



October 15, 2004

Rich Karney  
ENERGY STAR Program Manager  
US Department of Energy  
1000 Independence Avenue SW  
EE2J  
Washington, DC 20585

Dear Rich:

The CEE Residential Appliance Committee (Committee) respectfully submits the following comments to the Department of Energy regarding the 2007 ENERGY STAR clothes washer criteria. The Committee comprises CEE-member energy efficiency program managers that support the national ENERGY STAR Program locally through rebates, education, and other strategies. CEE also invited select water efficiency program managers to participate in the Committee as it developed these comments. A list of the organizations that have developed and support these comments is given on page 16.

## **Background**

On the ENERGY STAR web site, the program is described as “a government-backed program helping businesses and individuals protect the environment through superior energy efficiency.” The question that is now facing the program is, “How does one define superior?” The CEE Appliance Committee would like to share its own proposed definition, which has been developed through a six-month iterative process involving stakeholders from two of ENERGY STAR’s key constituent groups: energy and water efficiency programs.

The Committee’s proposed definition for energy- and water-efficient residential clothes washers is given below, in Table 1. These levels are the outcome of the Committee’s diligent efforts to develop a recommendation that meets the following objectives:

- To ensure consumer energy savings above the 2007 Federal Minimum Standard Level of 1.26 MEF
- To ensure consumer water savings above the 2007 shipment-weighted average
- To enable continued cost-effective support for ENERGY STAR-qualified clothes washers by energy- and water-efficiency programs
- To recognize the movement in the market toward greater efficiency that has occurred since the ENERGY STAR specification was last revised
- To provide manufacturers with a platform to market their highest-efficiency products

**Table 1: Proposed ENERGY STAR Criteria**

Modified Energy Factor (MEF)	Water Factor (WF)
1.8	7.5

This level, which corresponds to the current CEE Tier 3A, has achieved significant traction in the market over the last few years, as is shown below. This comment letter provides DOE with the findings of Committee research, which were carefully considered in coming to a final recommendation. By sharing this information, the Committee hopes to provide justification for its proposal and to add value to DOE's specification revision process.

## **Information Sources and Scope**

CEE staff performed a number of analyses on the above proposed MEF and WF levels. These are summarized below in sections entitled, "Energy Analyses," "Water Analyses," "Price and Efficiency," and "Manufacturers, Brands, Models." Information for these analyses was drawn from efficiency program records, CEE research, and from the recent clothes washer rulemaking.

The efficiency programs listed below provided information for these analyses. They offered consumer rebates to support the purchase of over 132,000 efficient clothes washers in 2003, and submitted data to CEE staff on each of those rebates. A subset of programs provided data on nearly 20,000 rebates for the first half of 2004.

**Table 2: Efficiency Program Data Sources**

Alliant Energy-Interstate Power and Light Co.
Cape Light Compact
City of Austin
Efficiency Vermont
Unitil: Fitchburg Gas & Electric
Long Island Power Authority
Minnesota Department of Energy
Massachusetts Electric/Nantucket Electric
Narragansett Electric
Nevada Power/Sierra Pacific Power
New Hampshire utilities
Connecticut Light & Power
Northwest Energy Efficiency Alliance
NSTAR
NYSERDA
Oregon Office of Energy
Pacific Gas & Electric
Puget Sound Energy
Sacramento Municipal Utility District
San Diego County Water Authority
Seattle Public Utilities
The United Illuminating Company
Western Massachusetts Electric
Wisconsin Division of Energy

## Scope

The analyses presented in this comment letter review the state of the residential clothes washer market in 2003 and 2004. They review the characteristics of models on both the CEE and ENERGY STAR qualifying products lists over that time period.

Due to the fact that combination washer/dryers have different applications than washer-only models, combination units are not considered in these analyses. Combination washer/dryers account for 12 of the total 137 washers for which information is available. Thus, the analyses were performed on a total of 125 models. Their exclusion should ensure that the research is not “skewed” by products that perform differently than the majority of models sold. The average MEF of the 12 combination washer/dryers that were removed is 1.88, and the average WF is 6.02. The average price of the combination units is \$1,168.39.

## Energy Analyses

### Baseline MEF

As DOE is well aware, the current Federal Minimum Standard is 1.04 MEF, set to increase to 1.26 in 2007. This minimum standard governs the efficiency of all washers sold. However, the installed base of clothes washers is markedly less efficient. A report completed in California in 2000 (California Residential Appliance Saturation Report) demonstrated that the average statewide Energy Factor for clothes washers was 1.26 (approximately 0.87 MEF), in contrast with the federal standard of the time of EF 1.18 (0.817 MEF). Assuming a 5% improvement in the installed base of washers since 2000 (to .91 MEF), see Table 3 for a comparison that demonstrates the wide range of performance.

**Table 3: MEF Comparison**

Federal Standard	Assumed Installed Base	% Difference from current standard	Most Efficient Unit	% Difference from current standard
1.04 MEF	0.91 MEF	- 12%	2.5 MEF	+ 92%

### Technical Potential - Energy

The Technical Support Document (TSD) for the 2001 clothes washer rulemaking considers efficiency levels up to 1.634 MEF. This represents a 50% improvement over the previous minimum standard, and was the highest level that DOE wished to explore for a *standard*. However, this performance level is certainly not the highest level appropriate for a *voluntary* specification. For example, the current CEE specification includes two tiers with MEF levels at 1.8. The significant amount of program activity that occurs at these levels is discussed below.

The energy efficiency of currently available models (up to 2.5 MEF as listed above) demonstrates the feasibility of improvements far beyond those researched by DOE for the standard. Unfortunately, CEE staff found no additional technical potential research had been undertaken since the rulemaking was completed. The Committee believes that the high level of energy efficiency achieved by currently available products is indicative of substantial technical

improvement by manufacturers in recent years, which should be recognized in the 2007 ENERGY STAR criteria.

