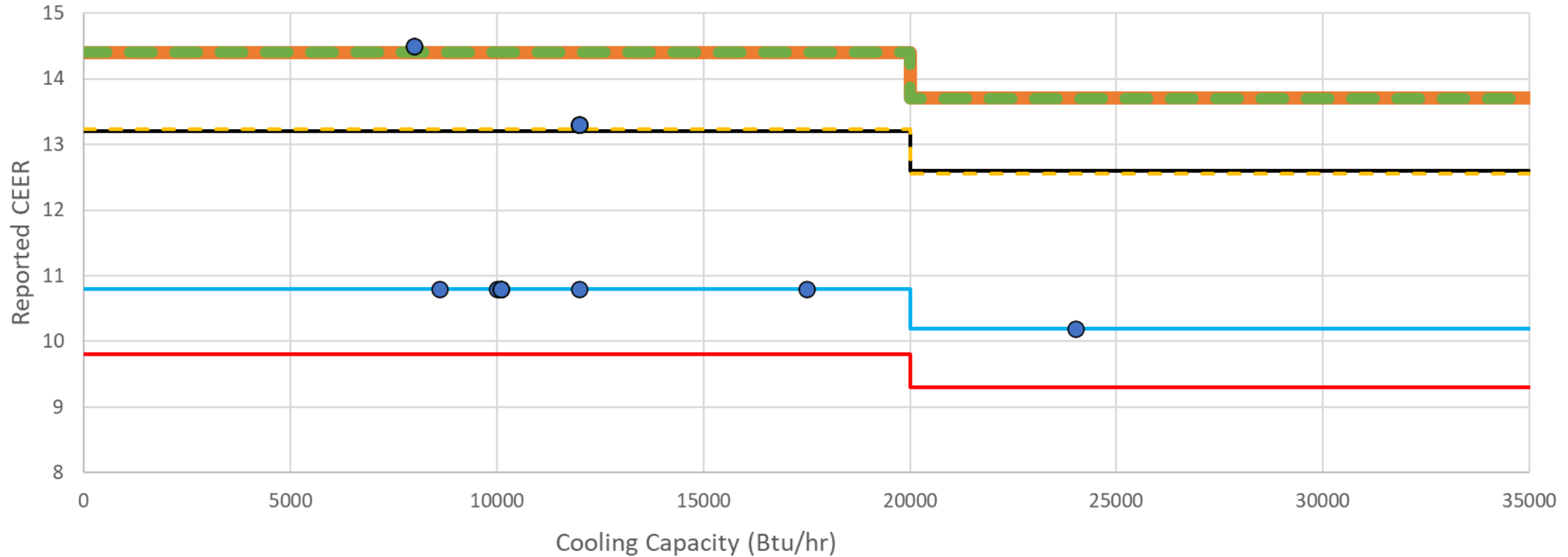
Models Without Reverse Cycle & Without Louvers



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Room Air Conditioners

Models With Reverse Cycle & With Louvers



Proposed New Federal Standard

2024 ESME Proposal

Version 5.0 ENERGY STAR

2023 ENERGY STAR Most Efficient

Version 4.2 ENERGY STAR

Current Federal Standard

Models With Reverse Cycle & With Louvers



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dehumidifiers



- **2024 Proposal:**

- Revise the criteria for most of the dehumidifier product types:

Type, Size	Integrated Energy Factor (IEF)
Portable, capacity \leq 25.00 pints/day	\geq 1.70
Portable, capacity 25.01 to 50.00 pints/day	\geq 2.01
Portable, capacity $>$ 50.00 pints/day	\geq 3.40*
Whole-Home, case volume \leq 8.0 ft ³	\geq 2.22
Whole-Home, case volume $>$ 8.0 ft ³	\geq 3.81

- **Rationale:**

- 42% of ENERGY STAR models currently meet ENERGY STAR Most Efficient;
- ENERGY STAR Most Efficient criteria for dehumidifiers have stayed at the same IEF levels for the past several years

*Note: Portable Dehumidifiers ($>$ 50 pints/day) IEF for ENERGY STAR Most Efficient 2024 updated from draft memo (was 3.10).



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dehumidifiers – Levels and Savings

Capacity (pints/day) / Case Volume (ft ³)	IEF (V5.0)	IEF (ESME 2024 Proposal)	ESME Savings (Over DOE)
Portable Dehumidifiers			
<= 25.00 pints/day	1.57	1.70	27%
25.01 – 50 pints/day	1.80	2.01	23%
> 50 pints/day	3.30	3.40*	19%
Whole-Home Dehumidifiers			
<= 8.0 ft ³	2.09	2.22	23%
> 8.0 ft ³	3.30	3.81	45%

***Note:** Portable Dehumidifiers (>50 pints/day) IEF for ENERGY STAR Most Efficient 2024 updated from draft memo (was 3.10).



