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Ms. Gina McCarthy, mccarthy.gina@epa.gov
Mr. Bryan Berringer bryan.berringer@ee.doe.gov
ENERGY STAR Program
Ariel Rios Building 6202J
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Ms. McCarthy and Mr. Berringer:

I write on behalf of the American Council for an Energy-Efficient Economy (ACEEE) to offer our thoughts on the *Enhanced Program Plan for ENERGY STAR Products.*[1] Although we are concerned about elements in the *Plan*, it is an excellent document, with enough specificity for thoughtful responses.

ACEEE is a nonprofit, non-partisan, organization dedicated to advancing energy efficiency as a means of promoting economic prosperity, energy security, and environmental protection. ACEEE fulfills its mission by conducting in-depth technical and policy assessments; advising policymakers and program managers; working collaboratively with businesses, public interest groups, and other organizations; publishing books, conference proceedings, and reports; organizing conferences and workshops; and educating consumers and businesses. ACEEE's analyses relevant to this issue include most of the products in the portfolio. Recently, we have been most active in work in lighting, appliances, HVAC, and water heating.

Praise

ACEEE is pleased that your agencies are carrying out such a careful road mapping exercise for the future of ENERGY STAR (and the proposed "Super Star"). We're impressed with the clarity of the proposed plan, and generally support the thrust outlined. We call out some elements that warrant specific commendation:

Program Enhancements (p. 4). This is very good. We are impressed with recognizing the need to do things faster, more often, and for more products. We are particularly excited by the emphasis on quality installation where appropriate, since we feel that there are enormous savings possibilities in *system* considerations to complement equipment specifications. We appreciate the increased attention to anticipating market share in the future when setting thresholds (page 7), but note that this process has a self-fulfilling prophecy aspect, too: A more aggressive threshold set in advance will induce the introduction of conforming products – perhaps nothing is better demonstrated in ENERGY STAR's history.

Product Energy Use Limitations.[2] Ultimately, the rationale for federal spending for ENERGY STAR is pollution prevention. ACEEE has long noted that a qualifying 4000 square foot ENERGY STAR "McMansion" will use more energy than a code-compliant 3000 sf house that itself is much larger than the 2008 median new house. We are pleased that EPA is addressing this issue, on which ACEEE submitted comments earlier. The principle needs to be considered for other products. The ENERGY STAR brand is debased when used to justify excess in any form. We do not recommend outlawing conspicuous consumption, but people who so indulge should not be awarded with an imputed government blessing.

[1] http://www.energystar.gov/ia/partners/downloads/mou/Enhanced_Program_Plan_for_ENERGY_STAR_Products.pdf, dated December 2, 2009

[2] "For product categories with large variations in product size (with impacts on energy use), overall limits for energy use may be incorporated into ENERGY STAR specifications." Page 7.

Verification (p. 14). The enhanced product verification, testing, and enforcement program must be supported by all stakeholders. It is essential for rebuilding confidence that was somewhat damaged by press coverage of manufacturer problems, and it is essential for protecting honest manufacturers. Indirectly, we expect that it will also drive investments in yet better quality control, to minimize exceptions and defects.

Reservations

We have a few significant reservations about the Program Plan. These deal with implicit defects in the program paradigm, defects that will limit the long-term effectiveness of your work.

25% is not really "Top Performing," for many reasons (p. 4, 7, and elsewhere). First, and this will be largely rectified with new reporting requirements, ENERGY STAR has often needed to use the efficiency distribution of numbers of models as a proxy for unavailable shipment data. ACEEE and others have done the same, but it is a weak thread. Anecdotally, we expect rarefaction at the upper levels, with many catalogued models that have near-zero shipments. One explanation is just the value of aspirational or premium models in "good-better-best" marketing strategies. So, if we were able to see shipment data, which you plan to get, we might find that the average efficiency of the top 25% is not much better than the average for the bottom 75%. This is likely to be the case for products that have federal minimum standards in poorly differentiated markets. For products that are not subject to federal standards, the situation may be even worse: For products with a Gaussian efficiency distribution (bell shaped curve), the top 25% includes products that are less than one standard deviation from the mean. That is, ENERGY STAR separates A and B students from C students, but doesn't spotlight the honor roll at all.

