September 23, 2013

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

RE: ENERGY STAR® Clothes Dryers Draft 2 Version 1.0 Specification

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 Draft 2 Version 1.0 Specification.

The signatories of this letter, the California Investor-Owned Utilities (IOUs), represent some of the largest utility companies in the Western United States, serving over 40 million customers. As energy companies, we understand the potential of appliance efficiency specifications to cut costs and reduce consumption while maintaining or increasing consumer utility of the products and preserving electrical safety and grid reliability.

Clothes dryers have become nearly ubiquitous in U.S. households with roughly 80% penetration. Collectively, dryers represent a $9 billion annual national energy bill—about 6% of residential electricity consumption and 2% of residential natural gas consumption.[1] Dryers consume as much electricity per year—60 billion kWh—as the entire state of Massachusetts, and they are responsible for 40 million metric tons of annual carbon dioxide emissions.[2] Dryers are also the most prevalent and energy consumptive appliances in U.S. homes for which no ENERGY STAR specification currently exists. In short, clothes dryers represent an enormous potential to reduce energy use, and we applaud EPA for attempting to leverage the ENERGY STAR program to realize the energy savings possible from more energy efficient dryers.

Executive summary

The Draft 2 Version 1.0 Specification represents an improvement over Draft 1. We strongly support EPA's decision to use appendix D2 of the Department of Energy's recently finalized test procedure. This procedure relies on automatic termination, which represents an extremely cost effective and consumer-friendly method of saving energy by reducing wasted energy at the end of the drying cycle. We likewise support the apparent stringency of the proposed efficiency criteria in Draft 2.

[1] David Denkenberger, Serena Mau, Chris Calwell, and Eric Wanless. 2011. Residential Clothes Dryers: A Closer Look at Energy Efficiency Test Procedures and Savings Opportunities. Ecova and NRDC.
[2] Ibid.

Despite these improvements, EPA should strengthen the proposed specification in subsequent drafts. We have performed and reviewed a variety of laboratory and field testing on dryers that question EPA's proposed specification. Specifically, our testing indicates that EPA's proposed specification might fail to deliver real world energy savings because it would provide an avenue for dryers to earn the ENERGY STAR label by simply extending drying time in the default manufacturer settings. If consumers chose a faster, more standard drying time, the energy savings promised by the ENERGY STAR label would likely disappear, based on findings of our product testing to date.

All vented dryers can become highly energy efficient simply by running in no heat mode for a significant fraction of the time. If EPA retains its proposed CEF independent of drying time, manufacturers could make the default setting correspond to a slow, efficient drying mode that sacrifices drying time for better energy performance. If consumers are unhappy with this drying speed, they are likely to use it infrequently. There is no reason to believe that a dryer that delivers energy savings by lengthening the drying time would offer energy savings if the customer selects a faster, more standard drying mode.

There are a number of ways in which EPA can correct this oversight, and we detail three options below. The first and preferred option is for EPA to link efficiency criteria to drying time and test in multiple modes, thereby guaranteeing that the dryers perform more efficiently than most of their peers at multiple speeds (see Table 1). The second option is for EPA to require the single DOE test mode to be above a sloping specification line. A third option—which should only be considered if EPA is unwilling or unable to link efficiency to drying time—is to require dryers to demonstrate energy savings in their fastest mode to qualify for the ENERGY STAR label.

Table 1. Option 1: specification line that increases with drying time, and testing in multiple modes.[3]

Product Type	EPA CEF BASE (lbs/kWh)	IOU CEF BASE (lbs/kWh)
Vented Gas	3.48	2.33+0.028*(Drying time in minutes) for all modes; Slow mode ≥4.4 lbs/kWh; Fast & medium modes ≥3.5 lbs/kWh
Vented Electric, Standard (4.4 cu-ft or greater capacity)	3.93	3.13+0.0241*(Drying time in minutes) for all modes; Slow mode ≥5.0 lbs/kWh; Fast & medium modes ≥4.0 lbs/kWh
Ventless Electric, Standard (4.4 cu-ft or greater capacity)	3.93	3.54
Vented Electric, Compact (120V) (less than 4.4 cu-ft capacity)	3.80	TBD: b+a*(Drying time in hours) for all modes; Slow mode ≥TBD; Fast & medium modes ≥TBD
Ventless Electric, Compact (120V) (less than 4.4 cu-ft capacity)	3.80	3.42
Vented Electric, Compact (240V) (less than 4.4 cu-ft capacity)	3.45	TBD: b+a*(Drying time in hours) for all modes; Slow mode ≥TBD; Fast & medium modes ≥TBD
Ventless Electric, Compact (240 V) (less than 4.4 cu-ft capacity)	2.68	2.68

We support EPA's effort to expand their specification to dryer types that are not yet commercially available. However, ventless dryers are inherently less efficient, so we propose lower CEF levels for ventless dryers to equalize stringency. Ventless dryers cannot take advantage of the desiccating properties of room air, so a specification independent of drying time is adequate. Also, testing at multiple drying

[3] TBD is to be determined.

speeds is less important for ventless dryers because of the lower correlation of efficiency with drying time. We summarize EPA and IOU proposals in Table 1.

In addition to describing our concern with EPA's proposed specification and detailing three options for addressing this concern, our comments include recommendations related to a Tier 2 ENERGY STAR specification, the use of automatic termination, areas deserving of future study and attention by EPA, and the 2014 Emerging Technology Award Specification (as the Appendix).

I. The Draft 2 Specification risks the energy savings promised by the ENERGY STAR label by allowing dryers to qualify for ENERGY STAR regardless of the time it takes to dry a load of laundry.

We have performed a variety of tests on clothes dryers demonstrating that one way to decrease the energy required to effectively dry a load of laundry is to increase the drying time. As currently proposed, EPA's Draft 2 Specification does not link drying time and energy use (other than asking manufacturers to report the drying time associated with the cycle whose energy efficiency data are being furnished). As a result, even though EPA's proposed efficiency specification is relatively stringent for fast drying, a manufacturer could design a dryer to meet it primarily by establishing the default manufacturer settings to use low or no heat over an extended drying time. While such a dryer would earn the ENERGY STAR label under the proposed specification, it would not deliver that degree of energy savings in typical use, given the percentage of users that would select faster drying modes.

We tested several dryers on delicate or low-temperature mode.

Figure 1 shows a typical power over time profile of low-temperature versus high-temperature behavior.

Figure 2 shows the same data plotted cumulatively. On average across five conventional electric dryer models, this lengthened drying time by 23% and increased efficiency by 3% (see Figure 4).

Figure 1: Power over time plot of conventional dryer across different drying modes.

