



ENERGY STAR[®]

Residential Dishwashers

Draft 1 Version 5.0
Stakeholder Meeting
Tuesday, October 26, 2010

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Meeting Goals



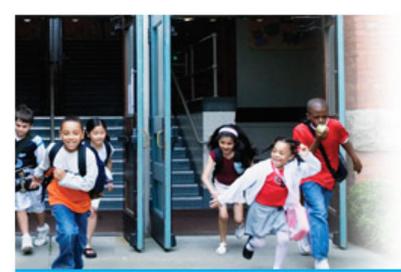
1. Present the drivers and goals for this revision process
2. Highlight changes in the Draft 1 Version 5.0
3. Solicit stakeholder feedback on proposal and outstanding issues
4. Address stakeholder questions about process and/or changes
5. Identify next steps and timeline

Today's Agenda

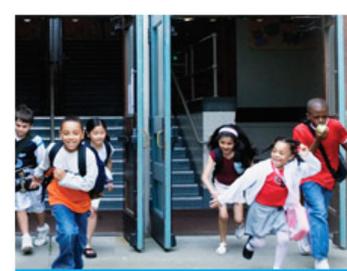


- 9:00 – 9:20 AM Introduction/Overview, Review of Agenda
- 9:20 – 9:45 AM ENERGY STAR Spec Dev. Process
- 9:45 – 10:45 AM Overview of Draft 1 V 5.0 Specification
- 10:45 – 11:00 AM *Break*
- 11:00 AM – Noon Overview of Draft 1 V 5.0 Specification (*cont.*)
- Noon – 1:00 PM *Lunch*
- 1:00 – 2:45 PM Cleaning Performance Requirement/Test
- 2:45 – 3:00 PM *Break*
- 3:00 – 4:30 PM Cleaning Performance Requirement/Test (*cont.*)
- 4:30 – 5:00 PM Timeline and Summary of Action Items

Throughout the presentation, questions on which EPA would particularly like stakeholder feedback will be highlighted in this format.



Introduction



ENERGY STAR Overview



- What is ENERGY STAR?



A voluntary climate protection partnership
A strategic approach to energy management
Recognized by over 75% of Americans
An internationally recognized brand

In 2009 alone, Americans, with the help of ENERGY STAR, saved enough energy to **avoid GHG emissions equivalent to those from 30 million cars** – while savings **\$17 billion** on utility bills



DOE → EPA Transition



- New challenges and opportunities
 - More products at a faster pace, frequently reviewed
 - GAO report, third-party certification across all product types
- Maintaining strong brand is priority
- Memorandum of Understanding (MOU) explains how ENERGY STAR will prioritize specification revisions
- Annual Plan planned distribution in early 2011



MOU Trigger for Review of Specs



*“For appliances and other product categories with longer-lived product models, specifications will be reviewed for a possible revision at a **minimum of every three years** or once the market share for ENERGY STAR qualifying products reaches **about 35%.**”*



Market Share Considerations



- When considering when to revise a specification, EPA considers *sales-weighted* market share data
 - Under MOU, 35% market share is one trigger for review
- When revising specification, new requirements typically recognize, approximately, the top 25% of products in the market
 - This is based on # of models (as listed on qualified product list)
 - Minimum lead time of 9 months from when a new specification is final until its effective, means that more products will be able to qualify by the time new specification becomes effective



ENERGY STAR Guiding Principles



ENERGY STAR criteria are designed to balance a varied set of objectives, including:

- Significant energy and/or water savings
- Cost effective
- Energy consumption that can be measured and verified with testing
- Equivalent or enhanced functionality and performance
- Achievable through several technology options; at least one of which is non-proprietary
- Label provides meaningful differentiation

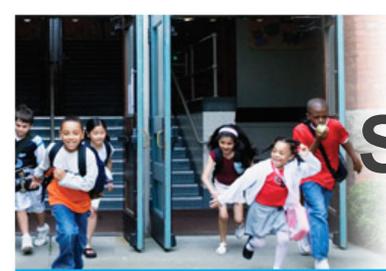


Additional Considerations for Specification Development



Other considerations that may be taken into account include

- Changes in federal efficiency standards
- Technological advances in energy efficiency
- Product availability



Specification Development Cycle



Specification Development Cycle





Specification Development Process



- Solicit informal feedback from stakeholders
- Conduct a market and engineering analysis
- Identification of appropriate test procedure(s)
- Analysis of product energy performance data
- Announce proposed ENERGY STAR criteria
- **Hold stakeholder meeting**
- Evaluate comments/revise proposal
- Finalize criteria



Dishwasher Revision: Drivers



- Technology has advanced to a point where ENERGY STAR is industry standard
- In the current specification, finalized in 2008, ENERGY STAR reserved the right to revisit the 2011 levels if anticipated qualifying rates warranted more stringent levels
 - 81% of models are currently ENERGY STAR qualified, accounting for nearly 70% of sales in 2009
 - 36% of models already meet July 1, 2011 ENERGY STAR spec; many more will likely meet it by the time it goes into effect
 - EPA anticipates more than 50% of standard dishwashers sold next year will meet the 2011 level
- Likelihood of more stringent Federal standards for dishwashers in 2013



