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January 28, 2014

Ms. Amanda Stevens
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue NW
Washington, DC 20460

RE: ENERGY STAR® Clothes Dryers Supplemental Proposal

Dear Ms. Stevens:

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SCGC), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE) in response to the Environmental Protection Agency (EPA) ENERGY STAR® Clothes Dryers Supplemental Proposal that was released on December 19, 2013.

The signatories of this letter, the California Investor-Owned Utilities (IOUs), represent some of the largest utility companies in the United States, serving millions of customers. As energy companies, we understand the potential of appliance efficiency specifications to cut costs and reduce consumption while maintaining or increasing consumer utility and preserving electrical safety and grid reliability.

Summary

EPA's Supplemental Proposal represents an improvement compared to the earlier drafts of the Version 1.0 Clothes Dryer Specification. We focus our comments on a handful of small, but useful improvements that EPA should make to its specification between now and when it launches in the marketplace. We continue to believe that, as we outlined in our September 23, 2013 comment letter, EPA should use a sloped specification line dependent on cycle time and certify at multiple drying speeds.

If EPA is unwilling to use a sloped line, EPA should increase the stringency of the proposed specification to a CEF of 4.29 for full-sized electric dryers for two principal reasons. First, we believe the ENERGY STAR spec can and should encourage fundamental improvements in conventional dryer design beyond improved automatic termination. These improvements would save energy at standard drying speeds and, more importantly, save energy in ~30% of all loads dried that are timed, rather than automatically terminating. The range of possible design approaches and technologies that can deliver such savings is broad, and we detail several possibilities below. Second, the delay in implementation of the specification from the 2013 timeframe to January 2015, as now proposed, means that the baseline has improved.

If EPA is unwilling to increase the stringency of the specification line, we recommend reducing the maximum drying time limit. While 80 minutes is an acceptable time constraint for drying a comparably sized load of real clothes, a dryer that takes 80 minutes to dry a standard load of DOE test cloths would need about 86 minutes to dry a more realistic load of similar size, based on the testing our consultants have conducted to date.

In addition, we encourage EPA to require manufacturers to clearly and consistently label the energy savings modes on ENERGY STAR qualified models in order to help consumers realize the energy savings that the ENERGY STAR brand promises. We support requiring the disclosure of the per-cycle energy performance and duration of the manufacturer-defined fastest setting. We encourage EPA to clarify that the fastest mode is with a given load of clothing and that the mode must be able to sufficiently dry the clothing.

Finally, we continue to support the requirement to use Appendix D2 of the DOE test procedure, because it more effectively differentiates products and provides an incentive for dryers to improve automatic termination and reduce wasted energy at the end of the drying cycle.

I. Multiple Avenues to a More Efficient Dryer

We recognize that the initial version of this ENERGY STAR specification does not target heat pump technology, but rather aims to improve the energy efficiency and performance of conventional electric resistance and natural gas dryers. One obvious way to improve conventional dryers is for manufacturers to improve their automatic termination to reduce the energy and time wasted heating and tumbling clothing which is already sufficiently dry. Our testing, as well as that conducted and published by DOE, confirm that this design strategy alone offers energy savings of roughly 17% and can trim approximately five minutes off typical automatic termination cycle times. We illustrate the effect of this improvement on Figure 1, below, highlighting the differences in energy efficiency and drying time among the range of conventional electric resistance models we have recently tested in the laboratory with the D2 test procedure. Improving automatic termination, by itself, will likely not be sufficient to allow most dryers to qualify for ENERGY STAR, but it is the essential first step, because the energy and time it saves afford manufacturers a range of other options for achieving the remaining improvements without exceeding EPA's stipulated 80 minute time limit.

Some manufacturers may simply elect to slow down the drying process in the default mode, by either lowering the heating element wattage or decreasing the fraction of time that the heating element is on. If dryers with improved automatic termination typically complete a D2 cycle in approximately 40-45 minutes this gives them roughly 35-40 additional minutes of time to slow the drying process down, gaining approximately 0.16 lbs/kWh for every 10 additional minutes the drying process requires. Therefore, at 80 minutes, these well-automatically terminating dryers would have a CEF of ~4.5. Indeed, we have shown that an entry-level (approximately \$300) dryer with only simple changes to the operation of the dryer's heater can achieve a CEF of 4.36 and a drying time of 60 minutes. We simply manually switched back and forth between heat and no heat mode based on a target exhaust temperature. Basic dryers already monitor exhaust temperature to prevent clothing damage, so including this temperature switching would only require an inexpensive and simple software change.