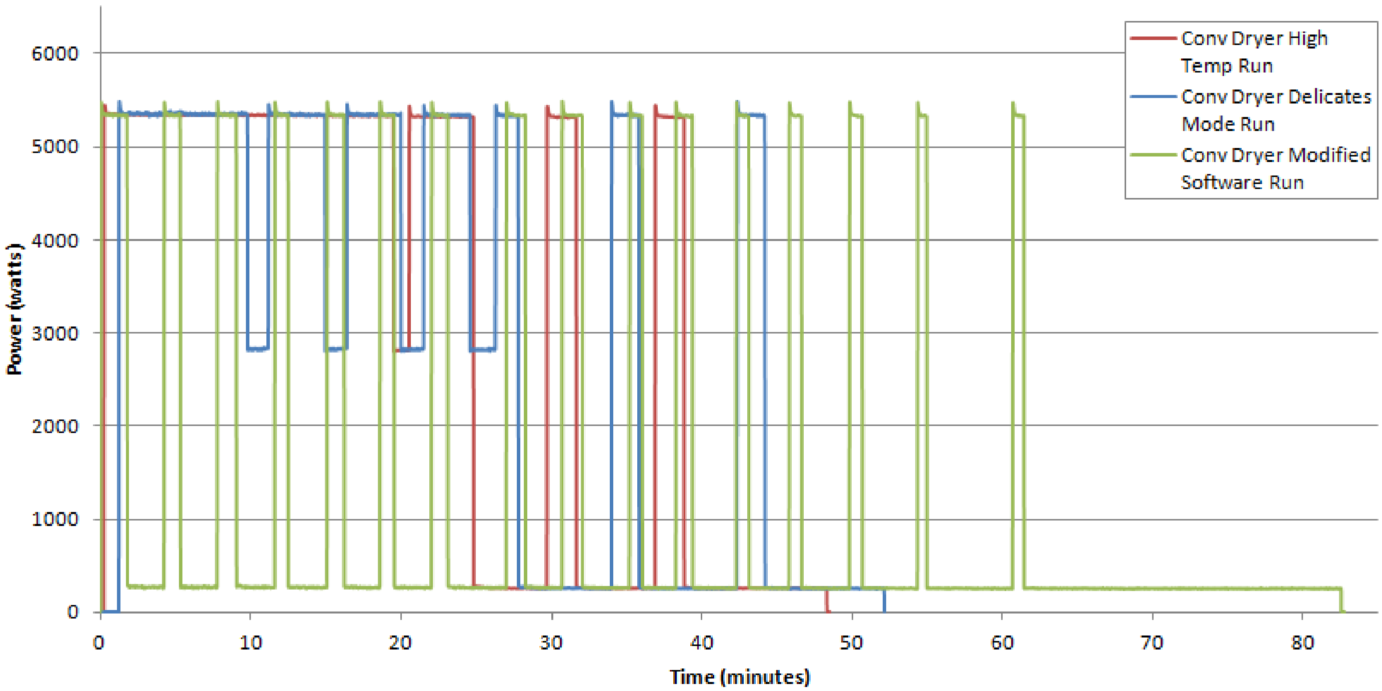
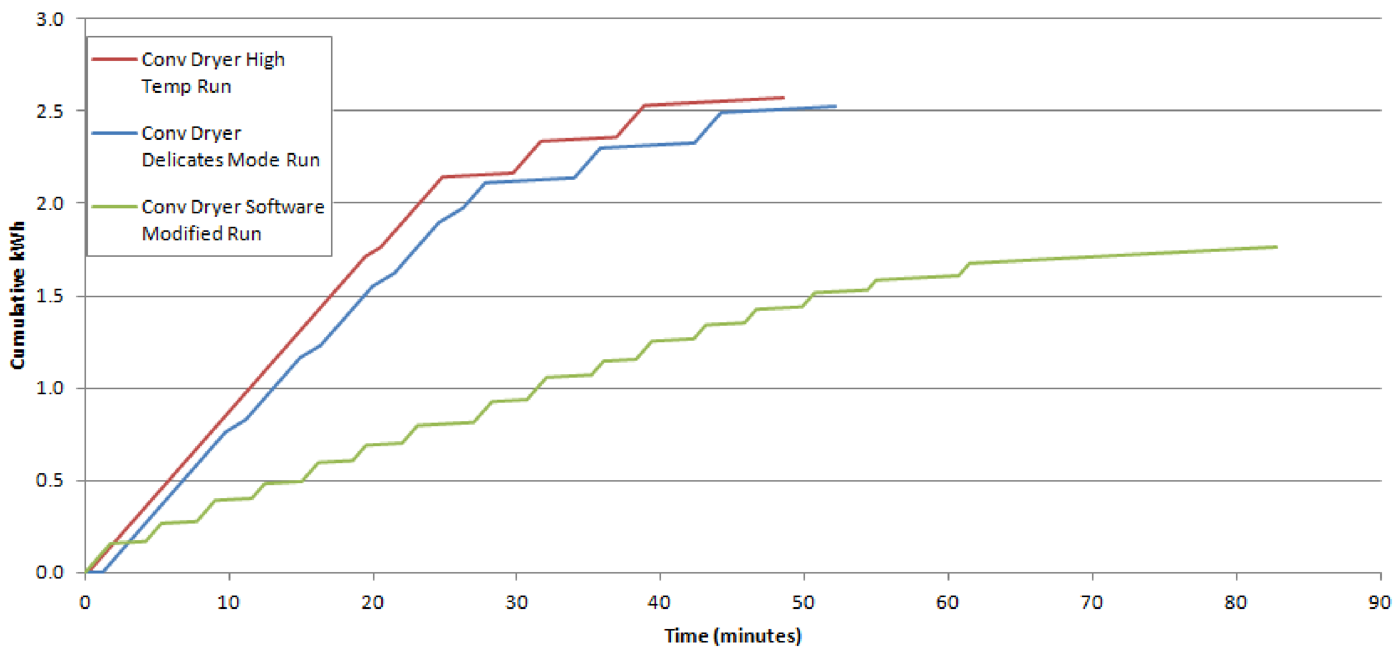


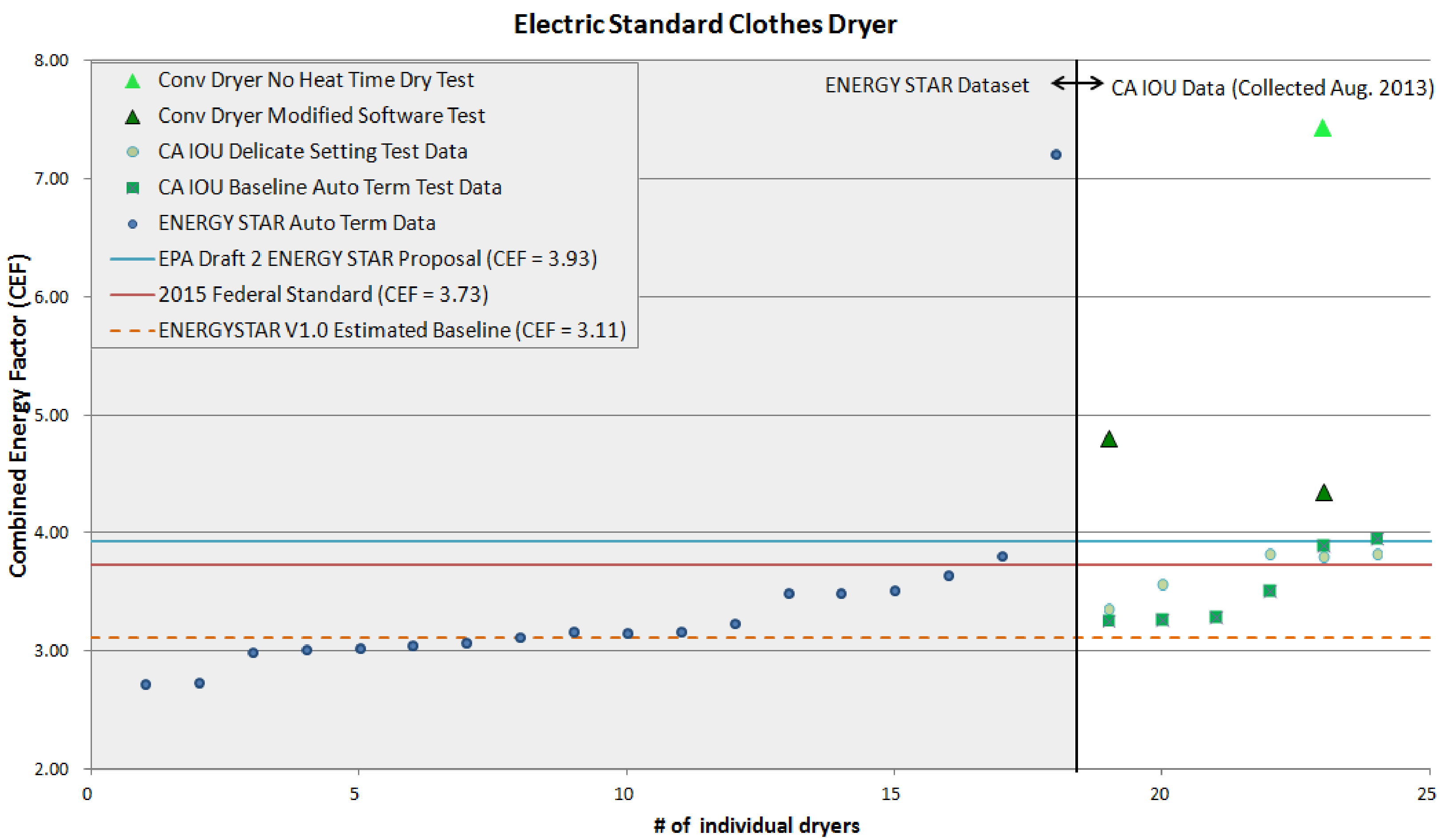
Figure 2: Cumulative energy consumption over time for full size conventional dryer across different drying modes.