Dishwasher Specification History



Year	Test Procedure	ENERGY STAR Criteria
1994	Federal Dishwasher Test Procedure Adopted	
1997		EF \geq 0.52
2001		EF \geq 0.58
2003	New Federal test procedure adopted; addresses soil sensing technology and standby	
2007		Standard: EF \geq 0.65 Compact: EF \geq 0.88
2009		Standard: \leq 324 kWh/yr, \leq 5.8 gallons/cycle Compact: \leq 234 kWh/yr \leq 4.0 gallons/cycle



Dishwasher Revision: Goals for New Specification Levels



- More effectively designate high performing models for consumers by reducing market share of ENERGY STAR dishwashers to 25%
- Realize significant cost-effective energy and water savings on a national basis
- Establish a cleaning performance requirement to ensure consumers purchasing ENERGY STAR qualified dishwashers do not sacrifice cleaning performance for improved efficiency



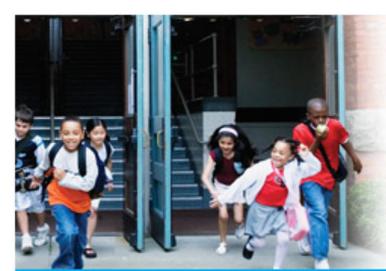
Overview & Discussion of
Draft 1 Version 5.0 Specification
*Program Changes in Anticipation of
Third-Party Certification*



Program Changes in Anticipation of Third Party Certification



- Existing specification revised to support upcoming third-party certification requirements
- EPA to release Final Version 4.1 specification and new ENERGY STAR Partner Commitments **today**
 - Partner Commitments will also apply to Version 5.0
 - Changes made in Version 4.1 provide additional clarification for Certification Bodies and level playing field for qualification
 - Comments received on draft version re: alignment with DOE, changes made after the release of Version 5.0
 - EPA intends to include these enhancements in next draft version of Version 5.0
 - These revisions will be shared for comment today, where applicable
- Final Version 4.1: www.energystar.gov/testingandverification



Scope and Definitions

Residential Dishwashers



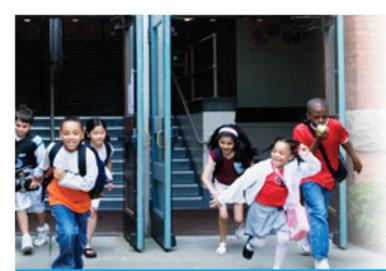
- Current scope: compact and standard dishwashers
- Current Draft 1 Version 5.0 Definition:
 - An appliance designed to clean and sanitize plates, glasses, cups, bowls, and utensils by applying sprays of water and detergent solution
- Final Version 4.1 Definition (10 CFR 430.2), which EPA plans to incorporate into next draft of Version 5.0:
 - A cabinet-like appliance which with the aid of water and detergent, washes, rinses, and dries (when a drying process is included) dishware, glassware, eating utensils, and most cooking utensils by chemical, mechanical and/or electrical means and discharges to the plumbing drainage system



Items for Discussion



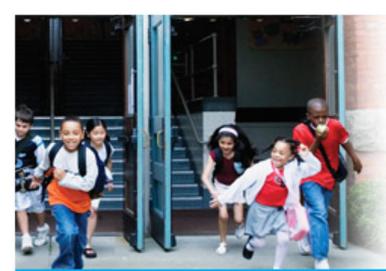
1. EPA will include the DOE definition for residential dishwasher in next draft. Are there any enhancements or clarifications needed?
2. Are there other product types that EPA should consider under this specification?
3. Energy factor and standby energy were defined in Version 4.1, but were deleted in Draft 1 Version 5.0 since ENERGY STAR performance requirements are no longer expressed in terms of these metrics. EPA requests comment on its proposal to delete these definitions from the specification.



Product Families



- Current Draft 1 Version 5.0 proposal:
 - Product family defined as a group of models sufficiently similar that the energy and water performance of all members may be predicted from the energy performance of a platform model
 - Generally, this will be a regular range of sizes of a similar type, design and construction, and having a common designation as catalogued
 - Differentiators within product families include control panel configuration and internal configuration
- Final Version 4.1 approach: use definition for Basic Model provided in 10 CFR 430.2 for qualifying product groups



Basic Model Approach



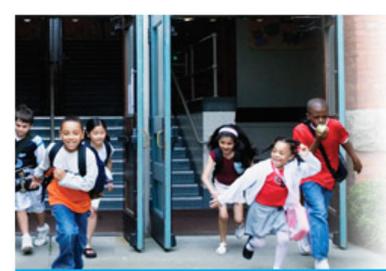
- Definition of Basic Model in Final Version 4.1:
 - Units of a given type of covered product (or class thereof) manufactured by one manufacturer that have electrical characteristics which are essentially identical and which do not have any differing physical or functional characteristics which affect energy and water consumption
- EPA understands that efforts are underway to clarify basic model definition and approach
- Once rulemaking process is complete, EPA will work to address any inconsistencies through specification revision process



Items for Discussion



EPA is interested in stakeholder feedback on the basic model approach. Is there an opportunity to further clarify through ENERGY STAR as an interim step to the final rulemaking?