Figure 1 demonstrates the tradeoff between efficiency and drying time for individual dryer units tested in Ecova's lab using the D2 test procedure¹². Square markers represent D2 tests (lowest efficiency data

¹ Each colored square in the charts above represent a unique dryer unit sometimes tested in multiple settings not explicitly stated in the DOE D2 test procedure. Tests for which we measured the energy use of these dryer units in different settings were conducted for the purposes of assessing the relationship between efficiency and drying time.

² The CEF values for dryer units represented in the charts below were not adjusted for EPA's proposed 5% CEF allowance for connected functionality, which would have the effect of either raising the measured efficiency of those models or reducing the efficiency target they need to meet by 5%.

points in each trend). The higher efficiency data points for each dryer represent either delicate, eco-mode, or manual override tests. Circular markers represent tests conducted in these higher efficiency modes. In cases where only D2 and delicate runs are available, we have extrapolated the behavior with dotted lines.

Figure 1. Efficiency vs. Drying Time for Conventional Electric Dryers Tested in Multiple Modes

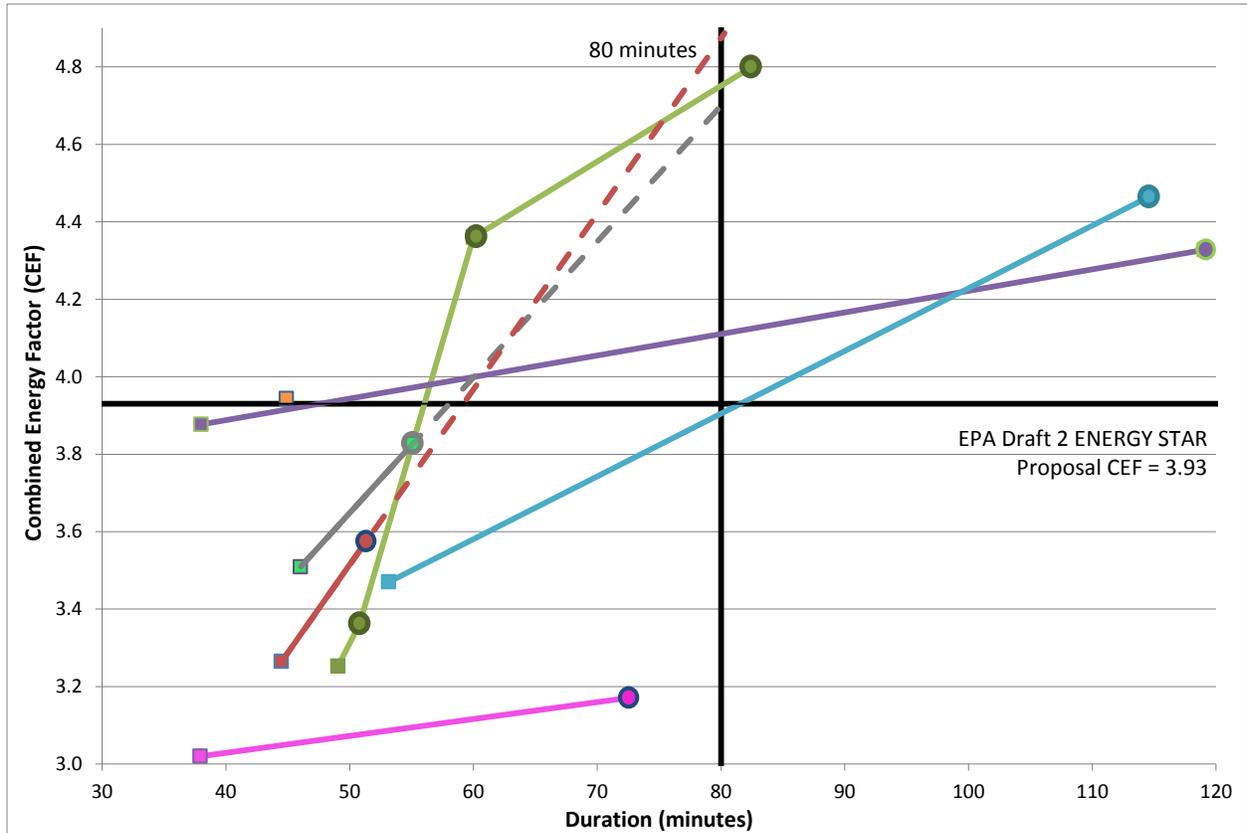
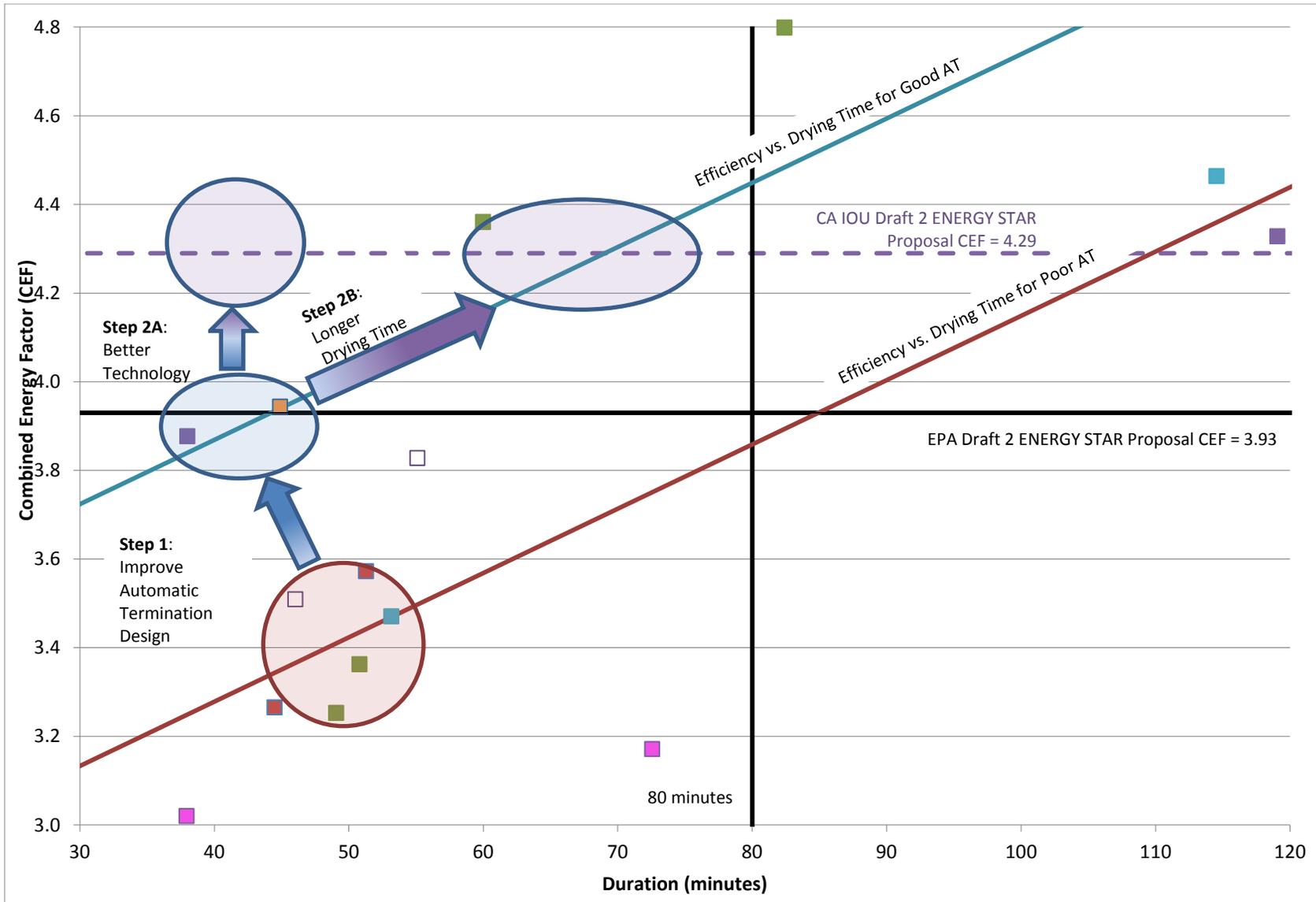