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dehumidifiers – Product Count

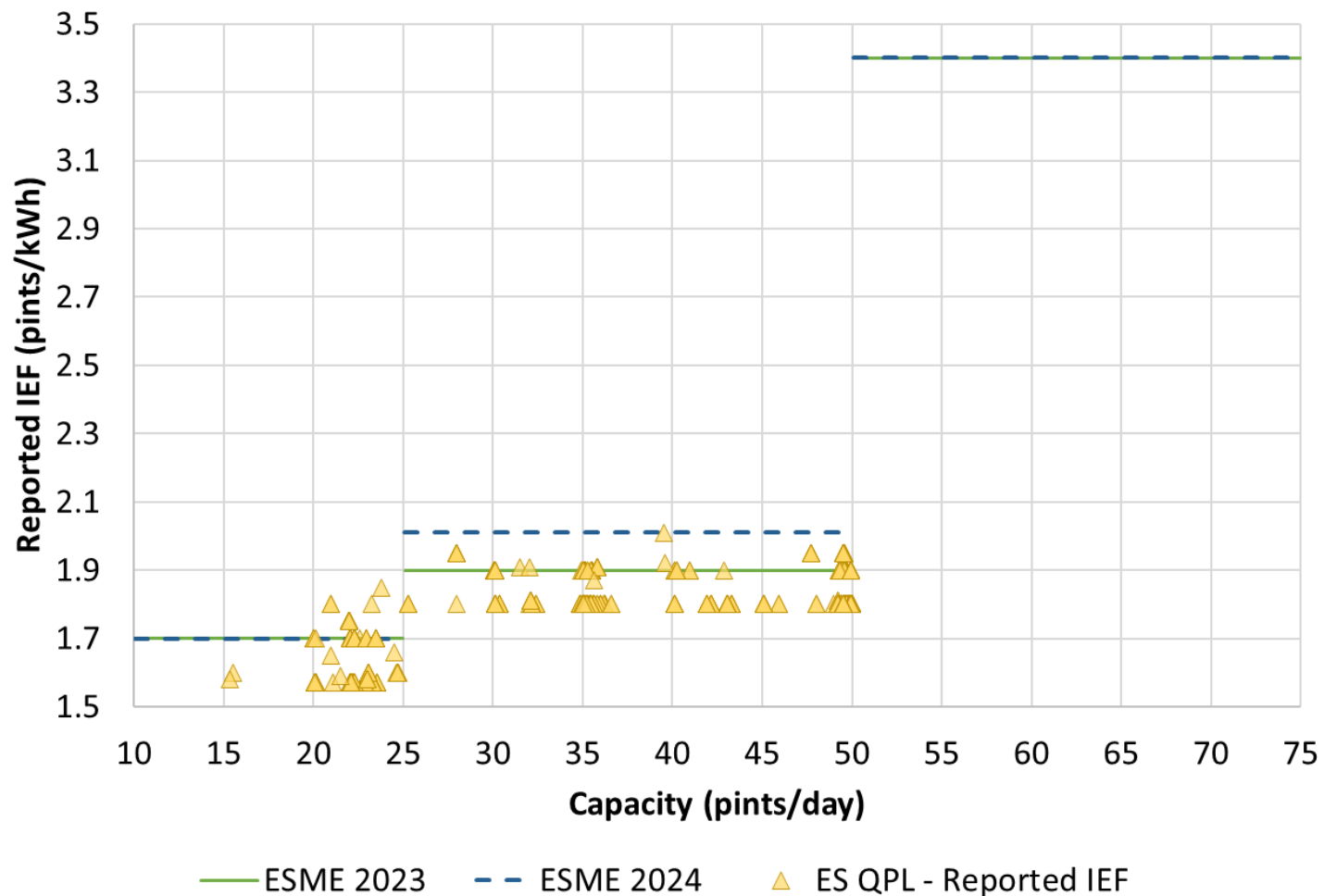
Capacity (pints/day) / Case Volume (ft ³)	ENERGY STAR	2024 ENERGY STAR Most Efficient Proposal	# of Brands Meeting Proposal
Portable Dehumidifiers			
<= 25.00 pints/day	134	53	34
25 – 50 pints/day	373	1	1
> 50 pints/day	0	0	0
Whole-Home Dehumidifiers			
<= 8.0 ft ³	14	12	5
> 8.0 ft ³	0	0	0



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dehumidifiers – Portable, Reported IEF

