

# Market Impact Analysis on the Potential Revision of the ENERGY STAR<sup>®</sup> Criteria for Dishwashers

## **Background and Current ENERGY STAR Criteria for Dishwashers:**

The ENERGY STAR criteria for residential dishwashers were last revised on January 1, 2007. The current criteria require all ENERGY STAR qualified standard size dishwashers to have a minimum Energy Factor (EF) of 0.65 and all ENERGY STAR qualified compact dishwashers to have a minimum EF of 0.88. The Federal standard for standard size dishwashers has been in effect since May 14, 1994, and is a minimum EF of 0.46, so the ENERGY STAR criteria is approximately 41% better than the Federal standard. The Federal standard for compacts also took effect on May 14, 1994, and is a minimum EF of 0.62, so the ENERGY STAR criteria is also just above 41% better than the Federal standard.

Revising ENERGY STAR criteria is often critical to protecting the value of the ENERGY STAR brand and ensuring its continued relevance in the marketplace. ENERGY STAR criteria are designed to consider and balance a varied set of objectives, including ensuring that the established criteria:

- Provide meaningful differentiation between ENERGY STAR qualified products and those that just meet the Federal standard.
- Will result in significant energy savings, both for consumers and the nation as a whole.
- Are cost-effective for manufacturers as well as consumers.
- Provide ample consumer choice, both in terms of number of models and a wide range of manufacturers.
- Do not compromise functionality or performance of the qualified product.
- Do not rely on proprietary technologies of one or a small set of manufacturers.

The Energy Independence and Security Act of 2007 (EISA) establishes new Federal standards for dishwashers. All standard dishwashers manufactured on or after January 1, 2010, shall not exceed 355 kWh/year and 6.5 gallons per cycle. All compact dishwashers manufactured on or after January 1, 2010, shall not exceed 260 kWh/year and 4.5 gallons per cycle. The shifting of the metric for measuring energy efficiency from EF to kWh/year is intended to account for standby power. The 355 kWh/year is the equivalent of an EF of 0.62 (347 kWh/year) plus the 8 kWh/year that a 1 watt dishwasher will use in standby mode. This allows for standby power, but regulates the maximum standby power that a machine with minimum active power efficiency can use.

The inclusion of water consumption in the Federal standard also marks the first time that water efficiency has been included in a DOE dishwasher standard. Both standby power and water consumption were suggested as possible areas for ENERGY STAR to include during the public comment period for the current ENERGY STAR criteria.

## **Key Market Indicators**

A crucial element to the ENERGY STAR criteria revision process is to identify all key market indicators that may influence the guiding criteria principles or objectives. The Department examines the current retail market and technology trends to identify all supporting evidence or potential limitations to increasing the ENERGY STAR criteria.

### *Dishwasher Market Share:*

The existing dishwasher market includes 21 different manufacturers that produce a total of 948 dishwasher models under a total of 58 brands. Of these 948 models, 655 or 69% of the available models are ENERGY STAR qualified. Seven manufacturers' entire dishwasher product lines are ENERGY STAR qualified.

Full sales data is not yet available from all retailers for any quarter of 2007. However, the available data suggests that for all of 2007, the market share of ENERGY STAR qualified dishwasher sales was approximately 60%. There are no indications that this number is inaccurate or has changed dramatically for 2008, however, without a criteria change it is expected based on historical trends and partner feedback that the market share will increase over time.<sup>1</sup>

### *Retail Price Trends:*

The price premium for ENERGY STAR qualified dishwashers as compared to non-qualified dishwashers historically was estimated at \$30-\$50. Before the 2007 criteria revision, the price premium was virtually non-existent since nearly all available products were ENERGY STAR qualified. Today the least expensive models are not ENERGY STAR qualified, but ENERGY STAR qualified models are available for only \$20-30 more than the least expensive models.