### ***Annual Energy Savings***

The following table (Table 4) demonstrates the annual kWh savings associated with various MEF levels as compared to a 2007 standard washer. Because capacity can be a confounding factor, the savings estimates below are capacity-neutral, using a 2.96 ft<sup>3</sup> washer as an average.

**Table 4: Annual Energy Savings Estimates**

MEF	Savings Over 2007 Baseline (kWh)
1.8	276
2.0	341
2.2	393

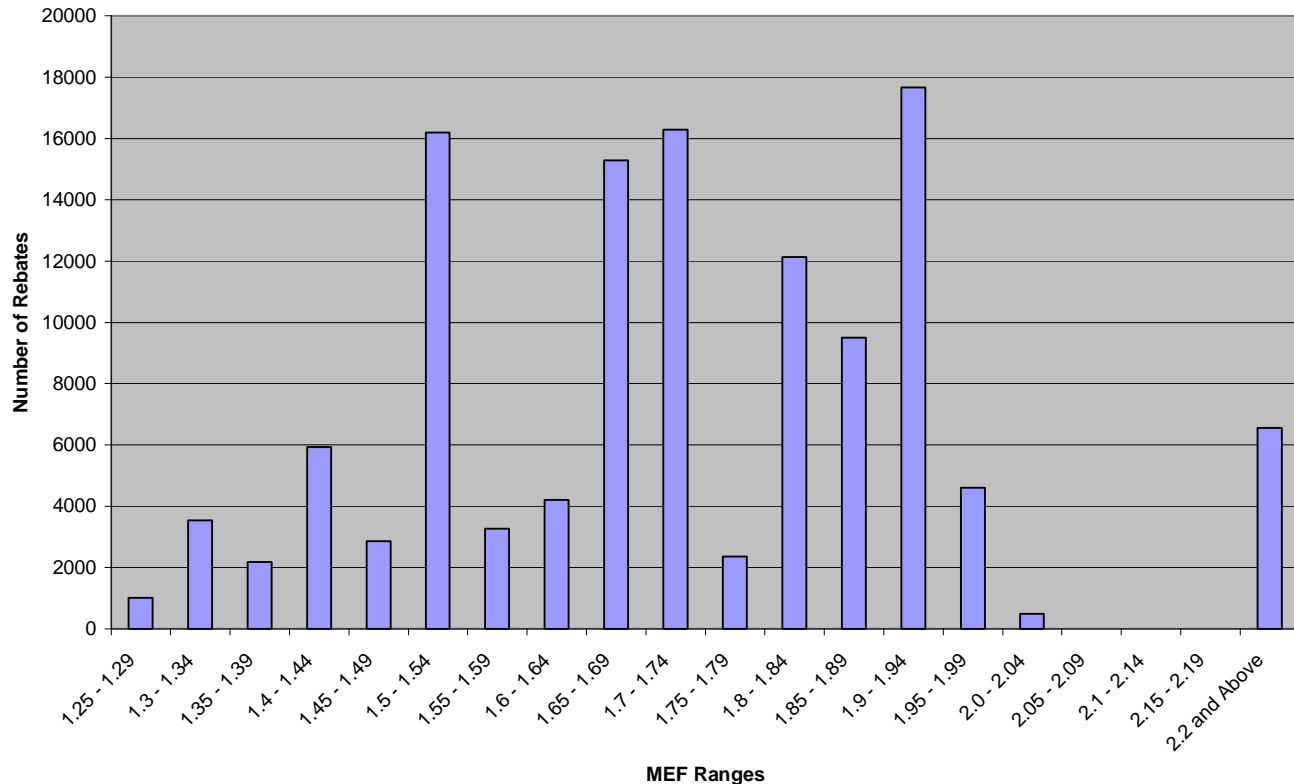
Committee participants discussed the level of savings needed to justify efficiency program cost-effectiveness. Several stated that those delivered by a 1.8 MEF level should enable programs to meet cost-benefit hurdles set by program regulators.

### ***2003 Efficiency Program Activity – MEF***

To help demonstrate the feasibility of the proposed 1.8 MEF level, Committee members submitted data on the rebates they issued in 2003. Information was received from the programs listed in Table 2, above. Chart 1 shows the distribution of products across various MEF ranges, with the largest number of rebates given at the following MEF levels: 1.5, 1.65, 1.7, and 1.9.