Rounding Principles



- Current Draft 1 Version 5.0 proposal:
 - All calculations shall be carried out with actual measured or observed values. Only the final result of a calculation shall be rounded. Calculated results shall be rounded to the nearest significant digit as expressed in the corresponding specification limit:
 - kWh/year: whole number
 - gallons/cycle: tenth decimal point (0.1)
 - Unless otherwise specified, compliance with specification limit shall be evaluated using exact values without any benefit from rounding.



Items for Discussion



In lieu of DOE requirements, is this an appropriate approach for these product types?



Overview & Discussion of
Draft 1 Version 5.0 Specification
Proposed Efficiency Levels



Proposed Draft 1, V 5.0 Criteria – Energy and Water



Product Type	ENERGY STAR Draft 1 Version 5.0 Specification
Standard-Size Dishwashers	≤ 280 kWh/year ≤ 4.0 gallons of water per cycle
Compact Dishwashers	≤ 222 kWh/year ≤ 3.5 gallons of water per cycle



Considerations



- Phosphate-free dishwashing detergents
- AHAM/Advocates proposal
- Market factors
- Engineering factors
- Cleaning performance

Impact of Phosphate Ban on Performance



- 16 states have banned phosphates in dishwashing detergent
- Industry agreed to ban them effective July 1, 2010
- Performance may be negatively affected without the use of phosphates in dishwasher detergent





AHAM/Advocates Agreement



- Proposal jointly submitted to DOE by AHAM and 38 energy and water efficiency advocates proposes new federal standards

Product Description	Proposed New Standard Effective Jan. 1, 2013
Standard (\geq 8 place settings plus 6 serving pieces)	307 kWh/year
	5.0 gallons/cycle
Compact ($<$ 8 place settings plus 6 serving pieces)	222 kWh/year
	3.5 gallons/cycle

Equivalent to the July 2011 ENERGY STAR levels set in 2008

- Agreement also identifies higher efficiency levels for eligibility for manufacturer tax credits