Currently the least expensive models that have an EF of at least 0.68 cost \$399 at major retailers. The least expensive models that have an EF of at least 0.72 cost \$499 at major retailers. Models meeting the 0.72 level are available as low as \$350 from other retailers. It is expected that the prices for ENERGY STAR qualified products would be lower by the time the criteria take effect.

### *Water:*

Water consumption has never been included in the ENERGY STAR criteria for dishwashers. However, the new Federal standard includes a maximum water consumption of 6.5 gallons per cycle, and stakeholders have recommended a water factor requirement for ENERGY STAR as well. Since approximately 56% of all dishwasher energy use is for water heating, any increase in energy efficiency will normally be accompanied by an increase in water efficiency, since the easiest way to reduce dishwasher energy use is to reduce the amount of water that must be heated. Additionally, adding a water metric substantiates the water savings claims and allows partners to promote ENERGY STAR qualified dishwashers as both water efficient and energy efficient.

### *Standby Power:*

In 2003, DOE incorporated a standby power requirement into the Federal dishwasher test procedure to comprehensively address annual energy use for the EnergyGuide label since EF only addresses per cycle consumption. The new Federal standard also measures dishwasher energy use by overall kWh/year including standby power. The assumption for the Federal standard is a minimum Energy Factor of 0.62 plus 1 watt of standby power for a total of 355 kWh/year (347 kWh/year from active power and 8 kWh/year from standby power).

Of the 948 models in the ENERGY STAR product database:

- 581 have some standby power usage.
- 217 models show standby power usage of less than or equal to 1 watt (8 kWh/year).
- The highest standby power use is 39 kWh/year but only 10 models have standby power above 20 kWh/year.

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<sup>1</sup> DOE anticipates the market share will increase based on historical trends and anecdotal information from partners. Interested stakeholders are encouraged to provide any additional non-confidential information to support this analysis. Any new information will be used in subsequent analysis.

- Of the 150 models with a standby power usage of more than 1 watt, 85 are currently ENERGY STAR qualified. Only 59 would be qualified with a minimum EF of 0.65 and a standby power requirement of 1 watt or less (a maximum energy use of 339 kWh/year).

### Market Effects of Potential ENERGY STAR Dishwasher Criteria Levels

**TABLE 1: Number of Dishwashers Available per Energy Factor – by Brand**

Energy Factor (EF)	Number of Products Available at Minimum Energy Factor (cycles/kWh)						
	Current Federal Standard	Current ENERGY STAR EF level	Potential ENERGY STAR EF level	Potential ENERGY STAR EF level	Potential ENERGY STAR EF level	Potential ENERGY STAR EF level	Potential ENERGY STAR EF level
<b>Energy Factor (EF)</b>	<b>0.46</b>	<b>0.65</b>	<b>0.68</b>	<b>0.70</b>	<b>0.72</b>	<b>0.74</b>	<b>0.76</b>
Ariston	6	6	6	6	6	6	6
Asko	21	21	21	21	21	21	21
Blomberg	50	50	0	0	0	0	0
Bosch	102	80	80	56	44	44	40
Crosley	7	1	0	0	0	0	0
Dacor	11	7	7	6	6	2	2
Danby	4	4	4	4	4	4	4
DCS	1	1	1	1	1	0	0
Electrolux	6	5	5	4	0	2	0
Equator	7	5	2	2	2	0	0
Estate	10	2	0	0	0	0	0
EuroDesign	7	7	0	0	0	6	0
Eurotech	6	6	6	6	6	0	0
Fagor/Heartland	14	14	0	0	0	0	0
Fisher and Paykel	2	1	1	1	1	0	0
Frigidaire	56	40	27	8	8	0	0
Gaggeneau	8	4	4	4	4	4	0
General Electric	103	41	6	4	4	2	2
Haier	19	11	11	11	11	11	11
Hotpoint	13	6	0	0	0	0	0
Ikea	6	4	2	2	0	0	0
Inglis	11	4	2	2	0	0	0
Jenn-Air	14	12	0	0	0	0	0
Kenmore	152	105	51	18	6	0	0
KitchenAid	30	25	4	1	1	0	0
Kuppersbusch	3	1	1	1	1	1	1
LG Electronics	9	9	9	9	7	3	1
Magic Chef	4	0	0	0	0	0	0
Maytag/Amana	48	36	5	3	0	0	0
Midea	14	14	7	4	4	3	2
Miele	29	17	14	2	1	0	0
Monogram	9	5	1	1	1	0	0
Porter and Charles	3	3	0	0	0	0	0
Profile	29	13	6	0	0	0	0
Roper	8	2	0	0	0	0	0
Samsung	2	2	2	0	0	0	0
Siemens	5	2	2	2	2	2	0
Silhouette	5	3	1	0	0	0	0
Smeg	6	6	2	1	1	0	0
Summit Professional	1	1	0	0	0	0	0
Sunbeam	7	7	0	0	0	0	0
Thermador	10	6	6	4	4	4	0
Viking	2	2	2	2	2	2	2
Vintage	3	3	0	0	0	0	0
Whirlpool	85	61	30	5	1	0	0
<b>Total Number of Products</b>	<b>948</b>	<b>655</b>	<b>328</b>	<b>191</b>	<b>149</b>	<b>117</b>	<b>92</b>
<b>Percent of Available Models</b>	<b>100%</b>	<b>69%</b>	<b>35%</b>	<b>20%</b>	<b>16%</b>	<b>12%</b>	<b>10%</b>