## Chart 1: 2003 Rebates by MEF

2003 Rebates by MEF Ranges



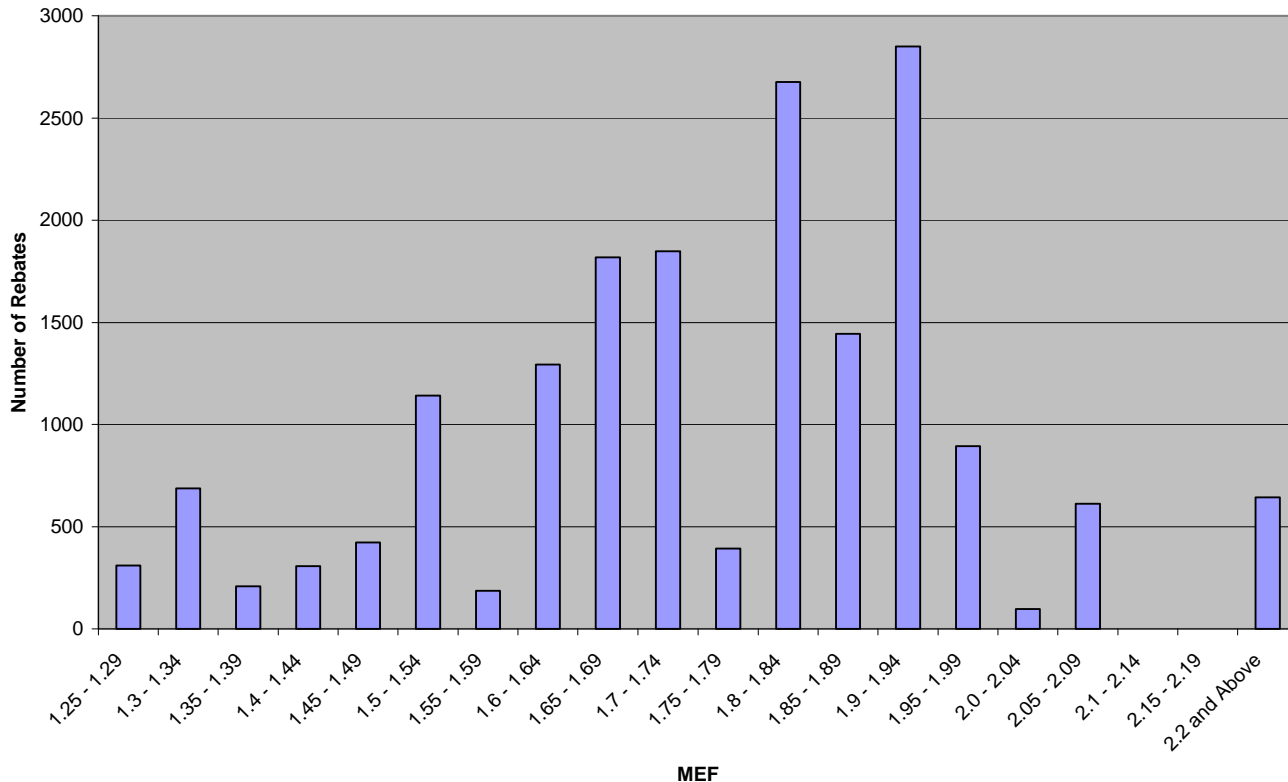
### 2004 Efficiency Program Activity – MEF

For comparison, several Committee participants submitted data for the first half of 2004. Data were received from PG&E, SMUD, and the City of Austin. The total number of rebates issued by those three programs between January and June 2004 was over 19,000. While admittedly a smaller number of models than was shown in Chart 1, the distribution of these models across various MEF ranges is a useful indicator of general program trends. Chart 2 shows this distribution.

Note the amount of activity at the 1.8 and 1.9 MEF levels as compared to 2003. In addition, a noted decrease in the relative amount of activity at the 1.5, 1.65, and 1.7 MEF levels can be seen.

## Chart 2: 2004 Rebates by MEF

2004 Rebates by MEF Ranges



## Water Analyses

The Committee applauds DOE's decision to consider Water Factor (WF) for inclusion in the 2007 criteria. WF is a proven component of the CEE clothes washer specification. Water efficiency was established as a criterion on equal footing with energy efficiency when the CEE specification was first developed in the late 1990s. Since that time, the component has enabled significant levels of participation by water utilities. In addition, manufacturers seem to have found the WF requirement to be helpful in differentiating their products; as stated below, one manufacturer asked CEE to develop a more stringent WF requirement during a recent specification revision.

### Baseline WF

Information on baseline WF is very difficult to obtain. CEE has an estimate provided by the Association of Home Appliance Manufacturers (AHAM) in 1996 that shows the baseline WF to be 13.3. In its Technical Support Document for the clothes washer rulemaking, DOE used a baseline WF estimate of 13.779, also said to have been provided by AHAM. However, in recent comments to the California Energy Commission, AHAM asserted that the projected shipment weighted average for 2004 was likely to be 10.81.

Due to the uncertainty surrounding these estimates and the lack of additional information, CEE staff averaged these three values for the purposes of the analyses. The following analyses use an estimated baseline WF value of 12.63 (which translates to 14,655 gallons/yr when using 392 cycles/yr and a capacity of 2.96 ft<sup>3</sup>).

### ***Technical Potential – Water***

CEE staff reviewed studies for information on the technical potential of water-efficient clothes washers, yet found no research on the topic. In place of a technical assessment, the Committee has considered the most water-efficient washer available, which has a WF level of 3.89.

Committee discussions also included consideration of the significant recent advances in water efficiency. In 2002, CEE first established tiers for WF that identified products below 11.0 and 9.5 WF. These were established at 8.5, 7.5, and 5.5 WF. The 5.5 WF level was established at the request of industry. At the time, no products met the 5.5 hurdle. Now, however, 18 products do so.

### ***Annual Water Savings***

As in the above example on energy savings, the following table demonstrates the annual water savings (in gallons) associated with various WF levels. These estimates were calculated using a 2.96 ft<sup>3</sup> capacity estimate, 392 cycles/year, and baseline water use of 14,468 gallons/yr.