When do efficiencies quit increasing? Embedded in the ENERGY STAR paradigm is an implicit assumption of continuous product efficiency improvement.[3] For many products using foreseeable technologies, there are real, physical limitations on performance. For example, without a heat pump cycle, no gas furnace will reach 100% efficiency.[4] Further, the savings (and thus program justification) decrease as efficiencies approach these limits, while incremental costs are expected to rise. *Thus, almost every successful ENERGY STAR product category will sunset, because it has moved the market as far as feasible with the incumbent technologies.*

Asymptotes and Market Transformation. At ACEEE, we regard Market Transformation as a *process,* one we can visualize as a conveyor belt. ENERGY STAR picks up the better products on the market. With partner programs, ENERGY STAR increases their market share. Where appropriate, standards set a new performance floor that makes the former ENERGY STAR criteria obsolete, so new performance levels are set. This works until we run out of "headroom," when no significant energy savings potential is left for a particular product class.

Top Tier or "Super Star" Conceivably, products get onto the conveyor belt in different ways. In one case, a new kind of product becomes important in the market, and criteria can be developed for ceiling fans, set-top boxes, and other products. In others, the asymptote is only an apparent limit, since new approaches to old problems can enter as product discontinuities with great promise. Water heating (heat pump and condensing gas water heaters), solid state lighting, and advanced HVAC technologies all offer examples. This is a key role for the proposed top tier program. If we think in terms of characteristic logistic curves of market share, a smart top tier program can increase visibility and

[3] For example, "Increasing the level of performance will provide greater energy savings in the future and maintain the credibility of the ENERGY STAR label as technologies and markets evolve. Page 8.

[4] This is not the same as AFUE 100, but the principle applies.

credibility, shortening the time to mainstream success from decades to years. A program like this is essential to keep feeding new products to the ENERGY STAR conveyor belt. From multiple perspectives, we can show that the proposed screening criterion of 5% market share[5] is far too restrictive. Again referring to standard logistic curves, 5% share may be the end of the fight for market acceptance.[6] It is far beyond the market share of some present product classes, such as "geothermal" heat pumps. A broader set of criteria is required. The current ENERGY STAR water heater program is an example of the kinds of technical and market criteria that may help select categories for the top tier program.

Of course, the paragraph above assumes that Super Star is designed to facilitate entry of new kinds of products with high energy saving potential. It also could be used to recognize a subset of particularly high performance products. This has the promise – and responsibility – of replacing the *ad hoc* criteria, based on DOE efficiency ratings,[7] that set thresholds for tax credits.

Rating method issues. ACEEE appreciates the careful consideration of rating methods, because it has consequences. However, we believe that some of ENERGY STAR's key successes have come from the ability, as a voluntary program, to include features that are not in the standards for rated products. ENERGY STAR was ahead of the standards process when the program included water efficiency criteria in clothes washers. ENERGY STAR air conditioners include both SEER and EER thresholds, meeting an identified need that could not be resolved in a timely manner in the standards process. A narrow legal interpretation prevented DOE from adopting a consensus recommendation that boilers have a minimum AFUE and better controls, which could be the basis for a more effective equipment program in ENERGY STAR. It is important to develop a more formal process that enables ENERGY STAR to focus on what manufacturers can do with qualified products, not on existing efficiency standards. As a current example, ACEEE, manufacturers, and others have reached a consensus agreement for furnaces, air conditioners, and heat pumps. If adopted, it will lead to regional standards for these products in 2013 and 2015. Should ENERGY STAR criteria follow the same path, in advance?