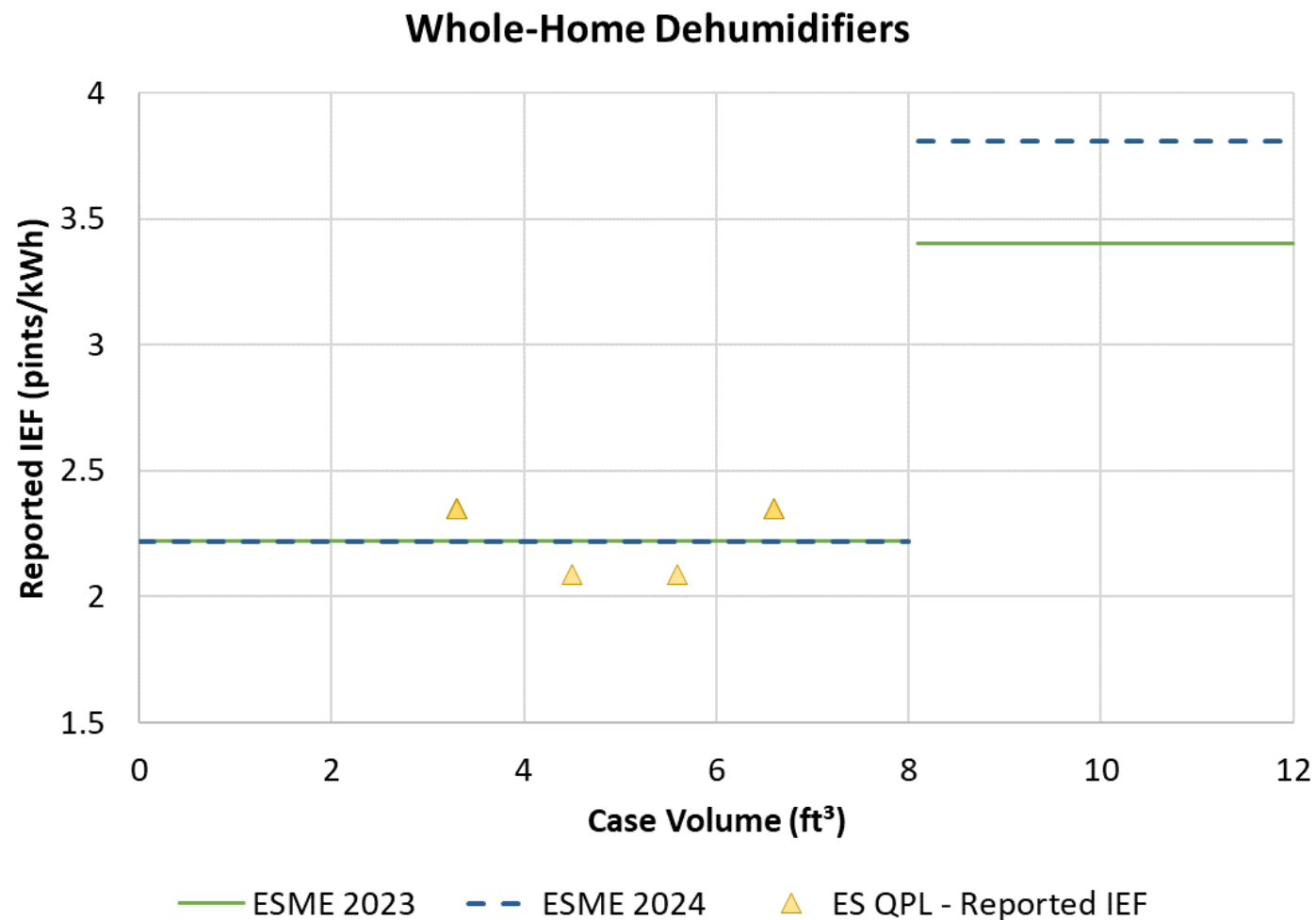
Portable Dehumidifiers





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dehumidifiers – Whole-Home, Reported IEF





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dishwashers



- **2024 Proposal:**

- Revise criteria for standard-size dishwashers
 - 27% more energy efficient and 38% more water efficient than the Federal minimum

Product Type	Annual Energy Use (kWh/yr)	Water Consumption (gallons/cycle)
Standard Dishwasher	≤ 225	≤ 3.2