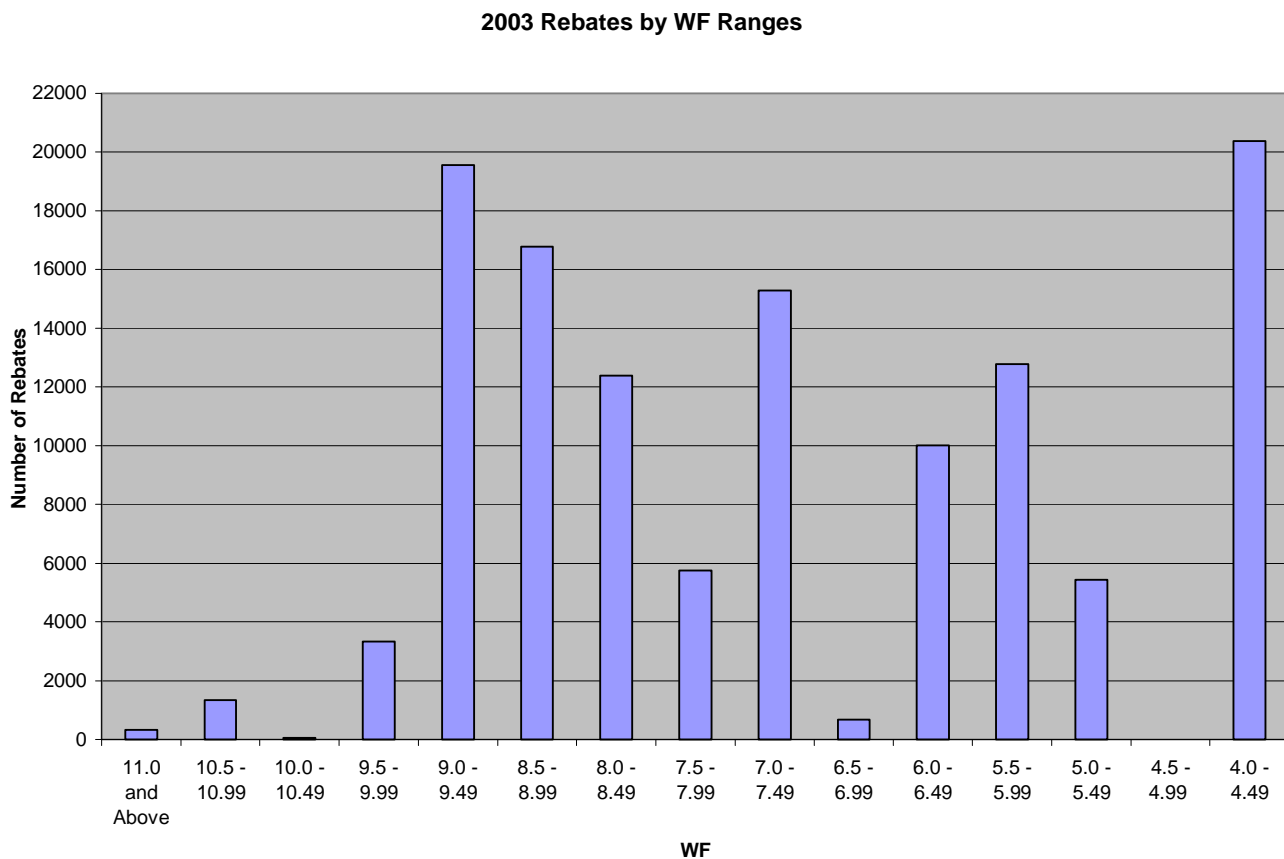
**Table 5: Annual Water Savings Estimates**

WF	Savings Over Baseline (gallons)
7.5	5,952
6.0	7,693
4.5	9,433

### ***2003 Efficiency Program Activity – WF***

Chart 3 contains data on the number of rebates given in 2003 at various WF levels. Note the level of program activity at the highest WF level (4.0-4.49 WF).