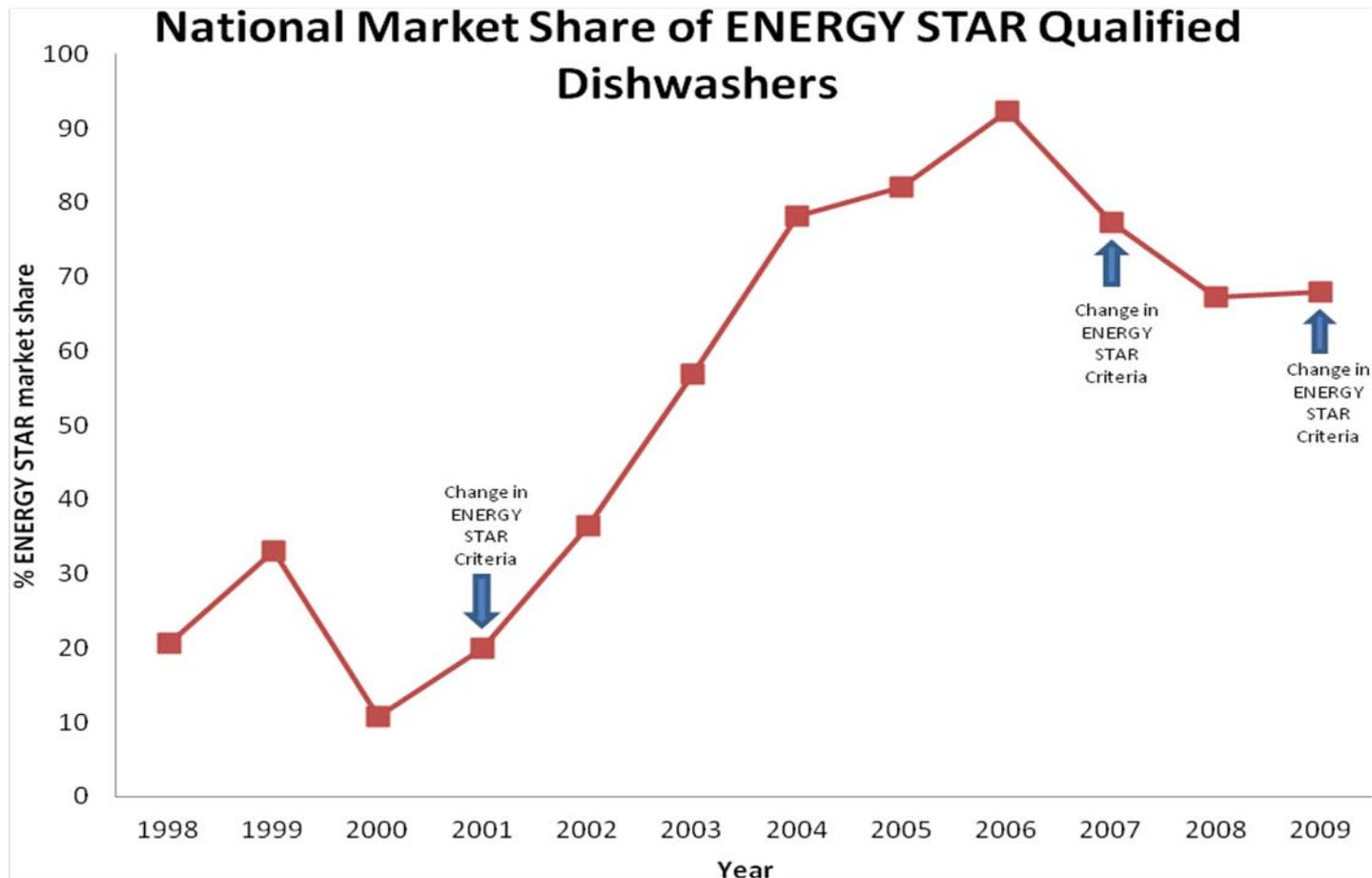


Smart Appliances



- EPA is interested in learning about new designs and technologies that enable all types of “energy-wise” or “smart” capabilities
- AHAM/Advocate proposal to EPA has recommend a 5% credit for smart grid enabled appliances, including dishwashers
- EPA will be analyzing the potential value to consumers from smart grid enabled dishwashers and energy wise functionality, and welcomes data and information that could be used in this analysis
- Stakeholders will have an opportunity to formally comment upon any smart grid or energy wise proposals