Because the results of the tests performed in low-temperature mode (also referred to as “Delicates Mode”) resulted in modest changes to efficiency, we took one high-end dryer and one entry-level dryer and modified how they behaved. We switched the mode to no heat periodically to maintain a low exhaust temperature. The “Conv Dryer Modified Software Run” in Figure 1 shows a typical power over time profile of this behavior. Across two conventional electric dryer models, this lengthened drying time by 141% and increased efficiency by 30% (see Figure 4).

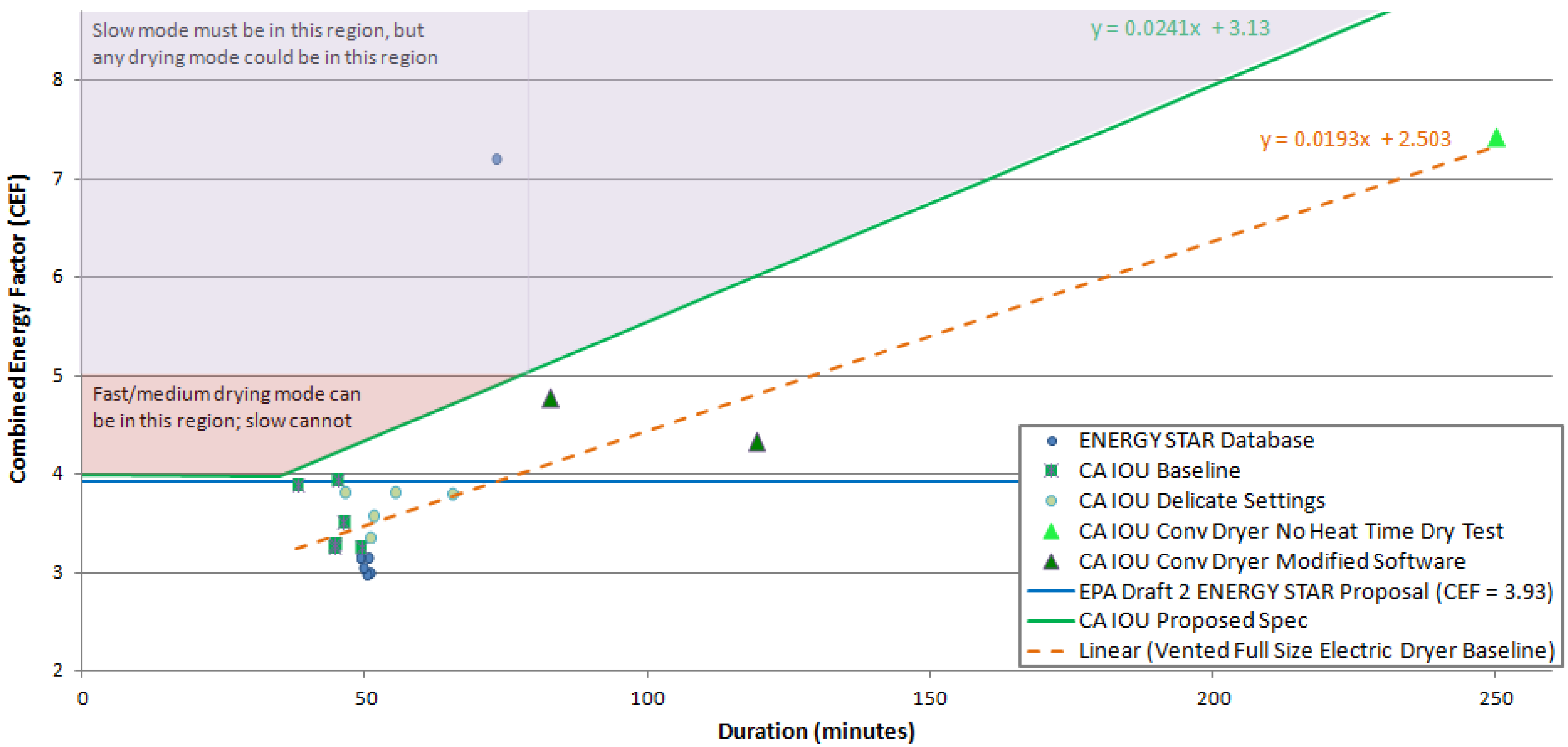
This interspersing of no-heat mode lengthened the drying times significantly, but allowed both dryers to pass the EPA-proposed 3.93 CEF easily (Figure 6). Manufacturers could make this behavior the default mode that the DOE test procedure specifies. Many, if not most, consumers will find such factor of 2-3 drying time extensions to be unacceptably long and will instead choose a faster mode. Since the Draft 2 specification does not require testing in faster modes, there is no reason to believe, however, that the faster mode will deliver any energy savings compared to a conventional, non-ENERGY STAR dryer. As a result, if the Draft 2 specification is finalized as proposed, consumers could purchase dryers that provide them with only a fraction of the energy savings, if any, that the ENERGY STAR label promises.

Figure 3. CEF for different full-sized electric models and settings. Individual data points represent individual dryer test runs (or averages of 3 identical runs). The shaded area of the chart represents ENERGY STAR's dataset of 18 runs (or averages) from 18 individual dryers. The unshaded area represents new data on 14 runs (or averages) conducted on an additional six individual dryers.[4] The blue line represents EPA's proposed CEF for residential clothes dryers as specified in the Draft 2 Version 1.0 specification. The orange dotted line represents the EPA-estimated baseline for clothes dryers based on the original ENERGY STAR dataset.



[4] One of these dryers does not have a delicate run. CEF values refer to base CEF values only.

Figure 4: CA IOU proposed CEF specification line for vented full size electric dryers. The green line represents a proposed CA IOU ENERGY STAR specification line that increases efficiency stringency (CEF) with drying time. The orange dotted line represents a baseline for vented full size electric dryers that is based on drying time and CEF data represented in ENERGY STAR's analysis, as well as new data that the we are submitting in this comment letter.[5] The blue line represents EPA's proposed Draft 2 ENERGY STAR specification for vented full size electric clothes dryers (CEF = 3.93).