### Chart 3: 2003 Rebates by WF

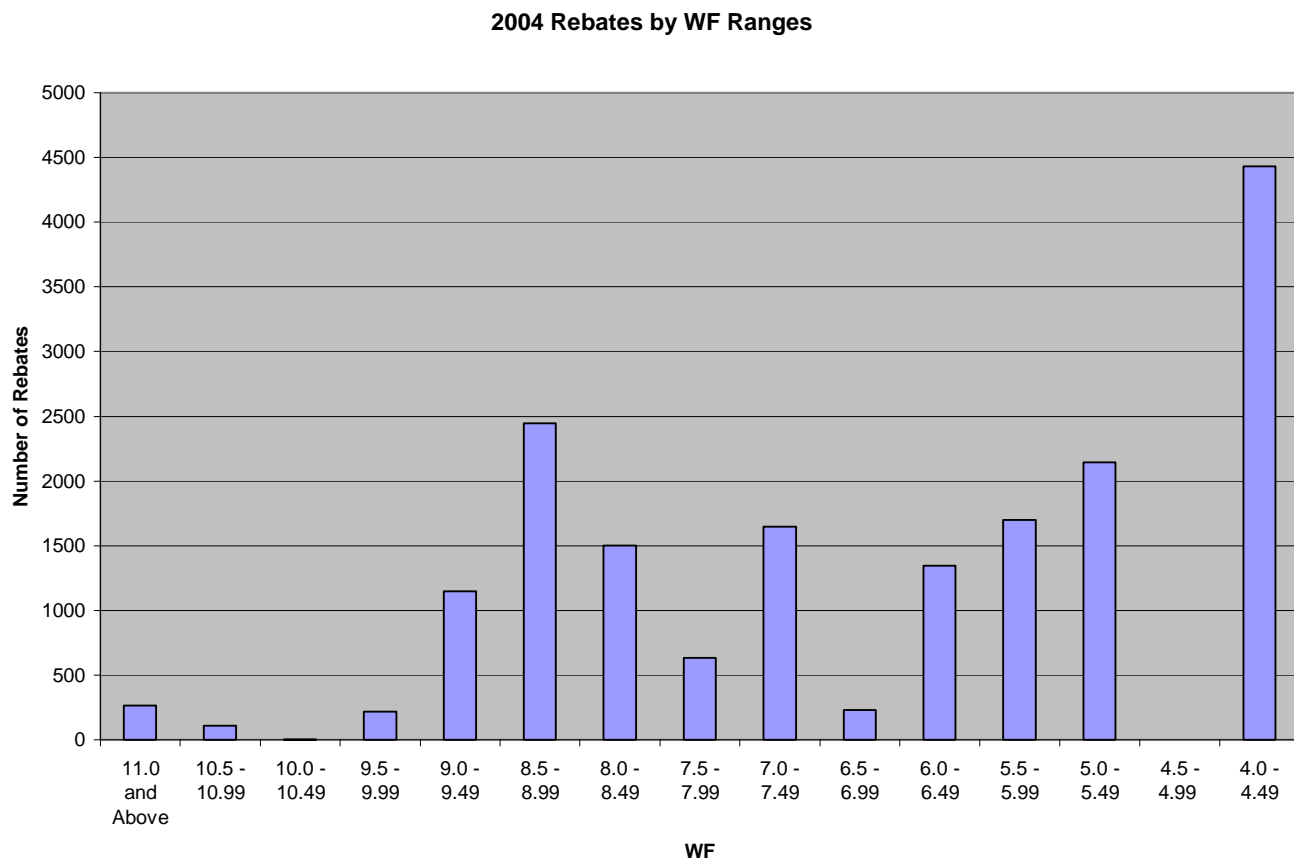


### ***2004 Efficiency Program Activity – WF***

As in the energy example given in Chart 2, CEE analyzed program data for the first half of 2004 from PG&E, SMUD, and the City of Austin. Chart 4 shows the distribution of over 19,000 products across various WF ranges. As in the 2003 Chart, there is substantial activity at the most efficient WF levels. The amount is even more striking in the 2004 data due to the relative decrease in activity at the 9.0 WF level.



**Chart 4: 2004 Rebates by WF**



### ***Energy Embedded in Water***

To develop a more robust estimate of savings associated with DOE's potential implementation of a Water Factor requirement within the ENERGY STAR criteria, CEE staff researched the amount of energy savings embedded in the water savings of efficient clothes washers (e.g. energy saved by pumping and treating less water). This question has been examined most carefully in California as part of a process to incorporate WF into state standards. In a December 2003 comment letter regarding the standards, PG&E stated that data collected from California, Idaho, Oregon, and Texas suggest that an embodied energy rate of approximately 3.0 kWh per thousand gallons is typical of most states, and that 5.5 kWh per thousand gallons is appropriate for California.

The following table (Table 6) contains estimates of the energy savings associated with several WF ranges using the national estimate of 3.0 kWh per thousand gallons. While the numbers may seem small compared to the energy savings noted in Table 4, they represent an average savings of 21.3 additional kWh. On the average, this is equivalent to boosting the savings delivered from MEF alone by over 5%. Energy savings associated with the CEE-recommended WF level of 7.5 are 17.9 kWh annually.

**Table 6: Embedded Energy Estimates**

WF Level	Average Savings (gal/yr)	kWh Savings from WF
Baseline 12.63		-
9.0	4,212	12.6
8.5	4,792	14.4
8.0	5,372	16.1
7.5	5,952	17.9
7.0	6,533	19.6
6.5	7,113	21.3
6.0	7,693	23.1
5.5	8,273	24.8
5.0	8,853	26.6
4.5	9,433	28.3
4.0	10,014	30.0