- Removing the cleaning performance requirement

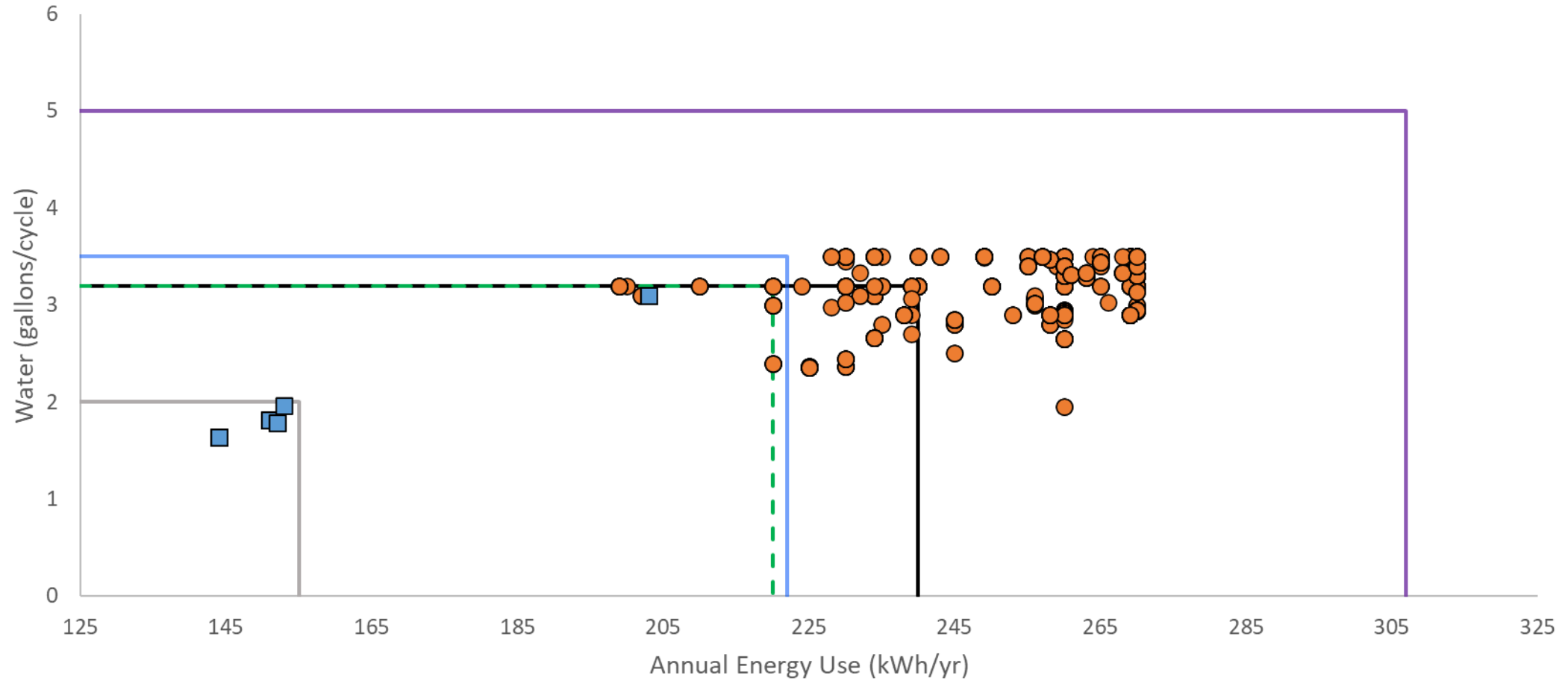
- **Rationale:**

- ENERGY STAR Dishwasher specification (Version 7.0) went into effect July 19, 2023
- Removing the cleaning performance requirement since there is now a cleaning performance requirement as part of ENERGY STAR
- 20 base models from 8 brands meet the criteria, equating to 5% of the market and 21% of brands.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Dishwashers



- Standard
- Compact
- Version 7.0 - Compact
- Version 7.0 - Standard-Size
- - - ESME 2024 - Standard Proposal
- Fed. Std. Compact
- Fed. Std. Standard



SAVE TODAY. SAVE TOMORROW.
 SAVE FOR GOOD.

Ceiling Fans



2024 Proposal:
 Revise the criteria

Product Class	Proposed 2024 ENERGY STAR Most Efficient Criteria	Weighted Savings (% over baseline)
Standard	3.25 x Blade Span + 107	74%
HSSD	3.25 x Blade Span + 107	19%
Hugger	1.44 x Blade Span + 120	75%

Rationale:

More savings to be realized and a high number of products were meeting the old criteria.

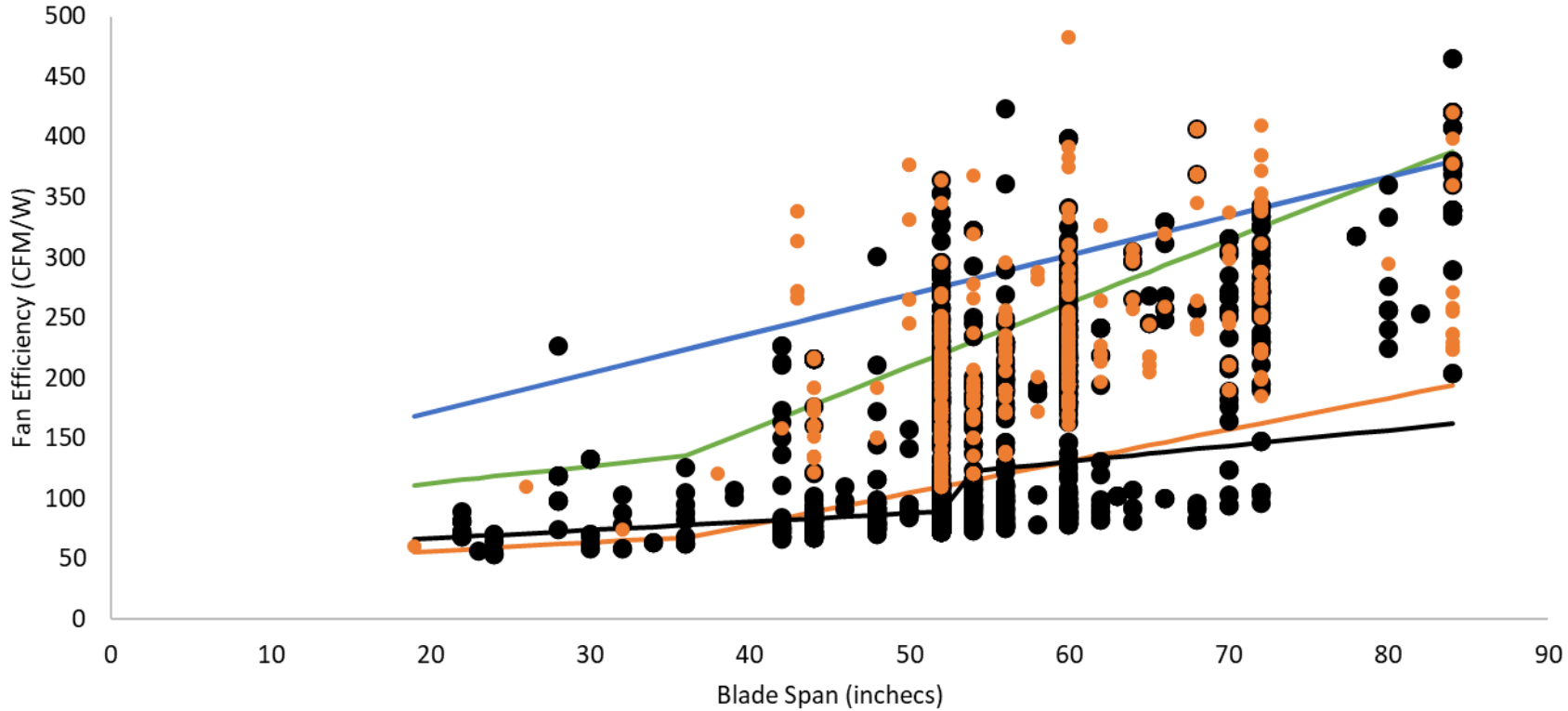
- HSSD Fans:
 - Only one partner has certified HSSD fans.
 - 58% of certified models from 44" to 60" diameter meet the current ENERGY STAR Most Efficient criteria (too lenient).
 - 33% of certified models from 44" to 84" diameter meet the proposed criteria which is more stringent for all but the largest diameter (slight decrease to expand the range of ENERGY STAR Most Efficient offering).
- Standard Fans:
 - 24% of certified models meet the current ENERGY STAR Most Efficient criteria (too lenient).
 - 11% of certified models meet the proposed criteria that is more stringent for all but the largest diameter (slight decrease).
- Hugger Fans:
 - 7% of certified models from 2 partners meet current ENERGY STAR Most Efficient criteria (excludes larger blade spans).
 - 13% of models from 4 partners in a variety of blade spans would meet the proposed criteria.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Standard Ceiling Fans