"Cost-Effective." For SuperStar, the term is extremely "squishy," because advanced technology costs decline with increasing manufacturing experience. "Cost-effectiveness" is far more easily used to screen out technologies that can save enormous amounts of energy than to screen them in. The problem is that emerging technologies, whether with 0.1%, 1% or 5% market share, inherently carry much higher unit costs than mass-produced and mass-marketed commodity products, and much higher costs than most premium products. Two examples are illustrative: Today's installed ground source heat pump system is likely to be several times more expensive than a conventional system offering comparable amenity. Even leaving out the cost of ground loop installation, the equipment is still much more expensive for residential installations. There are not enough units mede to capture economies of scale. Similarly, for two decades many of us have joked that the mature market cost of a heat pump water heater, sans installation, should be about the cost of a resistance water heater plus a room air conditioner. A heat pump water heater just combines these two technologies. The products entering the market are several times more expensive, but everyone in the industry expects prices to decline smartly with increasing market share. There are well-established methods for predicting *declining costs,* or *learning curves,* which are characteristic of virtually everything manufactured. Today's cost-effectiveness cannot be used to screen out technologies we want to encourage for their environmental benefits.

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[5] Cf, "The Super Star program will promote a "top-tier" of energy efficient products in a given category; it will cover approximately 5% of products in a given category and will, when appropriate, be supportive of products that have a longer payback period than those products under the main ENERGY STAR logo."
[6] See, for example, R.N. Foster, *The Attackers Advantage.* 5% *not* checked for accuracy, but it's in the ballpark.
[7] Or, on occasion, Consortium for Energy Efficiency "Tiers." www.cee1.org.

The argument for this is even more basic: What is a cost-effective Cadillac? The question is non-sense, because people make many decisions on criteria other than dollars and sense, and they do so in every sphere of life. A nearly perfect example is the success of the USGBC LEED program, which has always been about perceived value of the bundle of environmentally responsible features, not about cost-effectiveness. We assert that there is no energy saving or economic case for retrofitting a tankless gas water heater in an existing house: people do this for other reasons. For this reason, we again plead that the top tier program, which is critical in so many ways, use a broader set of selection criteria than today's cost-effectiveness.

Other Recommendations

Systems. We applaud ENERGY STAR's pilot project on *Quality Installation* of HVAC systems, because it recognizes many of the largest remaining opportunities are in system design, installation, and operation, not just equipment efficiency. One near-term opportunity would be ENERGY STAR coverage for retrofit boiler controls compliant with the provisions of the 2012 federal efficiency standards for new equipment. These controllers are commercially available from multiple firms, and have a much greater likelihood of saving energy than programmable thermostats. We would be pleased to provide additional information.

Water Heaters. The final program announcement called for the residential non-condensing gas tank water heater threshold to rise from 0.62 to 0.67 in October, 2010. ACEEE supports this for two reasons: (1) To avoid pulling the rug out from manufacturers who have invested scarce human resources and capital to have products ready for this program, and (2) to avoid further delay in the overdue demise of the obsolete gravity vented water heater, whose continued high market share obstructs investments in better products, such as dedicated (instead of add-on) designs for power vented appliances.

Beyond this, ACEEE and other stakeholders, including industry, will suggest some additional water heater product classes for early consideration. The first of these is commercial (size) condensing gas water heaters, which fit well into the Commercial Food Service focus area (page 6) and can be important for comparable applications such as laundromats, motels, and health clubs, all of which are associated with high hot water use. The rating method is mature, and we know of no issues around this product class. The second category is add-on heat pump water heaters, units that can be retroffited on existing resistance water heaters. Additional work will be required to develop a consensus that assures high levels of customer satisfaction, but retrofit programs would have very high energy savings potential. There also may be an opportunity to work together on a specification for high quality point-of-use solar boosters that avoid the distribution losses of conventional storage applications. Even though these are a resistance product, they may help achieve robust system savings in some cases.

Summary

We thank DOE and EPA again for the opportunity to comment. This platform has great promise, and we are encouraged by its publication. We do believe that there are some important issues that need to be addressed, and look forward to working with you on them.

Sincerely,

Harvey M. Sachs, PhD
Senior Fellow