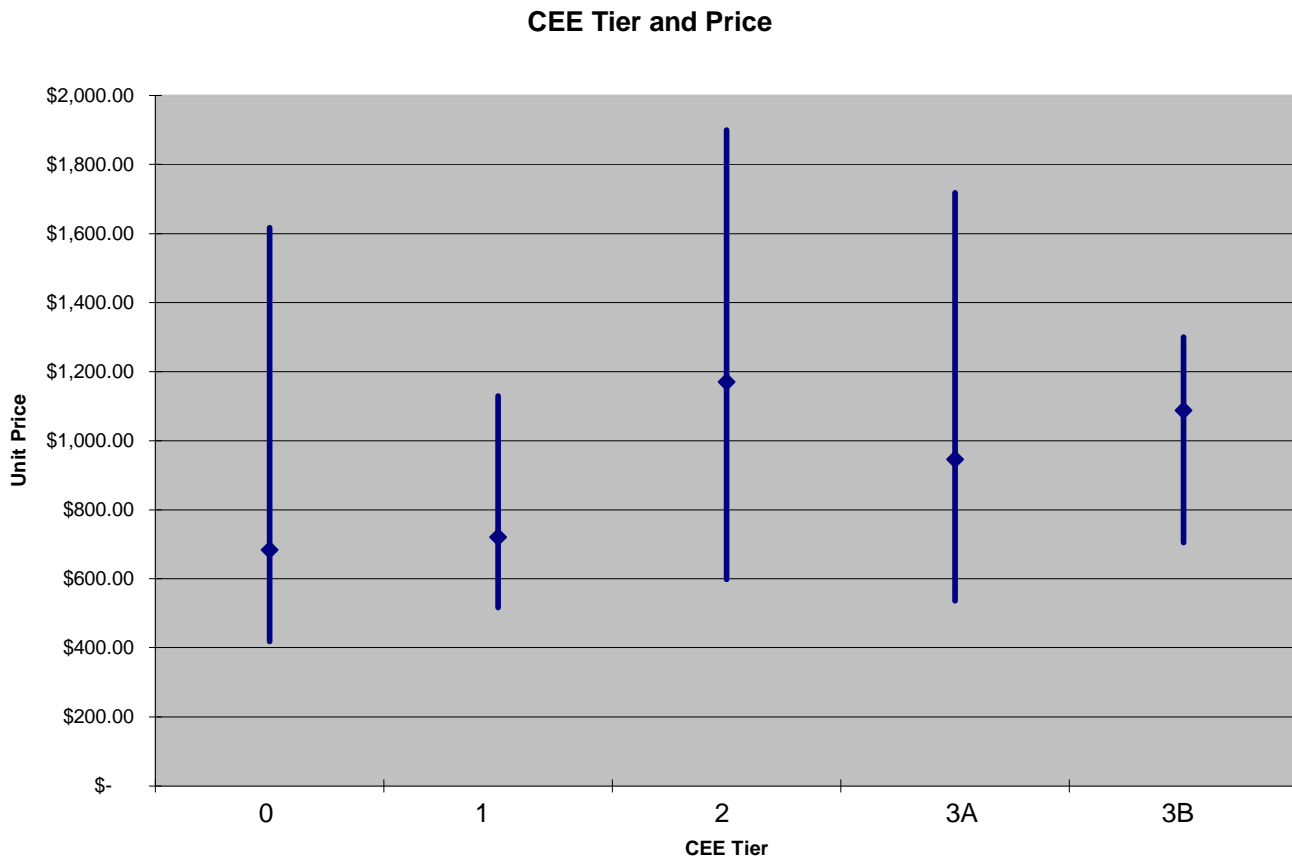
## **Price and Efficiency**

Average prices of products were calculated for a sub-set of 99 of the total 125 washers included in the analyses. These models represent those for which pricing data were available. Sources for these data include information from 1) rebate program applications supplied by Seattle Public Utilities, the San Diego County Water Authority, Pacific Gas & Electric, and the City of Austin; 2) research on average prices in New York State from NYSERDA; 3) research on average prices in the Northwest from the NW Alliance; and 4) research on internet prices performed by CEE staff. While the sources of these data are varied, the Committee believes that when aggregated they can provide a valuable perspective on costs to the consumer.

### ***By CEE Tier***

The first analysis done with the pricing information collected was to investigate how price differs between the current CEE Tiers. Chart 5 shows the variation around the average, with the highest average prices being found in CEE Tier 2, not in the highest tiers. This strengthens the assumption that, while improvements in efficiency do come at a cost, manufacturers are bundling those efficiency enhancements with other features.

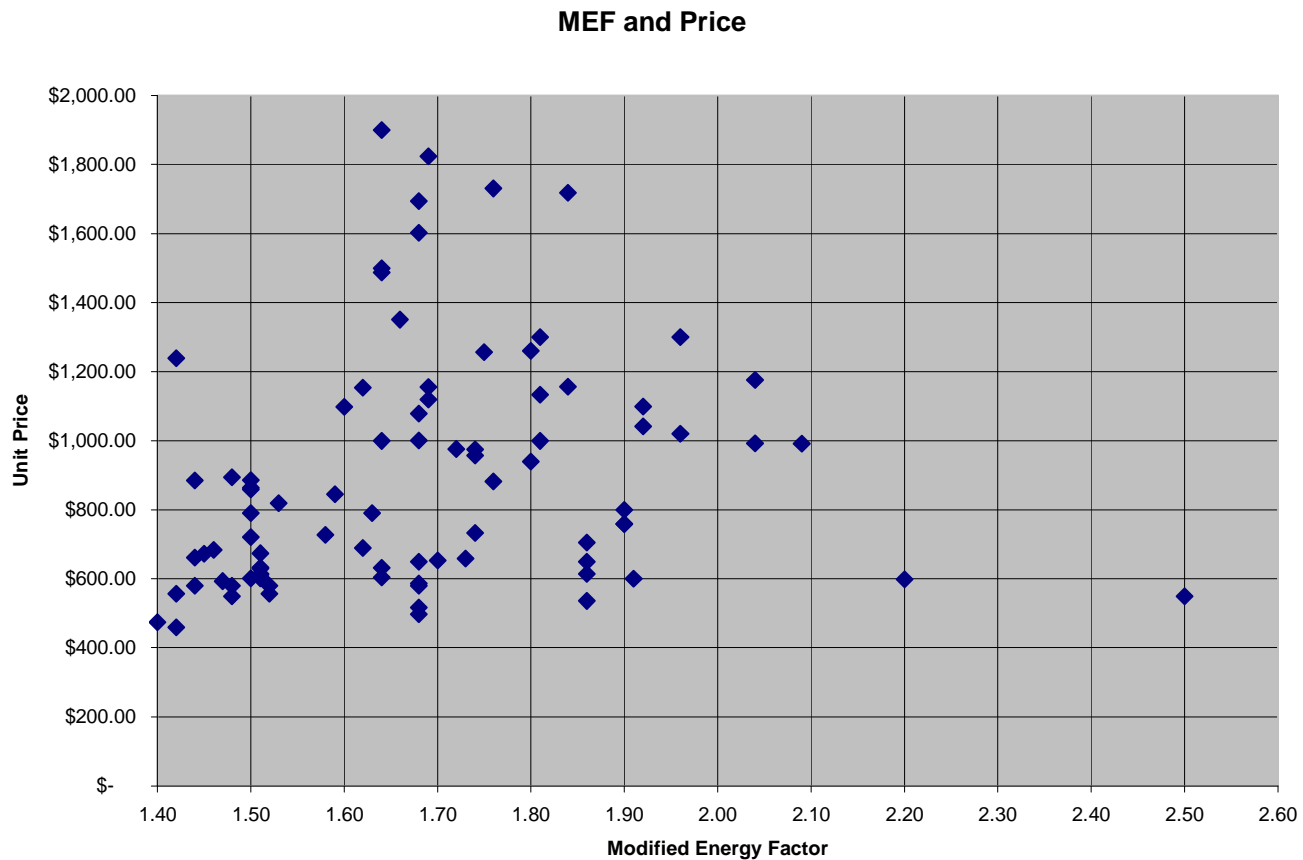
**Chart 5: CEE Tier and Price**



### ***By Modified Energy Factor***

The Committee also investigated whether a relationship exists between MEF and price. If a strong connection existed, we would expect to see a prominent trend of the points in a scatter plot toward the upper right-hand corner. As Chart 6 demonstrates, the points in the chart appear grouped together in a cone-shaped formation in the upper left with only a slight trend toward the upper right-hand corner.