Standard Ceiling Fans and Levels



Proposed 2024 ENERGY STAR
Most Efficient level for
ENERGY STAR certified
Standard ceiling fans =

$$3.25 \times \text{Blade Span} + 107$$

- 74% savings over baseline
- 24% savings over proposed new baseline

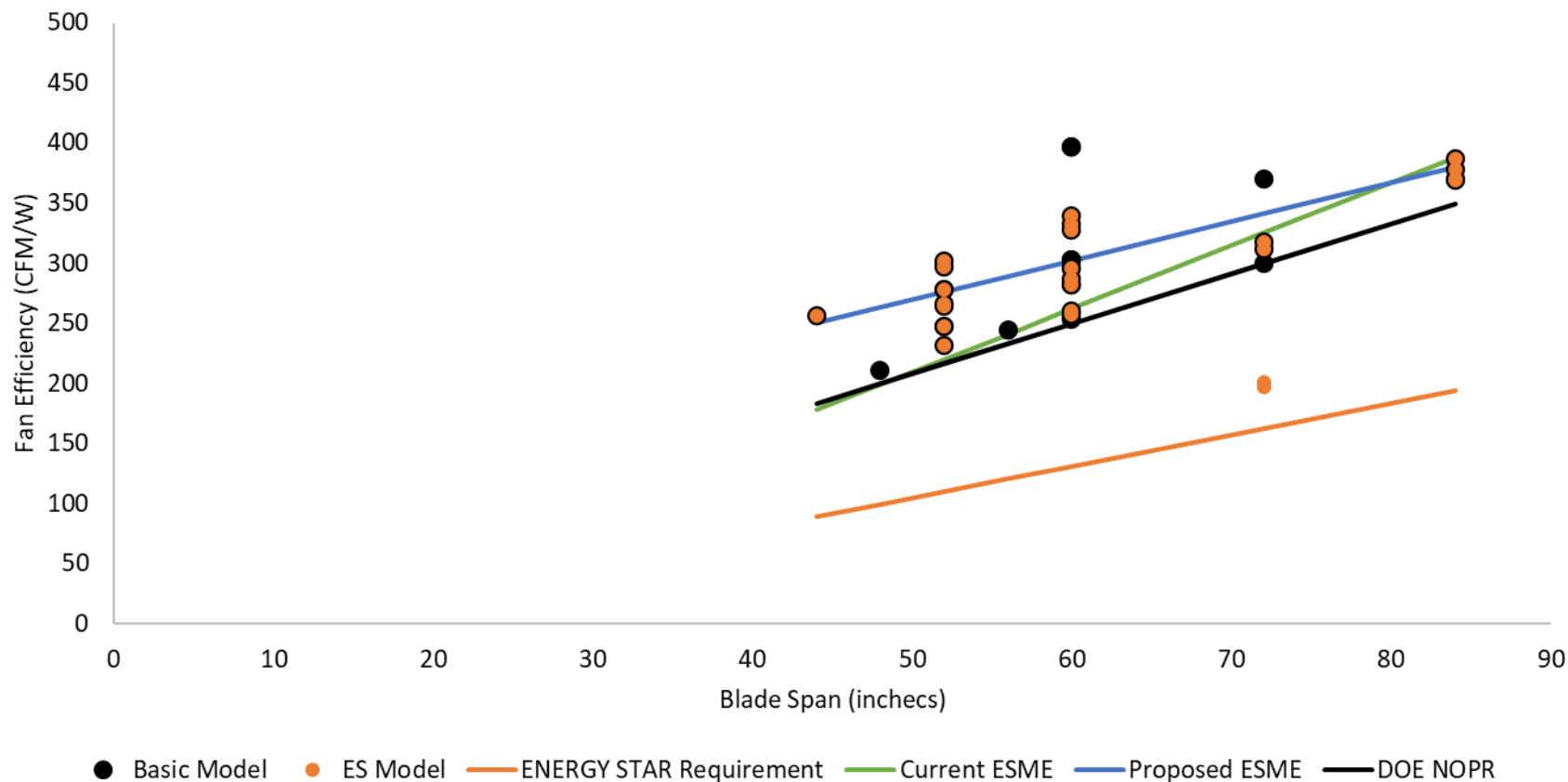
● Basic Model ● ES Model — ENERGY STAR Requirement — Current ESME — Proposed ESME — DOE NOPR