## **Partner Feedback**

In the month of May, D&R International spoke to most major stakeholders on behalf of the Department of Energy. The nearly unanimous consensus was that the ENERGY STAR criteria should not be raised to a level where it may be difficult to offer effective dishwashers at all price points. The risk is that manufacturers may need to sacrifice cleaning performance in order to produce qualified models at price points required by retailers. Due to the increase in retailer promotions of ENERGY STAR qualified appliances and the high market share of ENERGY STAR qualified dishwashers, retailers now require manufacturers to produce a certain percentage of ENERGY STAR qualified dishwashers. Retailers will not allow a decrease in the market share of ENERGY STAR qualified dishwashers to the sub-30% range that existed for the first few years of the ENERGY STAR program for dishwashers.

At the 2005 ENERGY STAR dishwasher stakeholder meeting, one manufacturer proposed adding a performance requirement to the ENERGY STAR criteria. Stakeholders were asked in May about the possibility of adding performance to the criteria for the current criteria revision. The industry consensus is that the only current industry-wide performance standard (AHAM DW-1) is obsolete and not representative for current dishwashers. Most manufacturers have developed their own performance tests. It would take years of effort to develop a consensus performance test that would be agreeable to all manufacturers. Therefore, the Department is not including performance in the proposed criteria and trusts industry to protect their brands and the ENERGY STAR brand by releasing products that perform as well as current models. Performance tests are also very expensive for manufacturers to administer.

Another factor limiting the ability of ENERGY STAR to push the minimum efficiency requirement is the 2010 ban on most phosphates in dishwasher detergent that takes effect in several states including Washington, Maryland, Virginia, and Indiana, and is being considered in many other states. This ban will effectively require all detergents to contain less than 0.5% phosphates by July 1, 2010. Detergent manufacturers and dishwasher manufacturers are working to develop new soaps and cleaning methods, but the effects on efficiency are not yet known. Most manufacturers and one detergent manufacturer all expressed concerns that setting a high minimum ENERGY STAR criteria before the development of the new phosphate-free detergents could also have an adverse impact on cleaning performance and the ability of manufacturers to offer qualified units at affordable price points.