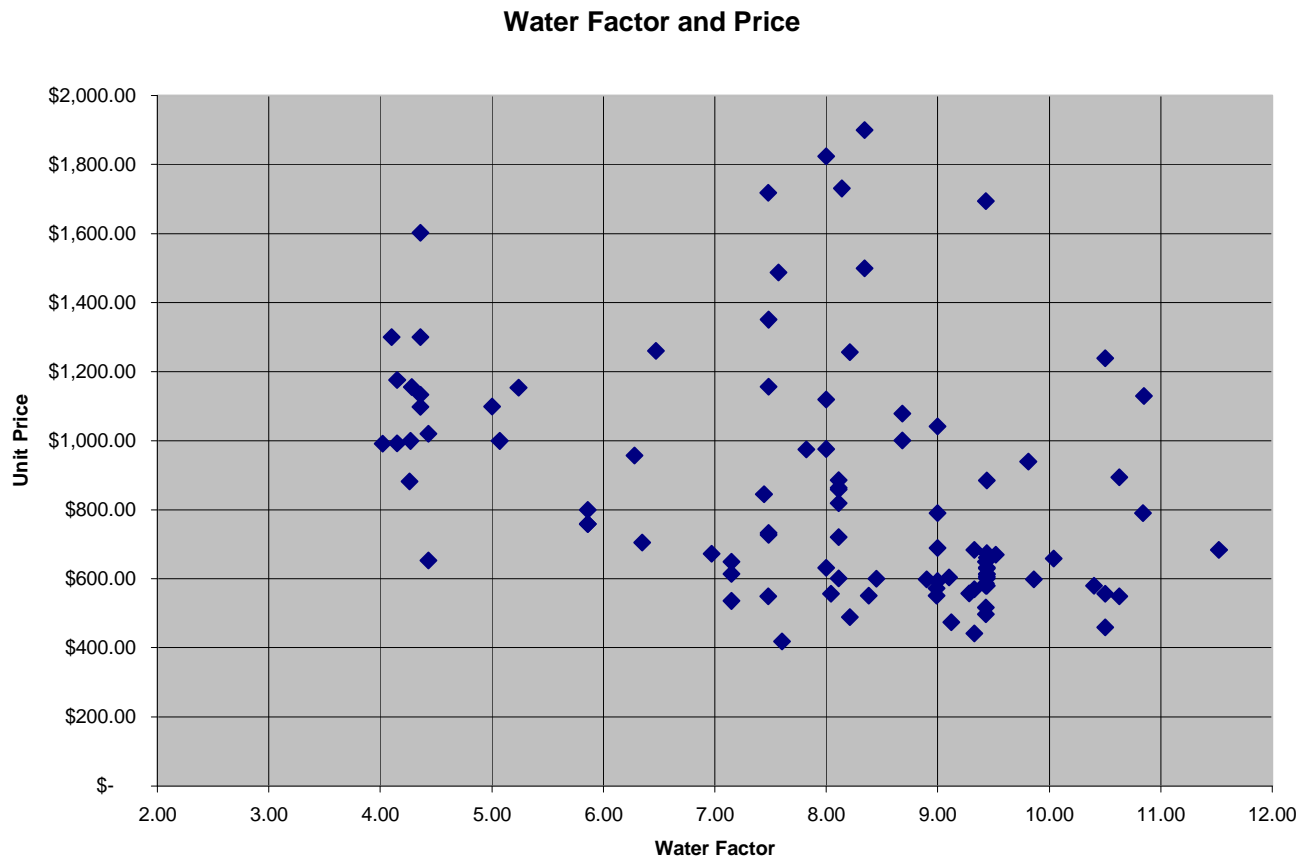
**Chart 6: MEF and Price**



### ***By Water Factor***

In the following chart (Chart 7), the relationship between WF and price is evaluated. In this scatter plot, the most water-efficient models appear on the left hand side. Therefore, if the most water-efficient models are the most expensive, a trend toward the upper left-hand corner would appear. As in the energy example above, however, price and WF do not seem to be strongly related.

## Chart 7: Water Factor and Price



## Manufacturers, Brands, Models

To understand more fully how manufacturers would be impacted by the proposed 1.8 MEF/7.5 WF level, the Committee reviewed the number of manufacturers and brands that met the level in 2003 and 2004. Due in part to the fact that the proposed level corresponds to the current CEE Tier 3A, the number (and type) of manufacturers producing models at the level grew significantly between 2003 and 2004. The number of brands has also risen substantially, from 6 in 2003 to 15 today. Within this universe of manufacturers and brands, the number of models has also risen, from 21 in 2003 to 53 today.

### Manufacturers – 2003

Asko

BSH

Electrolux

LG Electronics

Maytag

Whirlpool

**Brands – 2003**

Asko  
Bosch  
LG Electronics

Kenmore  
Kirkland  
Maytag

**Manufacturers – 2004**

Appliances International  
Asko  
BSH  
Electrolux  
Gorenje

LG Electronics  
Merloni  
Miele  
Summit  
Whirlpool

**Brands – 2004**

Ariston  
Asko  
Bosch  
Danby Designer  
Equator  
Eurotech  
LG Electronics  
Kenmore