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

HSSD Ceiling Fans

HSSD Ceiling Fans and Levels



Proposed 2024 ENERGY STAR
Most Efficient level for
ENERGY STAR certified HSSD
ceiling fans =

$3.25 \times \text{Blade Span} + 107$

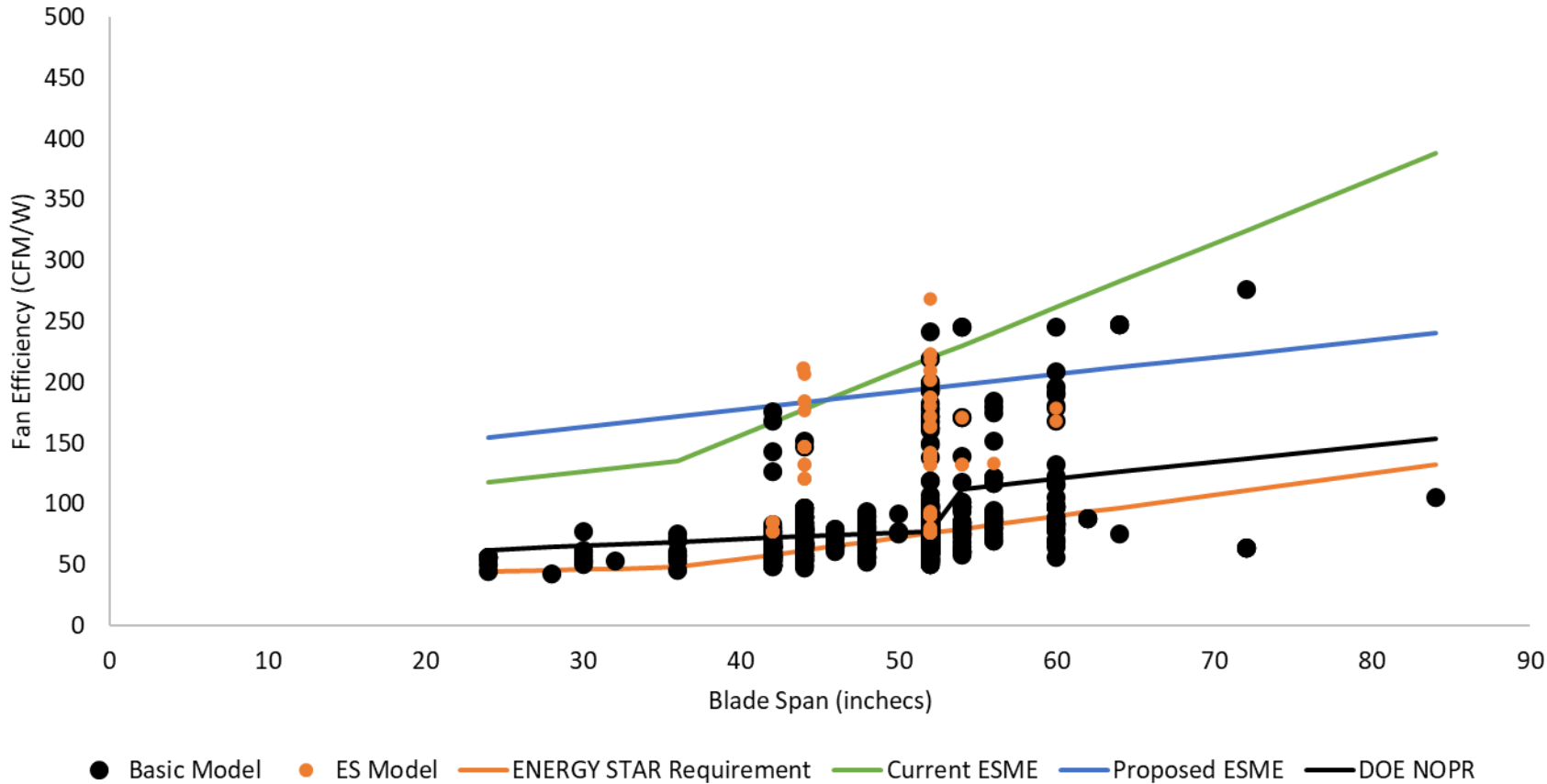
- Small market segment
- 19% savings over proposed new baseline