Figure 2

Figure 1 illustrates how dryers with poor automatic termination are not able to meet the EPA proposed ENERGY STAR spec line simply by extending their cycle time, from what had been roughly 40 minutes to a value closer to the 80-minute cutoff. It also illustrates how dryers with good automatic termination can meet the IOU proposed ENERGY STAR spec line either by improving the underlying technology of the dryer (Step 2A) or by extending their cycle time (Step 2B).

Figure 2. Potential Design Improvement Options Required to Achieve Efficiency Gains.



For consumers that are not washing and drying serial loads and are not in a hurry, trading time for increased efficiency may be perfectly acceptable. But for others that are buying an ENERGY STAR dryer with a belief that it can *save a significant amount of energy without sacrificing performance*, what else will qualifying models offer them? We believe the ENERGY STAR spec can and should encourage other fundamental improvements in dryer design that can save energy at standard drying speeds and, more importantly, save an additional 20+% of energy on all loads dried – whether they are timed or automatically terminating.

The range of possible design approaches and technologies that can deliver such savings is broad:

- Real time modulation of heater power and airflow in response to changes in remaining moisture content. While we have seen heater power modulation in dryer models from General Electric and Samsung, it has not been accompanied by corresponding changes in airflow.
- Designs that partially re-circulate exhaust air that is still quite dry, which would reduce the need for heater power to achieve a given air temperature.
- Separating the tumbling function from airflow. Manufacturers rely on a single motor for both functions, meaning that the drum must always tumble at a fixed speed when air is being vented, and air must always be vented at a fixed speed when the drum is tumbling. Using one motor for both functions causes more wear and tear on clothing than is warranted, misses a low cost opportunity to gain additional energy savings, and unnecessarily increases the HVAC impacts of operating a vented clothes dryer.
- An air-to-air heat exchanger - using warm exhaust air to preheat incoming air reduces the need for heater power to achieve a given air temperature in the drum.
- Increased cabinet insulation and better seals around the drum – these reduce heat loss from the drum and moisture loss into the laundry room, saving energy, reducing noise, and improving comfort in the laundry room.
- Improved-efficiency blower motor and blades – reduce energy losses associated with delivering a given amount of airflow.

In its September 12, 2012 webinar, EPA discussed these technologies and interviews conducted with manufacturers indicating that energy savings of 13% could be achieved cost-effectively.³ Our comment letter in response demonstrated the potential for even greater cost-effective energy savings. As a result, we believe it is reasonable to require 13% energy savings beyond the federal standard (which can be achieved without these technologies), or a CEF of 4.29. This is shown in Figure 2 as Step 2A.

II. The Baseline Efficiency of Dryers will Increase on or before January 1, 2015

The delay in implementation of the specification from the 2013 timeframe to January 2015, as now proposed, means that the baseline efficiency of dryers has improved. Dryers on the market in 2013 were not tested for automatic termination effectiveness, so manufacturers had no particular incentive to optimize their design to terminate promptly. By 2015, both the ENERGY STAR spec and the ability to qualify for DOE standards via the Appendix D2 test procedure will provide manufacturers with an incentive to improve automatically terminating design. Even regardless of how manufacturers qualify particular models for federal standards, consumers choose an automatic termination mode about 70% of the time, and ENERGY STAR should encourage technologies that reduce energy use in all settings that include automatic termination, not solely the manufacturer-labeled default setting.

³ ENERGY STAR® Clothes Dryers Draft 1 Version 1.0 Specification, Stakeholder Webinar. September 12, 2012.