Dishwasher Market Share

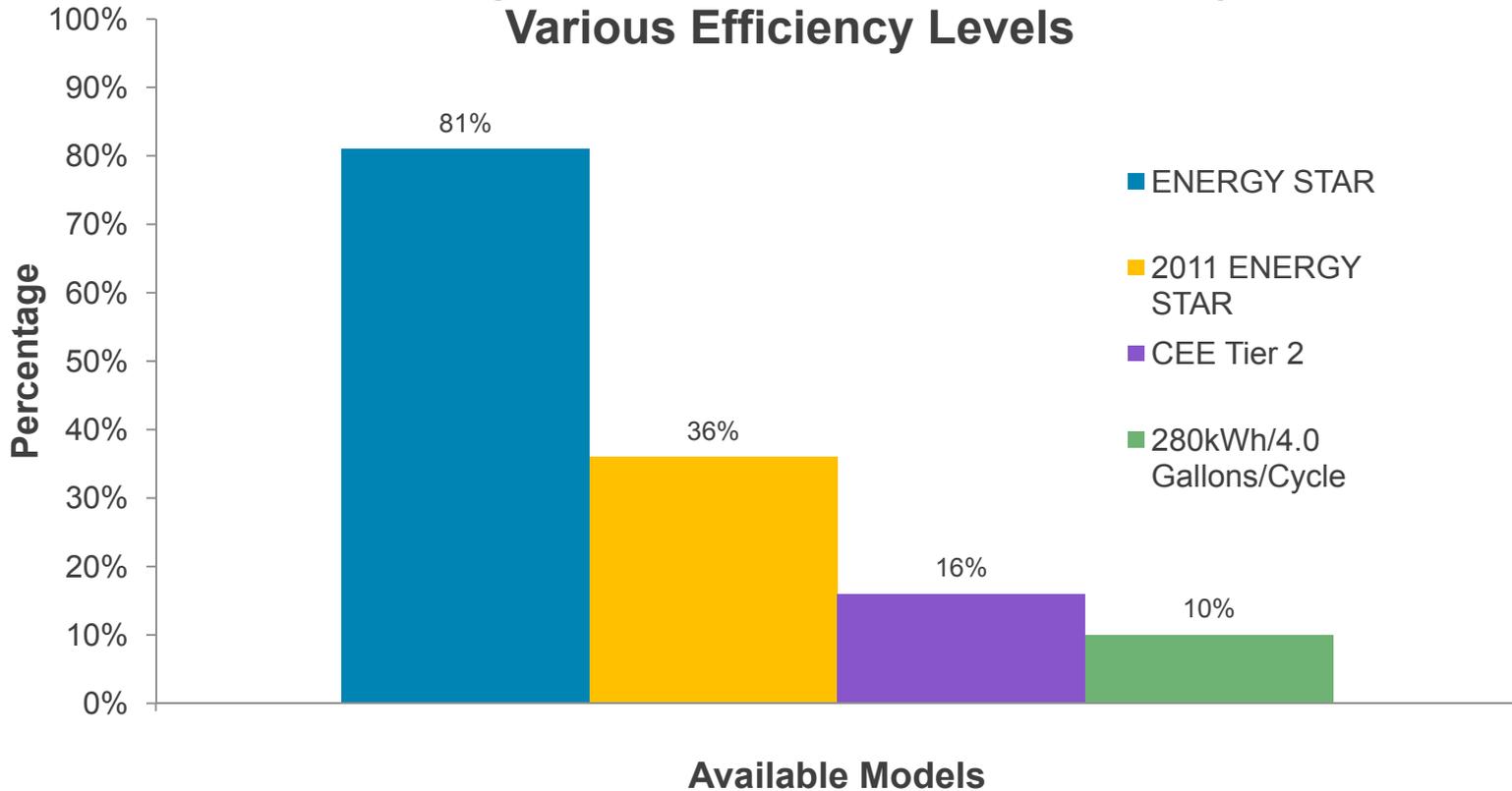




Product Availability



Percentage of Model Numbers that Qualify at Various Efficiency Levels

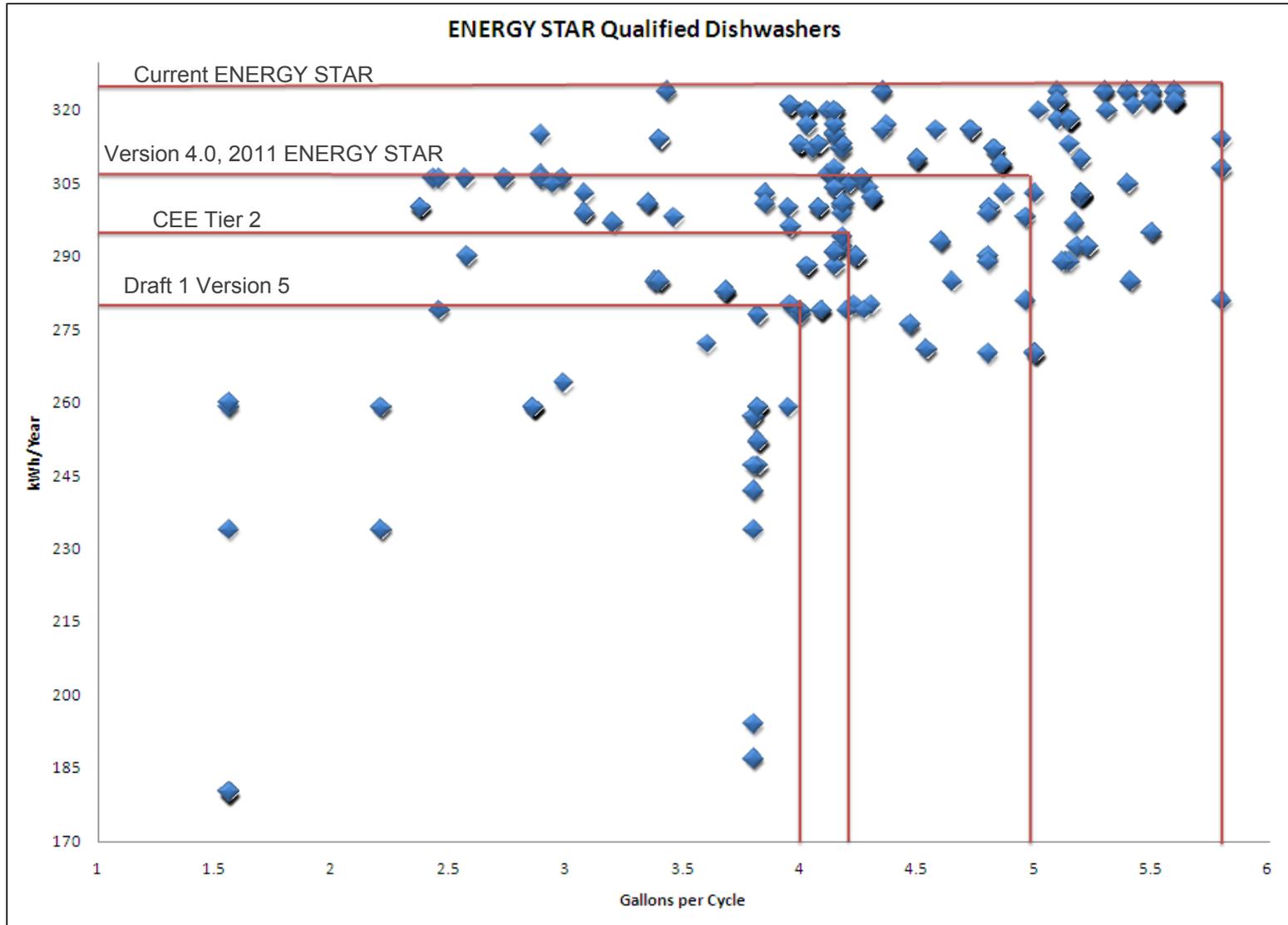


Note: Based on 2010 annual reports to the Federal Trade Commission there are 21 manufacturers that produce 589 models under 51 different brand names.