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Hugger Ceiling Fans

Hugger Ceiling Fans and Levels



Proposed 2024 ENERGY STAR
Most Efficient level for
ENERGY STAR certified
Hugger ceiling fans =

$$1.44 \times \text{Blade Span} + 120$$

- 75% savings over baseline
- 36% savings over proposed new baseline



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Summary

Product Class	Proposed 2024 ENERGY STAR Most Efficient Criteria	Weighted Savings (% over baseline)	% of Models	# of Brands
Standard	3.25 x Blade Span + 107	74%	3% of Total Models 11% of Certified Models	9
HSSD	3.25 x Blade Span + 107	19%	16% of Total Models 33% of Certified Models	1*
Hugger	1.44 x Blade Span + 120	75%	1% of Total Models 11% of Certified Models	9

*One partner has certified models as of June 2023



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Ventilating Fans



- **2024 Proposal:** Raise criteria
- In-Line Fans: ≥ 6.5 cfm/W
- In-Line Fans with Filter:
 - $6 \leq \text{MERV} \leq 13$: 4.7 cfm/W
- Bathroom/Utility Room Fans:
 - Efficacy at high speed (cfm/W): ≥ 11.4 cfm/W
 - Reported sound level (sones): ≤ 4.0 cfm/W at 0.25 in. w.g. at high speed
- **Rationale:**
 - Opportunity to raise the levels and offer higher savings across categories
 - No change in ESME criteria for fans tested with filters due to the restricted airflow and specific function

*Note: updates from ENERGY STAR Most Efficient 2024 July 18 memo: Bathroom/Utility Room Fans (was 10.1 cfm/W). For in-line proposal changed to a single level for all in-line fans (memo had single and multi-port with different levels), also added back 2023 levels for fans with filters.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Ventilating Fans



System Type	ENERGY STAR Most Efficient / All current ENERGY STAR	% ENERGY STAR Most Efficient / HVI Products	Per Unit Savings over baseline	Brands
Bathroom/Utility Room Fans Efficacy at high speed (cfm/W): ≥ 11.4 cfm/W (sones): ≤ 4.0	88 / 787 (11%)	6%	43%	17
Inline Fans In-Line Fans: ≥ 6.5 cfm/W*	24/101 (23.8%)	11%	40%	9
Total	112 / 888 (12.6%)	10%	-	



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Residential Heat Pumps

- **2024 Proposal:**
 - Remove ENERGY STAR Most Efficient recognition of CACs as messaged in 9/26/22 letter finalizing 2023 criteria, and in line with the proposed sunset of ENERGY STAR CACs.
 - Change levels for ductless heat pumps to align with tax credit eligibility and pause installation benefits for these units in 2024.
 - Reorganize all air source heat pump products into one criteria document, keeping a separate document for GHPs.
- **Rationale:**
 - Take advantage of the opportunity to make tax credit eligible units easier for consumers and contractors to identify.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Proposed Levels and Savings for Ducted HPs



System Type	SEER2	EER2	HSPF2	Savings (North)	Savings (South)		
Split HP	16.9	12.0	8.2	12%	13%		
Packaged HP	15.2	11.5	7.2	9%	10%	COP @ 5 °F	$\frac{\text{Capacity}_{5^{\circ}\text{F}}}{\text{Capacity}_{47^{\circ}\text{F}}}$ %
Cold Climate	15.2	11.0	8.5	17%	15%	1.75	≥70%



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Proposed Levels and Savings for Ductless HPs



System Type	SEER2	EER2	HSPF2	Savings (North)	Savings (South)		
Ductless HP	16.0	12.0	9.0	14%	12%	COP @ 5 °F	$\frac{\text{Capacity}_{5^{\circ}\text{F}}}{\text{Capacity}_{47^{\circ}\text{F}}}$ %
Ductless Cold Climate	16.0	9.0	9.5	12%	13%		1.75



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Percentage of Models Meeting Proposed HP Criteria

System Type	% Meeting ENERGY STAR Most Efficient 2024 Levels
Ducted Split HP*	6%
Ducted Packaged HP*	31%
Ducted Cold Climate*	5%
Ductless HP	32%
Ductless Cold Climate	50%

* Not taking installation benefits criteria into account.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.



Geothermal Heat Pumps

- **2024 Proposal:** Maintain current efficiency levels. All ENERGY STAR certified geothermal heat pumps will be recognized as Most Efficient.
 - 2024 ENERGY STAR Most Efficient includes a separate document for GHPs; it was included with CAC/HPs in previous years.
- **Rationale:**
 - Recognizes that geothermal heat pumps as a category reflect the intentions of ENERGY STAR Most Efficient.
 - In addition to their efficiency benefit, GHPs also provide better peak power reduction on very hot or very cold days, because their efficiency is not affected by outdoor temperature.