The baseline CEF of dryers, based on the new DOE energy conservation standards, will be 3.73 in 2015. EPA designed the CEF in the Draft 1 Version 1 of the clothes dryers spec to “reflect a 13% reduction in energy use from a baseline electric model.” An ENERGY STAR specification level reflecting a 13% reduction in energy use compared to the new DOE standard would be 4.29. Smart grid connected models could qualify with this IOU proposal with a CEF of 4.08, given their 5% credit (assuming a small energy requirement for the smart grid functionality).

III. Maximum Cycle Duration

Again, if EPA is not willing to adopt a sloped line, the ENERGY STAR spec line should be increased. If EPA is unwilling to adopt a sloped line or increase the spec line, then the maximum drying time requirement should be reduced. Research indicates that the 80-minute time requirement for a drying cycle would likely meet consumer needs and expectations for a load of laundry consisting of real clothes. *Consumer Reports* evaluated clothes washers for a variety of factors, and our analysis of their data identified 80 minutes as the average cycle time.⁴ Many consumers prefer washer and dryer cycle times to match so they may easily launder sequential loads. The Ecova laboratory has tested a number of dryers on identical settings with both DOE test cloths and the AHAM load, which more closely resembles a typical consumer load. On average, valid runs with an AHAM load with conventional dryers take 7% longer than the identical test with the DOE load. As a result, 74 for the D2 test, which would imply roughly 80 minutes for a typical consumer load, would be a more appropriate time constraint.

IV. Help Consumers Save Energy with Better Cycle Labeling

If EPA adopts the Supplemental Proposal, ENERGY STAR dryers will save consumers energy in their default mode, but their relative energy performance in other modes will be uncertain. To help consumers understand the most energy efficient settings on their dryer, we encourage EPA to require manufacturers to clearly and consistently label their efficient drying cycles in a way that maximizes the likelihood that consumers will use them. Increasingly, we have begun to see dryers that advertise efficient modes, often with an “eco” or “eDry” button. Some of the newest dryers even offer an “eMonitor” that show the relative efficiency of all loads and settings. Should dryer models that can meet ENERGY STAR efficiency and drying time requirements in particular modes simply place an ENERGY STAR logo next to those modes on the cabinet face, or illuminate an ENERGY STAR logo when one of those modes has been selected, or at least provide a list of those modes and settings in their manuals? Clear labeling of this type will help consumers realize the energy savings that the ENERGY STAR brand promises.

V. Test and Report Performance in the Fastest Drying Cycle

We continue to believe that the best way to ensure that ENERGY STAR dryers deliver energy savings to consumers is to test their energy consumption in more than one mode and pass a specification in every mode tested. Even absent a requirement to pass a specification in all modes, additional data about dryer performance can help improve the effectiveness of future versions of the dryer specification. As a result, we support EPA’s proposal to ask manufacturers to test and report the per-cycle energy consumption and duration of the manufacturer-defined fastest drying cycle.

⁴ <http://www.consumerreports.org/cro/clothes-dryers.htm>

In addition, we encourage EPA to clarify that the “manufacturer-defined fastest mode” is with a constant load of clothing. For instance, the “fastest” cycle based on the dryer’s time estimation could be delicates mode because the assumption is that the load is not very large and the initial moisture in the clothing is low. However, this delicates setting tends to be lower temperature and therefore not the fastest setting to use with a given load of clothing. Another constraint is that the mode must be able to dry the clothing sufficiently. For instance, an iron-dry or less-dry setting would complete faster, but would typically not dry the clothing to below 2% moisture content. In other words, EPA should clarify that the “manufacturer-defined fastest mode” is the fastest mode that achieves a RMC value of 2.0% or lower with the standard DOE load.

VI. Additional Test Data

We conducted testing to determine whether certain compact dryer models we had previously tested with a standard load would pass the proposed efficiency levels and the 80-minute requirement when tested with a compact load, as required under the DOE test procedure. Our testing found that all of the European compact ventless clothes dryers we tested meet both the efficiency level and time requirement when tested using DOE’s compact 3-pound load in at least one mode, and often in all modes tested. We found that reducing load size from 8.45 to 3 pounds, tended, on average to reduce drying time by 33% and reduce efficiency by 42%.

In conclusion, we thank EPA for the opportunity to be involved in this specification development process and encourage EPA to consider the recommendations outlined in this letter.

Sincerely,



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