[5] This baseline does not include the advanced technologies of heat pump and exhaust heat exchanger.

Option 1: EPA should have a sloped specification line and test in multiple modes

a. Full-sized electric dryers should have a specification that increases with increased drying time and be tested in multiple modes

One way of addressing the potential for manufacturers to achieve very high efficiency by doing little more than slowing the drying process down would be to implement a drying time limitation. This solution is problematic, however, because certain technologies could be limited in their drying speed, such as heat pumps. Furthermore, the choice of the maximum allowable drying time is difficult because of varying consumer preferences, load sizes, and clothing types. A more technology-neutral solution involves having a specification that is a function of drying time, i.e., greater efficiency is required if the drying time is greater.

As Figure 4 demonstrates, we have constructed a potential specification that we propose EPA use to link efficiency criteria to drying time. In order to construct our proposal, we first found the best-fit CEF line with conventional dryers (see Figure 6). We ran one high-end dryer in no-heat mode to test the extreme case.[6] With no heat, the dryer is relying on the natural desiccating capability of the room air. With the energy used to spin the fan and drum, drying occurs at about twice the efficiency of a conventional dryer in heat mode, but it takes about five times as long. This also explains the above results: slowing the drying down by running a significant fraction of the time in no-heat mode increases the efficiency.

For our proposal, we took this baseline curve fit and multiplied both the intercept and coefficient to the drying time by 1.25, representing the 20% energy savings[7] currently proposed by EPA (see Figure 6). Note that the heat pump dryer CEF is significantly above the proposed specification line, making it likely that heat pumps are not the only technology capable of earning the ENERGY STAR label under the IOU proposal. EPA has identified many different possible efficiency improvements in dryers that would help enable manufacturers to meet this specification; these measures include improved automatic termination, improved motor, more efficient blower blades, and lower pressure drop ducting inside the dryer.[8] We propose not to give additional energy use allowance for even faster drying time than typical dryers (the horizontal section of the green line in Figure 6).

To ensure that energy savings promised by ENERGY STAR are preserved in day-to-day operation, it is essential to test each dryer attempting to earn the ENERGY STAR label on multiple modes. We recommend testing the dryers in fast, medium, and slow modes, as defined below. With three repetitions of each of these modes, a total of nine test runs would be required. This is not overly burdensome on manufacturers relative to the value of the resulting energy savings; indeed it is the same number of tests DOE and ENERGY STAR already require for clothes washers, where labeled models yield smaller lifetime energy savings than clothes dryers relative to unlabeled models.

[6] We were not able to find a dryer that automatically terminated on no-heat mode. Therefore, we had to do multiple timed dry segments with intermediate weighing to achieve this result. The efficiency would likely be even greater without these intermediate weightings.
[7] 20% energy savings corresponds to 0.8 times as much energy use. The reciprocal is 1.25 times as efficient, or 25% greater efficiency.
[8] These latter 3 options apply even to the no-heat case.

Slow mode: the user manual should indicate the slow test settings. This could be an eco-mode or the lowest available temperature that performs automatic termination. The CEF must be greater than or equal to 5.0 and on or above the specification line (see Figure 4).

Medium mode: use the DOE appendix D2 test procedure. The CEF must be greater than or equal to 4.0 and on or above the specification line.

Fast mode: the program selected should be the one indicated in the manual which dries the clothing most quickly. Also, the technician should disable any energy-saving features. The CEF must be greater than or equal to 4.0 and on or above the specification line. If there is no faster mode than that specified by appendix D2, the fast test would not have to be performed.

See Table 1 for a summary of requirements.

b. Vented gas dryers should also have a specification that increases with drying time and be measured in multiple modes

For gas dryers, EPA should also adopt a specification line that increases with drying time in order to guarantee that the dryers have improvements other than simply slowing the drying down. The extreme case for gas dryers of no heat would be nearly identical to electric dryers, so we have used the electric data point (see Figure 7). Also, interspersing heat mode with no-heat mode would again increase the CEF significantly. Therefore, we used the same procedure of curve fitting the baseline and then multiplied by 1.266 (corresponding to 21% energy savings as in the EPA proposal) for the IOU proposal (see Figure 7). Also, the horizontal section of the proposed specification line roughly corresponds to the EPA proposal of CEF = 3.48.

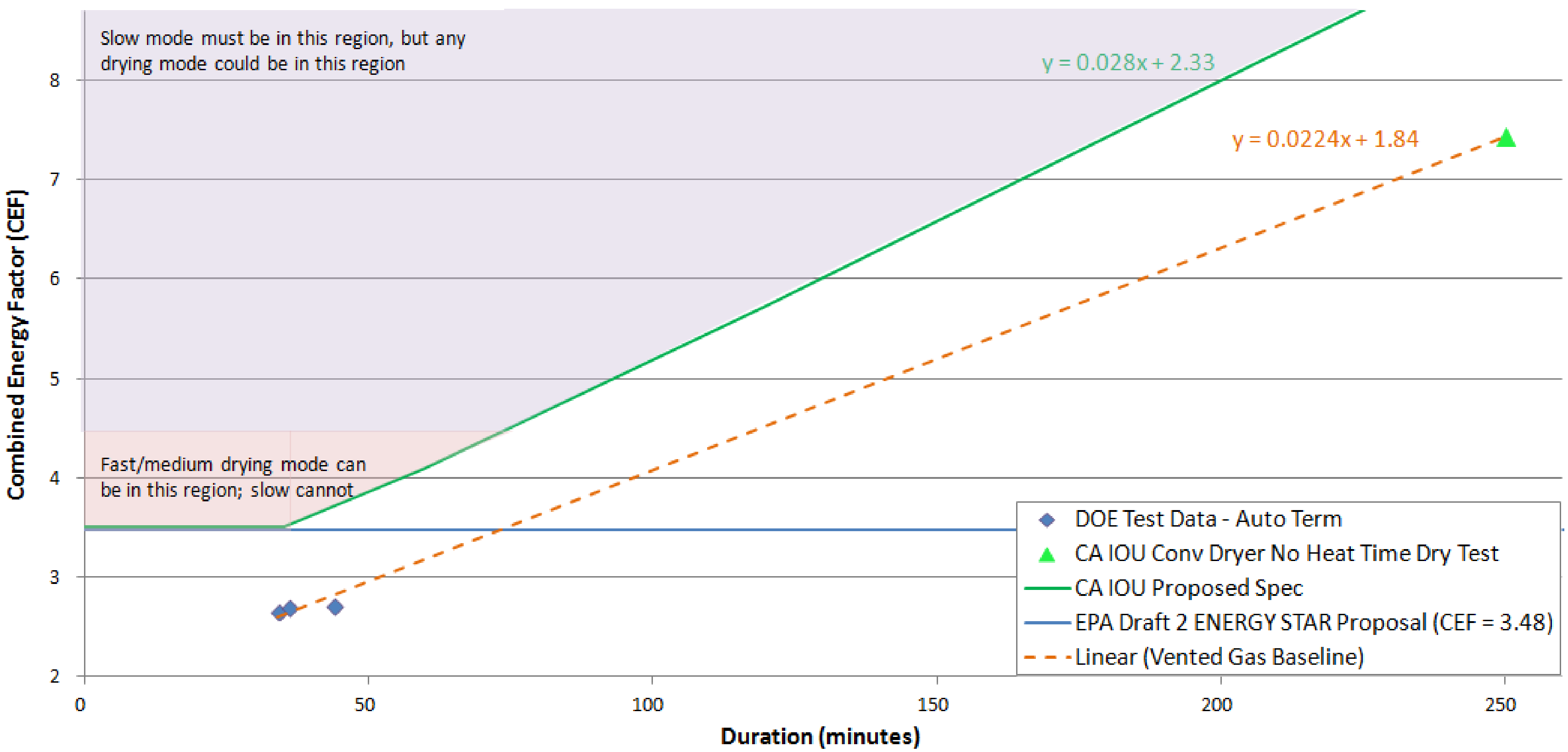
Testing in the same three modes would be required to ensure that consumers have a very high efficiency choice and that energy is saved in all drying speeds. We propose that the slow mode minimum CEF correspond to similar drying time as in electric dryers. This would correspond to CEF = 4.4 (see Figure 5).