Efficiency Scatter Plot



Product Availability



<p>≤ 295 kWh per year ≤ 4.25 gallons water per cycle CEE Tier 2</p>	<p>≤ 280 kWh per year ≤ 4 gallons of water per cycle Draft 1 Version 5 Criteria</p>
<p>16% of products on market</p>	<p>10% of products on market</p>
<p>Asko (17) Avanti (3) Bosch (26) Danby (3) Electrolux (1) Fisher and Paykel (3) Frigidaire (Electrolux) (9) Gaggeneau (Bosch)(4) Ikea (Whirlpool) (2) Jenn-Air (Whirlpool) (2) Kenmore (10) Kitchenaid (Whirlpool) (14) LG (6) Maytag (Whirlpool) (4) Samsung (4) Thermador (Bosch) (2) Viking (2) Whirlpool (1)</p>	<p>Asko (17) Avanti (2) Bosch (25) Electrolux (1) Fisher and Paykel (3) Gaggeneau (Bosch) (2) Kenmore (3) Samsung (4) Thermador (Bosch) (2) Viking (2)</p>



Listed vs. Tested Values



- Tested values have generally been found to be more efficient than listed values
 - ~ 5% for energy efficiency (ranges from 0-33%)
 - ~ 3% for water efficiency (ranges from 0-18%)
- Tested values were taken into account as part of the EPA analysis
 - Additional manufacturers were found to be able to meet the specification



Annual Unit Savings

Energy and Water



Efficiency Level	Unit Energy Savings with Electric Water Heating (kWh/year)	Unit Electricity Savings with Gas Water Heating (kWh/year)	Unit Gas Savings with Gas Water Heating (Therms/year)	Annual Water Savings (gallons/year)
V4.0, 2011 ENERGY STAR	48	21	1.22	323
CEE Tier 2	60	26	1.53	484
Proposed Draft 1 V5.0	75	33	1.91	538

Note: The average number of cycles per year is 215.



Annual Unit Savings Dollar



Efficiency Level	Unit Energy Savings with Electric Water Heating	Unit Electricity Savings with Gas Water Heating
V4.0, 2011 ENERGY STAR	\$ 7.54	\$ 6.02
CEE Tier 2	\$ 10.03	\$ 8.13
Proposed Draft 1 V5.0	\$ 12.04	\$ 9.66

Note: Dollar values are calculated using national averages for electricity and water rates. The average national electric rate is \$0.1068 kWh. The average national gas price is \$1.102/Therm. The average national water rate is \$0.007501 per gallon.



Snapshot of Retail Prices



Efficiency Level	Price (Price Premium)	Source
Federal Standard (Current)	\$ 250 (NA)	Price from major retailer.
V4.0, 2011 ENERGY STAR	\$ 250 (\$ 0)	Major brand name: 303 kWh/yr 4.87 gallons/cycle. <i>Price from major retailer, 9-21-2010</i>
Proposed Draft 1 V5.0	\$ 559 (\$ 309)*	Brand name; 279 kWh/yr, < 4 gallons/cycle. <i>Price from major retailer, 9-13-2010</i>

* Price premium is not from efficiency alone; the most efficient models currently on the market are typically bundled with a variety of higher-end features (e.g., stainless steel tub, more cycles, integrated control panel) that are not included in the baseline model.



Incremental Cost



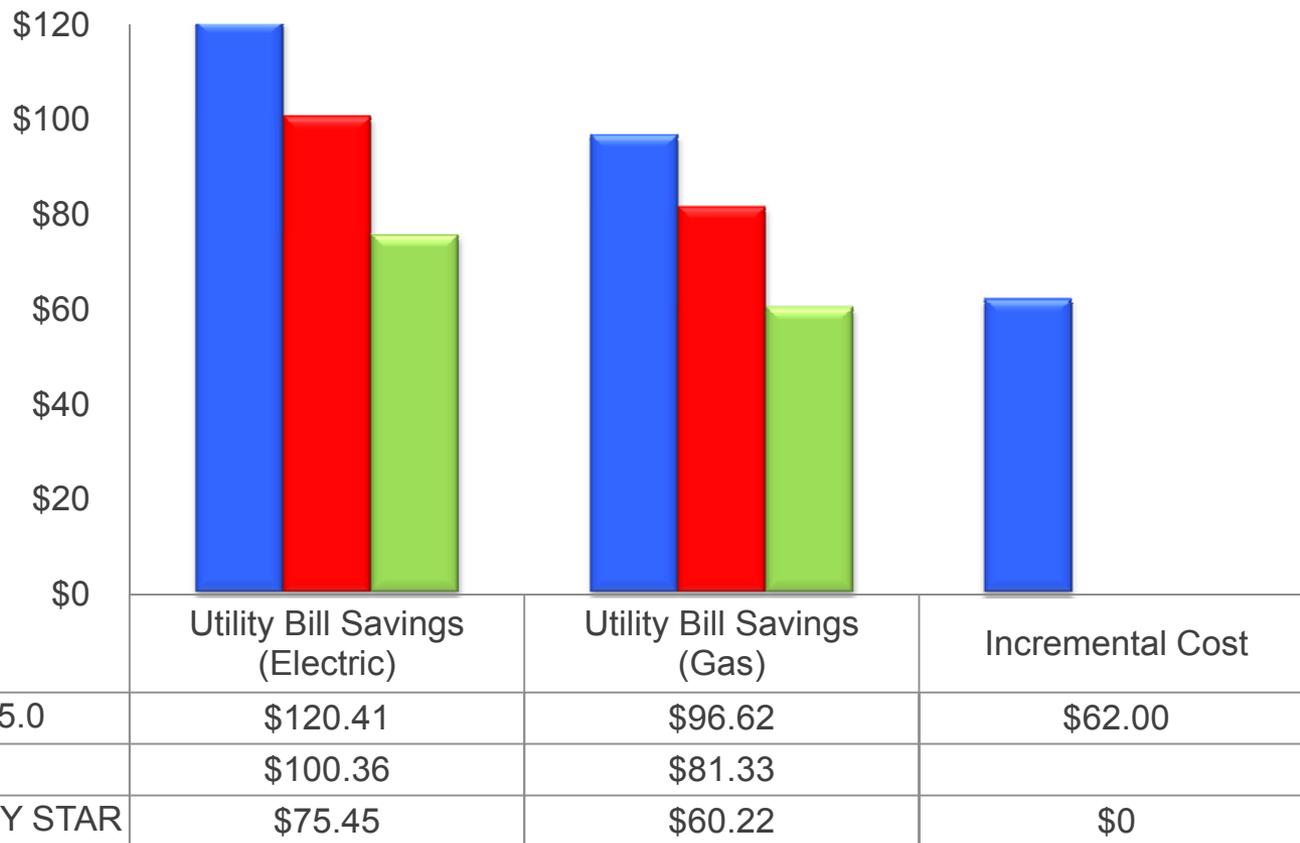
Efficiency Level	2007 DOE ANOPR Incremental Cost	2010 Adjusted Incremental Cost (.72 baseline)
Federal Standard (Current)	-	-
ENERGY STAR (Current)	\$ 23	-
V4.0, 2011 ENERGY STAR	\$ 64	-
Proposed Draft 1 V5.0	\$ 126	\$ 62