## **Potential ENERGY STAR criteria**

The Department proposes raising the minimum ENERGY STAR criteria for standard-size dishwashers to a maximum of 324 kWh/year effective July 1, 2009 and to a maximum of 307 kWh/year effective July 1, 2011. The 324 kWh/year allows for a minimum EF of 0.68 with 1 watt of standby power and the 307 kWh/year allows for a minimum EF of 0.72 with 1 watt of standby power. The Department also proposes establishing a maximum water consumption of 5.8 gallons per cycle effective July 1, 2009 and a maximum water consumption of 5.0 gallons per cycle effective July 1, 2011. This water requirement will guarantee that all ENERGY STAR qualified dishwashers will use at least 10% less water than dishwashers meeting the new Federal standard. These criteria also align with proposed production tax credits for standard size models. The Department also proposes new compact dishwasher criteria of a maximum of 234 kWh/year allows for a minimum EF of 0.95 with 1 watt of standby power and a maximum water consumption of 4.0 gallons per cycle effective July 1, 2009, and a maximum of 222 kWh/year allows for a minimum EF of 1.00 with 1 watt of standby power and a maximum water consumption of 3.5 gallons per cycle effective July 1, 2011.

Proposed New ENERGY STAR Criteria	Maximum Energy Use		Maximum Water Use	
	July 1, 2009	July 1, 2011	July 1, 2009	July 1, 2011
Standard Size	324 kWh/year	307 kWh/year	5.8 gallons per cycle	5.0 gallons per cycle
Compact Size	234 kWh/year	222 kWh/year	4.0 gallons per cycle	3.5 gallons per cycle

The proposed effective dates of the new criteria should allow manufacturers time to prepare for the new levels and also transition to the new criteria at a time when manufacturers tend to introduce new product lines for the year.

### **Potential Savings**

Assuming the proposed ENERGY STAR criteria take effect on July 1, 2009, they are expected to save 168,000 MWh, 5.1 million therms, and 452 million gallons of water for the second half of 2009. The savings decrease in subsequent years due to the new Federal standard taking effect on January 1, 2010, but by 2012, the annual savings are expected to be 119,000 MWh/year, 6.3 million therms per year, and 1.13 billion gallons per year. These savings assume an estimated 50% market share for qualified models, 59% gas water heating versus 41% electric water heating, and compare the minimum ENERGY STAR qualified unit to the minimum non-qualified unit.

Year	ENERGY STAR Qualified Dishwasher Sales	Unit Savings (kWh/year)	Unit Savings (therms /year)	Unit Savings (gallons/ year)	National Savings (MWh/year)	National Savings (therms/year)	National Savings (gallons/year)
2009	1,750,000	96	2.9	258	168,000	5.1 million	452 million
2010	3,500,000	21	1.2	151	73,500	4.2 million	529 million
2011	3,500,000	28	1.5	237	98,000	5.3 million	830 million
2012	3,500,000	34	1.8	323	119,000	6.3 million	1.13 billion

### **Summary**

With the upcoming Federal standard revision and the need to create differentiation in the marketplace, it is evident the ENERGY STAR criteria for dishwashers need revision. The Department proposes new standard size dishwasher criteria of 324 kWh/year and 5.8 gallons per cycle and new compact dishwasher criteria of 234 kWh/year and 4.0 gallons per cycle effective July 1, 2009. The Department also proposes new standard size dishwasher criteria of 307 kWh/year and 5.0 gallons per cycle and new compact dishwasher criteria of 222 kWh/year and 3.5 gallons per cycle effective July 1, 2011. The Department feels that setting more stringent criteria for 2009 is premature at this time due to the uncertainty over the technical potential of dishwashers and the detergent change. Pushing the criteria to higher levels may affect performance and cause consumers to switch to more energy-intensive behavior such as pre-washing, second washing, or using other cycles. Delaying a more aggressive change to 2011 should allow for manufacturers to adapt to the new criteria and the new detergents. Stakeholders are encouraged to submit public comments by September 15, 2008 to Richard Karney at [Richard.Karney@EE.DOE.GOV](mailto:Richard.Karney@EE.DOE.GOV). All comments will be posted at [http://www.energystar.gov/index.cfm?c=revisions.revisions\\_specs](http://www.energystar.gov/index.cfm?c=revisions.revisions_specs)