c. Vented compact 120 V dryers and vented compact 240 V dryers should also have a specification that increases with drying time and be tested in multiple modes

For the vented compact 120 V dryers and vented compact 240 V dryers, no-heat mode would offer high efficiency. Therefore, the specification should be a function of drying time. Also, testing in multiple modes would guarantee that consumers will enjoy energy savings regardless of drying speed. We do not yet have data to determine the parameters of this curve or mode limitations.

.

Figure 5: CA IOU proposed CEF for different modes of vented natural gas dryers. A specification that requires 6-9 valid runs (see text for details) would ensure that ENERGY STAR qualified natural gas clothes dryers meet a stringent level of efficiency across all drying times. The purple shaded region represents the efficiency and drying time requirement for natural gas clothes dryers in their slowest drying mode; however, any drying mode could be represented in this region. The red shaded region represents the efficiency and drying time requirement for natural gas clothes dryers tested in their fast and medium drying modes. Natural gas dryers tested in their slow drying mode cannot be in the red shaded region; in other words, their CEF must equal 4.4 lbs/kWh or greater. Note that the baseline (orange dotted line) includes the CEF and drying time data for a vented electric clothes dryer in no-heat mode, since our analysis indicates that an electric dryer in no-heat mode should behave in nearly the same way as a gas dryer in no-heat mode.



Option 2: EPA should have a sloped specification line and test according to D2

a. Full-sized electric dryers should have a specification that increases with increased drying time

This same proposed specification line would ensure that there would be some intrinsic improvement in the dryer in the mode measured and that dryers could not earn the ENERGY STAR label just by slowing the drying down (see Figure 6). The drawback to this approach, however, is that it would not guarantee energy savings in all drying speeds available. Similarly, it would not guarantee that consumers have the choice of setting a very high efficiency, slow drying mode.

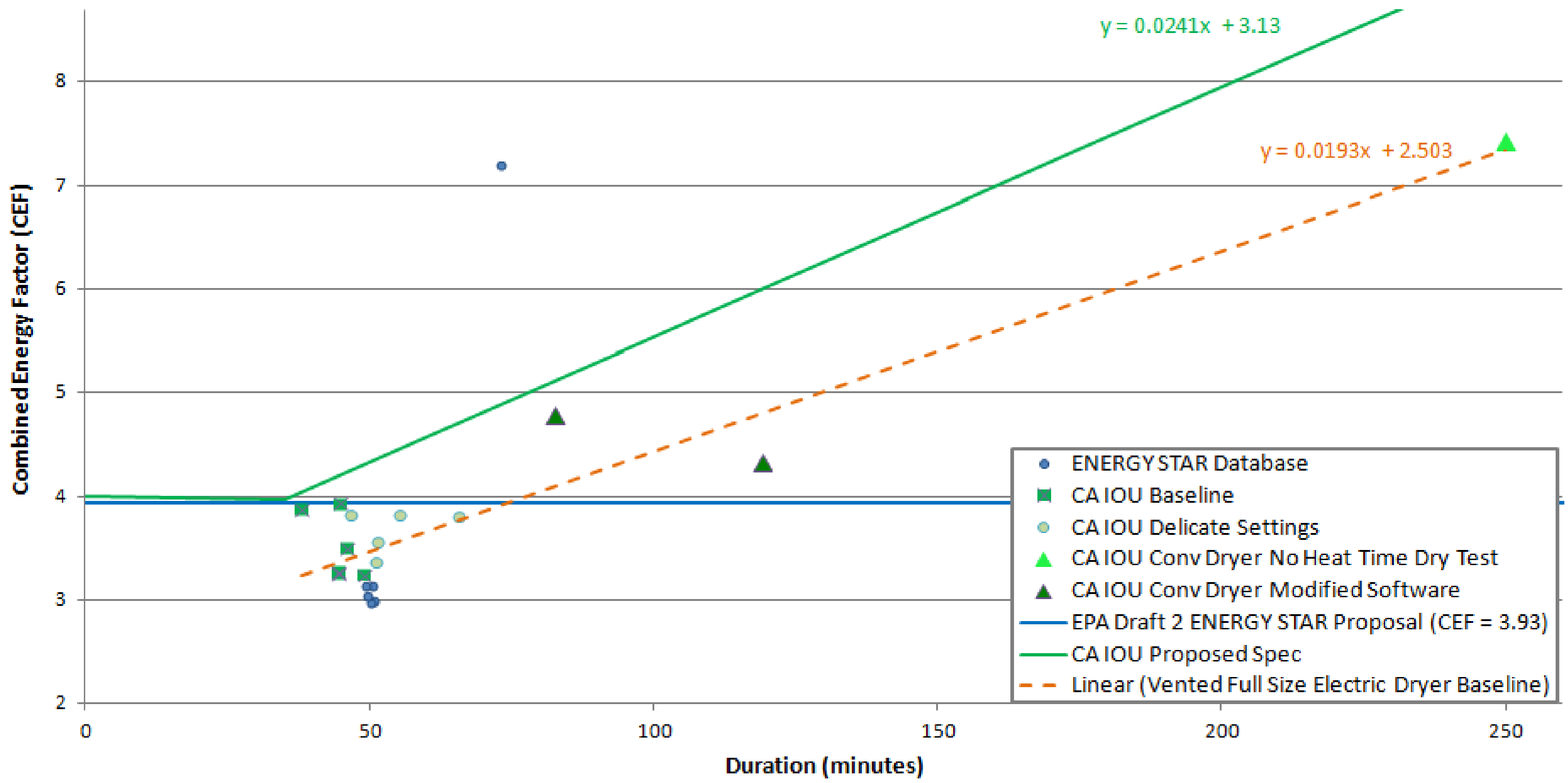
b. Vented gas dryers should also have a sloped specification line

This same proposed specification line would ensure that there would be some intrinsic improvement in the dryer in the mode measured and that dryers could not earn the ENERGY STAR label just by slowing the drying down (see Figure 7). Again, the drawback to this approach is that it would not guarantee energy savings in all drying speeds available. Similarly, it would not guarantee that consumers have the choice of setting a very high efficiency, slow drying mode.

c. Vented compact 120 V dryers and vented compact 240 V dryers should also have a sloping specification line