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Geothermal Heat Pumps



Geothermal Heat Pump System Type	EER	COP	Savings
Closed Loop Water-to-Air	17.1	3.6	27%
Open Loop Water-to-Air	21.1	4.1	39%
Closed Loop Water-to-Water	16.1	3.1	20%
Open Loop Water-to-Water	20.1	3.5	33%
DGX-to-Air	16.0	3.6	24%
DGX-to-Water	15.0	3.1	16%

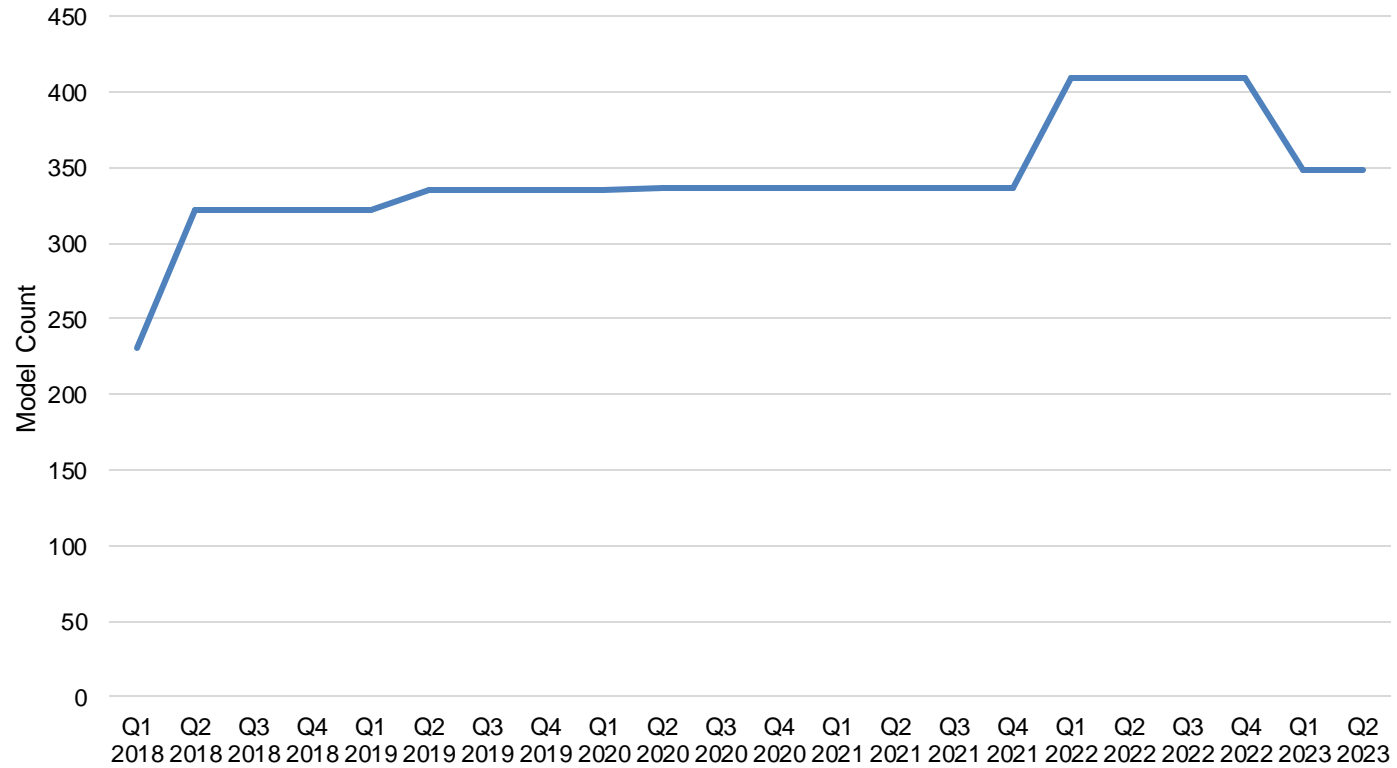


SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Geothermal Heat Pumps



ENERGY STAR Most Efficient GHPs





SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Next Steps

- Comments are due Monday, August 21; send to MostEfficient@energystar.gov
- Slides will be posted
to: https://www.energystar.gov/products/energy_star_most_efficient_2024_criteria_development
- The 2024 criteria will be finalized in early September 2023
- Products will be recognized as ENERGY STAR Most Efficient 2024 beginning January 1, 2024



SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.

Contacts

- Doug Anderson, EPA-Windows, anderson.doug@epa.gov
- Abigail Daken, EPA-HVAC, daken.abigail@epa.gov
- Katharine Kaplan, EPA Team Lead, Kaplan.katharine@epa.gov
- James Kwon, EPA-Electronics, kwon.james@epa.gov
- Steve Leybourn, EPA-Appliances, Leybourn.Stephen@epa.gov
- Taylor Jantz-Sell, EPA-Ceiling and Vent Fans, jantz-sell.taylor@epa.gov
- Jeremy Dommu, DOE Team Lead, jeremy.dommu@ee.doe.gov
- Jacelyn Williams, ICF, Jacelyn.Williams@icf.com
- Nadia Saponara, ICF, Nadia.Saponara@icf.com
- General Inquiries: mostefficient@energystar.gov

Thank you for your participation today.