Lifetime Savings



Lifetime Cost and Savings





Engineering Options



1. Condenser drying and venting/fan drying
2. Sump pressure transducer
3. Electronic controllers paired with water meters
4. Multi-speed pumps
5. Interior water distribution tubing
6. Sprayer
7. Flow-through heating
8. Thermocouple for temperature monitoring
9. Humidity sensors
10. Insulation

Engineering Analysis



Category	Detail	Unit Efficiency Factor		
		Current ENERGY STAR	V.4.0, 2011 ENERGY STAR	Proposed Draft 1 Version 5.0
Insulation by Location	Cavity-Top & Sides	Yes	Yes	Yes
	Cavity-Back	Yes	Yes	Yes
	Cavity-Bottom	No	No	Yes
	Door	No	Yes	Yes
Water System	# of Main Pump Speeds	3	3	1
	Water Supply Tubing Loc.	Exterior	Exterior	Interior
	Water Meter	No	No	Yes
	Multi-Spray / Diverter Valve	Yes	Yes	No
	Float Switch	Yes	Yes	No
	Sump Pressure Transducer	No	No	No
Sprayers by Cavity Location and Type	Bottom	Plastic 3-Arm	Plastic 3-Arm	Stainless 2-Arm
	Middle	Plastic 2-Arm	Plastic 2-Arm	Stainless 2-Arm
	Top	Plastic 2-Arm	Plastic 2-Arm	None
Heating	Heater Type	Tubular	Tubular	Flow-Through
Controls	Type	Electronic	Electronic	Electronic
	Thermocouple	Yes	Yes	Yes
	Soil Sensor	Yes	Yes	No
	Humidity Sensor	No	No	No
	Vent Technology	Active Door Vent	Fan-Assisted Vent	None



Draft 1 Levels: Justification



- As of August 2010, 10% of standard models on the QP list meet Draft 1 V 5.0 levels (based on listed values)
 - Tested kWh/year and gallons/cycle values are lower than listed values and indicate that more models can already meet proposed spec levels
- Cost-effective for consumers with paybacks of 5-7 years
- EPA expects number of models that can meet the proposed levels will be higher when final V5.0 specification takes effect approximately 1 year from now



Items for Discussion



Is EPA's dataset representative of the marketplace? Are there other considerations that should be taken into account in EPA's analysis?



Cleaning Performance Test



Cleaning Performance



- EPA is considering including a cleanliness requirement test to ensure that ENERGY STAR qualified dishwashers do not sacrifice on performance
- EPA's goal is to set a pass-fail requirement for cleaning performance
- A number of issues need to be addressed before a cleaning performance requirement and test can be incorporated



Cleaning Performance Tests



- EPA has identified the following cleaning performance and sanitation tests:
 - AHAM-DW-1-2009
 - AHAM-DW-1-1992 (*cited by DOE test procedure for energy and water consumption*)
 - IEC 60436 3rd Edition (2004-02)
 - NSF 184 2003 (Issue 8, Revision 1)
 - Consumers' Union
 - Good Housekeeping



AHAM DW-1-2009



	AHAM DW-1- 2009
Number of Soils	10 soils air dried for 2 hours
Load Size	At least 10 place settings
Water Hardness	0 to 85 ppm calcium chloride
Cycle	Normal
Detergent	.5% concentration of national formula or equivalent
Rinse Aid	As recommended by manufacturer
Scoring System	Elaborate
Reference Model	No
No. of Trials	≥3 for comparison
Acceptance Criteria	None