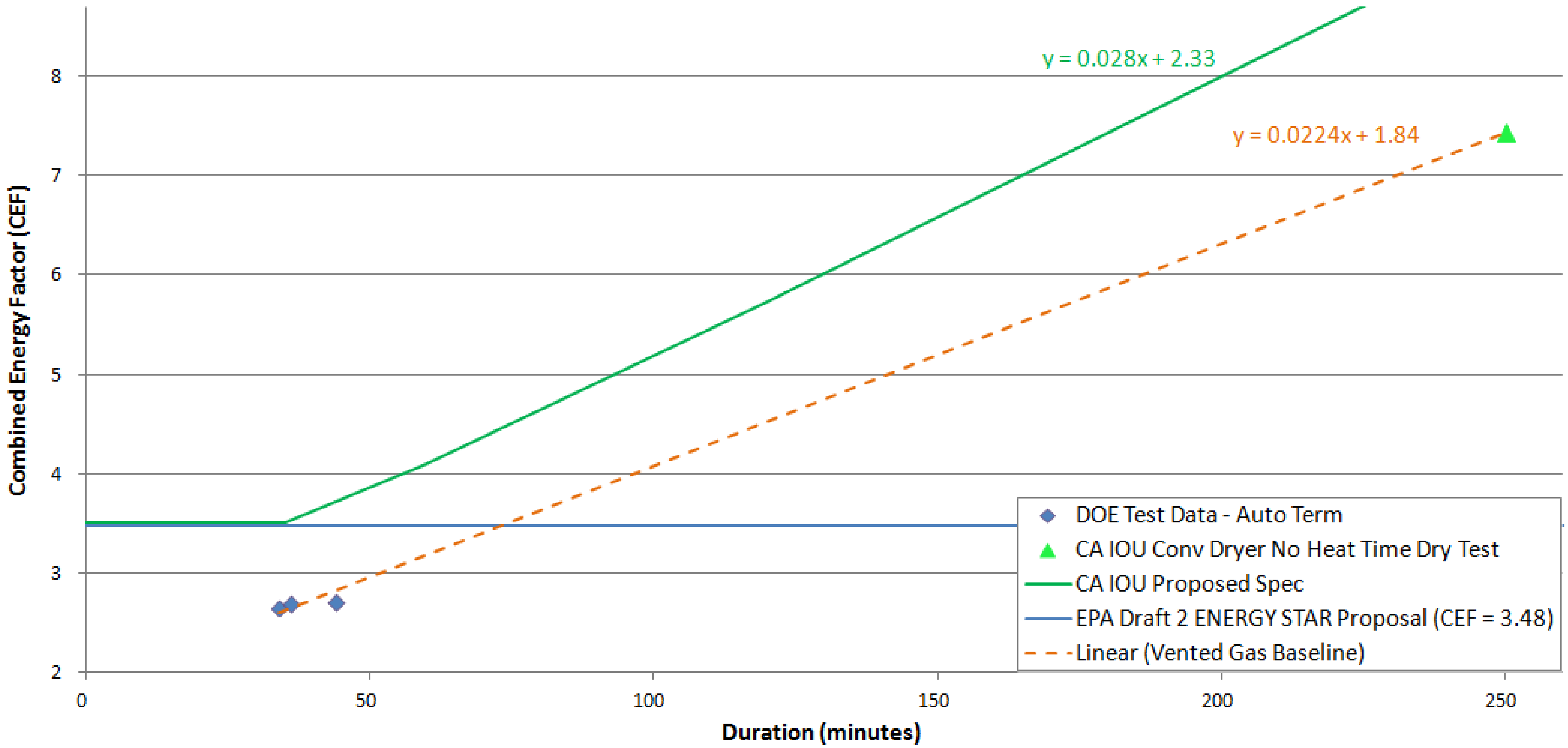
We do not yet have data to determine the parameters of the CEF curve for the compact vented dryers.

Figure 6: CA IOU proposed CEF specification line for vented full size electric dryers. The green line represents a proposed CA IOU ENERGY STAR specification line that increases efficiency stringency (CEF) with drying time. The orange dotted line represents a baseline for vented full size electric dryers that is based on drying time and CEF data represented in ENERGY STAR's analysis, as well as new data that the we are submitting in this comment letter.[9] The blue line represents EPA's proposed Draft 2 ENERGY STAR specification for vented full size electric clothes dryers (CEF = 3.93).



[9] This baseline does not include the advanced technologies of heat pump and exhaust heat exchanger.

Figure 7: CA IOU proposed CEF specification line for vented gas dryers. The green line represents a proposed CA IOU ENERGY STAR specification line for vented natural gas dryers that increases efficiency stringency (CEF) with drying time. The orange dotted line represents the baseline for vented natural gas dryers that is based on drying time[10] and CEF data represented by DOE's test data of automatically terminating vented natural gas dryers.[11] The baseline also includes the CEF and drying time data for a vented electric clothes dryer in no-heat mode, since our analysis indicates that an electric dryer in no-heat mode should behave in nearly the same way as a gas dryer in no-heat mode. The blue line represents EPA's proposed Draft 2 ENERGY STAR specification for vented natural gas clothes dryers (CEF = 3.48).



[10] The DOE Residential Clothes Dryer Test Procedure NOPR data did not actually include drying time data; we estimated it based on graphs.

[11] 2013-02-06 Presentation Slides: Test Procedures for Clothes Dryers - Notice of Proposed Rulemaking Public Meeting

Option 3: EPA should at minimum require vented dryers to demonstrate energy savings in the fastest mode to ensure that an ENERGY STAR-labeled dryer provides energy savings in the mode that is least likely to sacrifice drying time in order to gain energy savings.

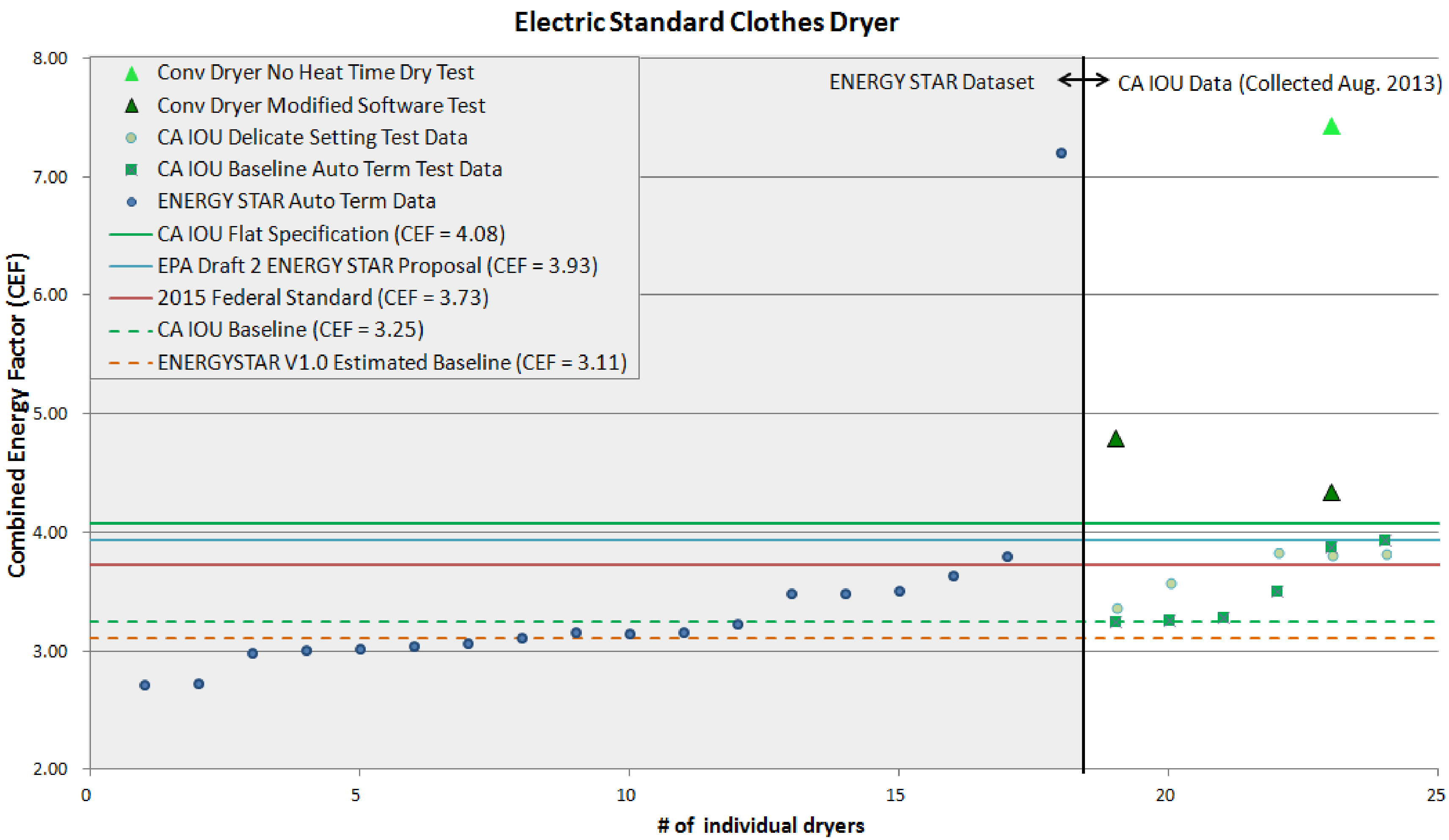
Figure 8 shows additional baseline data from testing conducted by Ecova on behalf of the California IOUs and Northwest Energy Efficiency Alliance (NEEA), indicating that the baseline should be 4% higher.[12] If EPA applied the same 20% energy savings to this higher baseline, the specification CEF would be 4% higher, or CEF = 4.08. This CEF could be used as the specification line independent of drying time, but applying to the fast mode. This would not guarantee that consumers have a slow drying option that would be very high efficiency. However, any slower modes offered would likely be higher efficiency. There would be no drying time limitation on this mode so as to allow technologies such as heat pump dryers. Table 2 shows the option 3 proposal for all product categories.[13]