Kitchen Aid  
Miele  
Siemens  
Simplicity  
Splendide  
Summit  
Whirlpool

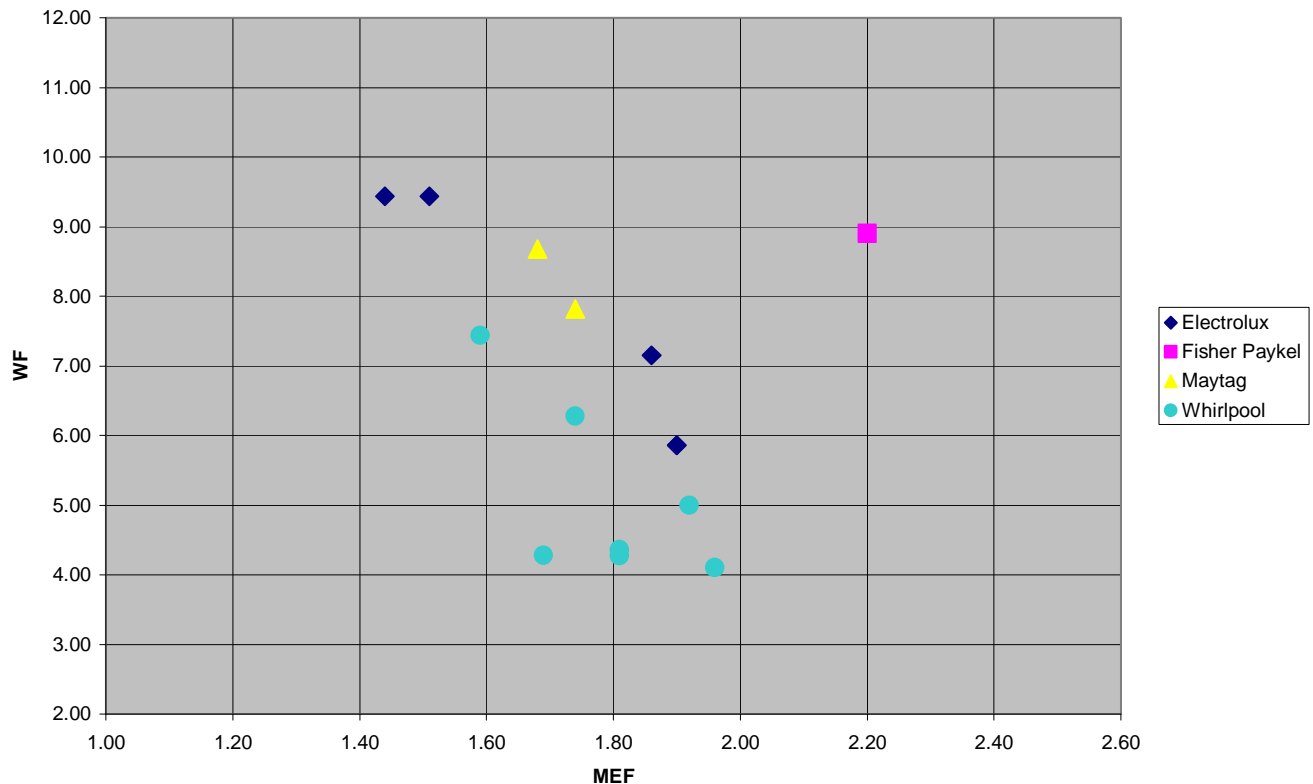
***Analysis of Top Selling Models***

Committee participants also reviewed information on the products that were the most popular in their efficiency programs. Chart 8 describes the MEF, WF, and manufacturer for models that accounted for greater than 2.5% of total rebates given in 2003. There were 14 such models from four manufacturers. (In the chart, there appear to be only 13 points because of overlap in performance of two Kenmore-branded models with similar performance.) Of these products, five would meet the proposed level without any modifications.

This information demonstrates that not all models at the proposed water- and energy- efficiency levels are “niche” products, purchased by only a handful of consumers a year.

## Chart 8: Top Selling Models

Top Sellers MEF, WF, and Mfr



## Summary

Based on the information presented above, the CEE Residential Appliance Committee proposes that DOE adopt a 1.8 MEF / 7.5 WF level for the 2007 ENERGY STAR residential clothes washer criteria. The group believes that this level:

- meets the objectives outlined on page 1 of this letter,
- rewards manufacturer investment at the highest end of the efficiency spectrum, and
- continues to define ENERGY STAR clothes washers as those that deliver *superior* efficiency to the consumer.

Both the number of models recently introduced and their popularity within efficiency programs contribute to the Committee's support for these specification levels. In addition, Committee participants expect that current product introduction trends will continue and that by the specification's effective date – still over two years away – even more models will be available. Table 7 summarizes the Committee's findings regarding the proposed level.

**Table 7: Summary Table**

Proposed Level	1.8 MEF / 7.5 WF (current CEE Tier 3A)
Annual Energy Savings (kWh)	276
Annual Water Savings (gallons)	5,952
Annual Energy Savings from WF (kWh)	17.9
# of Rebates at Proposed Level (2003)	43,437
Percent of Program Activity (2003)	32.5%
Average Price (2003)	\$934.82
Number of Manufacturers (2004)	10
Number of Brands (2004)	15
Number of Products (2004)	53

Once again, the Committee would like to thank the Department of Energy for the opportunity to comment on the 2007 ENERGY STAR clothes washer criteria. Please contact CEE Residential Program Manager Rebecca Foster at (617) 589-3949 ext. 207 with any questions about these comments.

Sincerely,



Marc Hoffman  
CEE Executive Director

### **Supporting Organizations**

American Council for an Energy-Efficient Economy  
Austin Water Utility  
BC Hydro  
Bonneville Power Administration  
California Urban Water Conservation Council  
Cape Light Compact  
Efficiency Vermont  
National Grid  
Natural Resources Defense Council  
Northeast Energy Efficiency Partnerships  
Northwest Energy Efficiency Alliance  
NSTAR  
Pacific Gas & Electric  
Sacramento Municipal Utility District  
San Diego County Water Authority  
San Diego Gas & Electric





Together We Can Change  
National Markets

Seattle City Light  
Seattle Public Utilities  
Southern California Gas  
The United Illuminating Company  
Wisconsin Division of Energy