IEC 60436 3rd Edition



	IEC 60436 3 rd Edition
Number of Soils	7 soils; oven and air dry
Load Size	Dependent on type
Water Hardness	Whatever is acceptable in USA
Cycle	Normal
Detergent	$\leq 15.0 + 1.25$ g per place setting
Rinse Aid	Required
Scoring System	0-5 scoring system
Reference Model	Yes
No. of Trials	5 to 12 (>8 if manual filter dishwasher)
Acceptance Criteria	Average of scores across trials must be below threshold



NSF 184 2003



	NSF 184 2003 (Issue 8, Revision 1)
Number of Soils	1
Load Size	Dinner plates, glasses, and dinner forks specified in AHAM DW-1
Water Hardness	4 to 200 ppm calcium chloride
Cycle	As specified by manufacturer
Detergent	Leading brand if $\geq 25\%$ of US market
Rinse Aid	As recommended by manufacturer
Scoring System	N/A
Reference Model	No
No. of Trials	2 if soil is visible after first trial
Acceptance Criteria	Visibly Clean



CU & Good Housekeeping



- Consumers Union
 - Test is proprietary
 - Manufacturers already have/use parts of this test
 - Labor intensive
 - Concerns raised over the replication of results
- Good Housekeeping
 - Proprietary test
 - No longer under consideration



Items for Discussion - Method



What cleaning performance test method should EPA cite? What are the strengths and weaknesses of the current cleaning performance test protocols? How could weaknesses be addressed? What metric for cleaning performance should the EPA use?

Should EPA consider allowing more than one cleaning performance test? If so, how could EPA assure comparable cleaning performance is achieved? What metric for cleaning performance should the EPA use?



Items for Discussion - Scoring



Assuming the EPA adopts the cleaning performance test method(s) and metric recommended in response to the previous questions, what cleaning performance 'score' should dishwashers receive to be eligible for ENERGY STAR qualification?

Is data available showing that certain test scores accurately predict consumer satisfaction with product cleaning performance?

Is there a certain tolerance EPA should consider establishing to account for qualitative differences in cleaning performance scoring that impact the final, quantitative score?



Next Steps

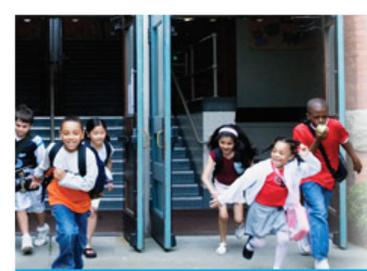


Anticipated Timeline



November 10, 2010	Comment period closes on Draft 1 specification <i>[Extended 1 week]</i>
Nov.-Dec. 2010	Draft 2 specification proposed; stakeholder meeting or webinar; and comment period.
Early 2011	Final Draft specification proposed; stakeholder meeting or webinar; and comment period.
February 28, 2011	Final specification posted
Late Fall 2011	Final specification effective

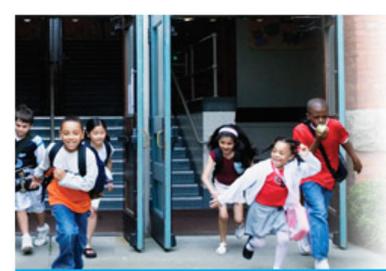
- Cleaning performance component may be finalized after February 2011
- Discussion on smart grid component may also extend beyond February 2011



Action Items



- **Stakeholders to provide comments and feedback by Nov. 10th, including:**
 - Version 5.0 cost and/or incremental cost data to EPA
 - Consumer feedback and/or data related to phosphate-free detergent
 - Information/data regarding the any potential benefits and costs to consumers, associated with “smart” appliances
 - Data showing the distribution of performance scores from testing with AHAM DW-1 and any data showing how these scores may correlate with consumer satisfaction
 - Data regarding consumer behaviors, such as pre-rinsing, to assist EPA in the development of savings tips for consumer messaging
 - Further information regarding repeatability concerns in cleaning performance testing and ideas for how EPA could address these concerns
 - Feedback and/or data about benefits or considerations of using a reference model as part of a dishwasher cleaning performance test (in US and Europe)



Action Items (cont'd)



- AHAM to provide comments/feedback on tax credit levels
- AHAM to provide feedback to EPA on some alternative language for the product family definition
- AHAM to assist with fast-tracking updates to AHAM DW-1 cleaning performance test procedure, as needed
- AHAM to provide comments as to the strengths and weaknesses of the cleaning performance test procedures

- EPA/ICF to post presentations from today's sessions online
- EPA to review forthcoming PNNL analysis that AHAM/Advocates will be providing in support of their proposal to ENERGY STAR on Smart Appliances and engage with stakeholders on proposed treatments of "smart" in ENERGY STAR specifications
- EPA to consider conducting round robin testing as it examines possible cleaning performance tests
- After reviewing all stakeholder comments, EPA will develop a second draft specification and host a second stakeholder meeting/webinar to discuss and receive comments, likely in November/December 2010



Items for Discussion



Currently, EPA is targeting an effective date in the fall of 2011. EPA requests comment on this target effective date.



Comment Period



- EPA welcomes all partner and stakeholder comments by **November 10, 2010**
- Comments should be submitted in writing to appliances@energystar.gov



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