Table 2. Option 3: flat specification line, and testing in fast mode.

Product Type	EPA CEF BASE (lbs/kWh)	IOU CEF BASE (lbs/kWh)
Vented Gas	3.48	3.48
Vented Electric, Standard (4.4 cu-ft or greater capacity)	3.93	4.08
Ventless Electric, Standard (4.4 cu-ft or greater capacity)	3.93	3.54
Vented Electric, Compact (120V) (less than 4.4 cu-ft capacity)	3.80	3.80
Ventless Electric, Compact (120V) (less than 4.4 cu-ft capacity)	3.80	3.42
Vented Electric, Compact (240V) (less than 4.4 cu-ft capacity)	3.45	3.45
Ventless Electric, Compact (240 V) (less than 4.4 cu-ft capacity)	2.68	2.68

[12] This excludes models that were chosen specifically because they were high efficiency under the 2005 test procedure.
[13] Ventless is explained below.

Figure 8. Option 3: CA IOU proposed flat specification and baseline. Individual data points represent individual dryer test runs (or averages of 3 identical runs). The shaded area of the chart represents ENERGY STAR's dataset of 18 runs (or averages) from 18 individual dryers. The unshaded area represents new data on 14 runs (or averages) conducted on an additional six individual dryers.[14] The green dotted line represents the CA IOU baseline that takes into account new data. The solid green line represents the CA IOU proposed flat specification line.



[14] One of these dryers does not have a delicate run.

II. Ventless electric standard clothes dryers, ventless compact 120 V dryers, and ventless compact 240 V dryers should be permitted to have a specification independent of drying time

Ventless dryers are inherently less efficient than vented dryers (all else equal, like the heat source) because ventless dryers cannot utilize the natural desiccating properties of room air. This also tends to increase drying time. Furthermore, though efficiency may be improved somewhat by slowing the drying process down, it would not be nearly as dramatic as the case of no heat for vented dryer. Therefore, it is not imperative to have a specification line that varies with drying time. We do not have additional data for these categories, and therefore support EPA's analysis and proposed level for the ventless compact 240 V dryers. However, we note that for the new categories EPA has proposed for ventless of electric standard and compact 120 V dryers, by using the same specification level as for vented, it will be more challenging for equivalent ventless dryers to qualify. Absent additional testing and analysis, we recommend a 10% reduction in the specification level for these categories. EPA and IOU proposals for ventless are summarized in Table 1 and Table 2 (the same in both tables). With the lower sensitivity of efficiency to drying time, it would be less important to test the dryers on multiple modes.

III. EPA should implement a Tier 2 with 10% more savings for electric dryers coincident with the January 2015 DOE standard

We agree with EPA that the initial specification should be easier to meet because it will take effect in the near-term. The general concept of saving 20% of energy including automatic termination, or about 10% of energy not including automatic termination is reasonable. However, in our comment letter on the Draft 1 specification, we demonstrated that closer to 20% energy savings beyond automatic termination would be feasible and cost-effective for electric dryers. Savings beyond automatic termination are particularly valuable because they would accrue even if the timed dry cycle is used. Therefore, we propose that ENERGY STAR multiply by 1.1 the specification lines shown in this Draft 2 comment letter for Tier 2. For gas dryers, since the cost of heat produced is significantly less, we propose to reserve the greater stringency for The Emerging Technology Award (see appendix).

Tier 2 should take effect January 1, 2015, coincident with the DOE standard. As when ENERGY STAR originally proposed its version 4 and version 5 specification levels for televisions, both tiers should be adopted simultaneously to give manufacturers as much advance notice as possible about the timing and the stringency of the second tier, so they can plan accordingly in their product design process. ENERGY STAR would reserve the right, as it did with televisions, to make minor updates to the second tier specification as its adoption date draws closer.

IV. EPA should further encourage the use of automatic termination.

We oppose the ability for timer dryers (those that do not have any automatic termination capability) to qualify for the ENERGY STAR label. For the remaining dryers that have automatic termination capability, we support SEDI's position of EPA encouraging an unequal choice hierarchy that will encourage user selection of the automatic termination option rather than timed cycles.

We also support SEDI's position of EPA requiring a warranty.

V. Clothing wear and tear, indoor air quality and HVAC impacts are important areas for future study and consideration by EPA, especially if the final ENERGY STAR specification promotes longer drying times.

Clothing wear and tear, indoor air quality and HVAC impacts are each significant issues associated with clothes dryers in addition to energy use. We support that EPA has expressed interest in studying further HVAC impacts of dryers, and encourage EPA to investigate these two additional issues.

The clothing temperature associated with a longer drying time is lower, reducing clothing wear and tear. However, more tumbling of the clothing would increase clothing wear and tear. Therefore, the result is ambiguous at this point, but further study is warranted because the clothing wear and tear would likely be a greater cost than the energy use.

As long as excessive building depressurization is avoided, exhaust ventilation provides significant indoor air quality benefits.[15] These ventilation benefits could be even larger than the energy cost,[16] especially for slow dryers.

The impact vented dryers have on HVAC energy use is associated with conditioning (heating, cooling, and or dehumidifying) the makeup air. This generally increases HVAC energy use. The HVAC impacts as compared to the dryer energy use depend on a number of factors, such as fuel type of the dryer, fuel type of the space heater, climate, whether the dryer is in a conditioned space or not, source energy for electricity, etc. If a longer drying time is implemented with the same airflow rate, much more total airflow occurs, making the HVAC issue more important to study. We recommend that EPA take the near term step in this process of requiring the measurement of the cumulative airflow for the cycle.

For ventless dryers (electric resistance or heat pump), all of the electricity going into the appliance is turned into heat that is then added to the room.[17] This is beneficial in the heating season, and detrimental in the cooling season. The impact is generally positive in the U.S. However, the net HVAC energy savings from ventless dryers would need to be weighed against the likely health benefits of greater venting in many homes.

We also believe it would be useful to consumers for EPA to report the annual and lifetime energy costs of each dryer model on the EPA website.

---

[15] "62.2 User's Manual: ANSI/ASHRAE Standard 62.2-2010 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings," December 13, 2010.

[16] William J. Fisk, "Estimates of Potential Nationwide Productivity and Health Benefits from Better Indoor Environments: An Update," Published as Chapter 4 in Indoor Air Quality Handbook, eds: J. D. Spengler, J.M. Samet, and J.F McCarthy, McGraw Hill.

[17] Assuming there are no leaks, and not dryers that condense onto cold water (which EPA has rightly excluded from consideration of the ENERGY STAR label).

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,

Rajiv Dabir
Manager, Customer Energy Solutions
Pacific Gas and Electric Company

Lance DeLaura
Southern California Gas Company

Steve Galanter
Manager, DSM Engineering
Southern California Edison

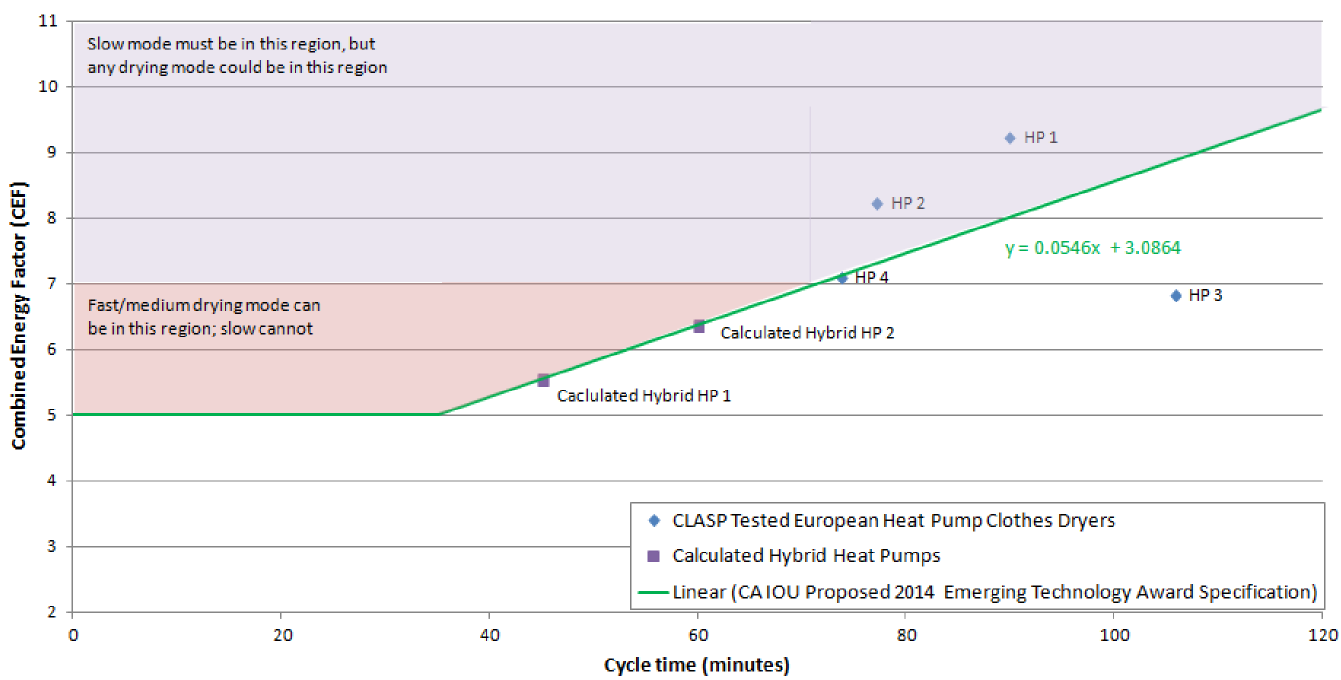
Chip Fox
Residential Programs and Codes & Standards Manager
San Diego Gas and Electric Company

Appendix: 2014 Emerging Technology Award recommendations: Include gas, have specification lines that increase with drying time, and test D2 in multiple modes

We support EPA's proposal to continue The Emerging Technology Award into 2014. We strongly encourage EPA to utilize appendix D2 as the test procedure for this award. For the reasons explained above, if the award applies to vented dryers, the specification would need to increase with drying time. However, even with condensing dryers, heat pump dryers open up the possibility of significantly different behavior with different drying time. For instance, a hybrid heat pump would contain electric resistance elements that could be turned on for faster drying, though this would make the efficiency lower. Another possibility is a heat pump with a variable compressor speed. The higher compressor speed would produce higher air temperatures and/or more heat and thus faster drying, but lower efficiency. Therefore, the specification should increase with drying time and multiple modes should be tested.

To develop an initial proposal, we used the four heat pump dryer tests performed for The Collaborative Labeling and Appliance Standards Project (CLASP) (see Figure A). We also calculated what CEF a hybrid heat pump might have.[18] Here we roughly use the best-fit line as the proposed specification (see Table A). One may argue that all heat pumps should be able to qualify, but in reality, a vented heat pump would likely be lower cost, greater efficiency, and shorter drying time. Furthermore, these European heat pump dryers' automatic termination systems were not optimized for the DOE test procedure.

Figure A. CA IOU proposed CEF specification line 2014 Emerging Technology Award for all categories of electric dryers. The green line represents a proposed CA IOU ENERGY STAR specification line that increases efficiency stringency (CEF) with drying time.



We also recommend that a separate Emerging Technology Award specification be developed for natural gas dryers. It is possible to construct a natural gas heat pump dryer. The mechanism is burning the natural

[18] In these cases, we have the drying time competitive with conventional dryers. Part of the heat would come from the heat pump, and the remainder would come from electric resistance.

gas and having this drive an absorption cycle that would produce more heat to dry the clothing than from simply burning the natural gas. Even if this is not economical due to relatively low natural gas prices, there are still other technologies that could push efficiency further than the IOU proposed levels for ENERGY STAR. A separate specification is needed within the Emerging Technology Award program because natural gas dryers inherently have lower site efficiency (the way the DOE test procedure measures energy use). Since all gas dryers must be vented, the specification should increase with drying time and multiple modes should be tested. Recognizing that the economics of improving the energy efficiency of natural gas dryers are more difficult, one possibility here is to use the Tier 1 specification for gas multiplied by 1.1 (see Table A).

Table A. CA IOU proposed Emerging Technology Award Specification.

Product Type	EPA CEF BASE (lbs/kWh)	IOU CEF BASE (lbs/kWh)
Vented Gas	N/A	2.56+0.031*(Drying time in minutes) for all modes; Slow mode ≥4.8 lbs/kWh; Fast & medium modes ≥3.8 lbs/kWh
Electric, all categories	N/A[19]	3.09+0.055*(Drying time in minutes) for all modes; Slow mode ≥7.0 lbs/kWh; Fast & medium modes ≥5.0 lbs/kWh

[19] The current Emerging Technology Award specification is not relevant because it utilizes the 2005 test procedure (without automatic termination).