**WORKPAPER DISPOSITION FOR**

**WPSCGREAP150604A Appliances and Plug Loads Clothes Washer Recycling**

**California Public Utilities Commission, Energy Division**

January 8, 2016

**Review Summary**

The EAR team has completed its review of the workpaper and has identified significant problems with the underlying assumptions, supporting research and documentation and some of the calculation methods described in the next section. The disposition includes the following:

* Alternative values, developed by the EAR team and approved by CPUC staff, are included in . SCG must update the workpaper to reflect the alternative values and these values shall be used for any savings claims.
* The savings for units collected from multifamily common laundry facilities are not approved at this time, the savings for units collected from individual dwellings may be used for multifamily units. SCG may submit additional documentation to support the savings case for units collected from multifamily common laundry facilities.
* The workpaper shall be updated to include preliminary cost-effectiveness analysis, including all anticipated costs and incentives, as well as TRC and PAC results.
* The research plan provided as an attachment to the workpaper shall be updated to include survey work intended to identify consumer preferences and behavior with respect to discarding and acquiring used clothes washers. This work shall be completed by the PAs prior to 12/31/2016 and shall be independent from the planned CPUC EM&V activities. PAs shall submit the revised research plan to CPUC staff for review and approval.

Table - Clothes Washer Recycling Savings Values

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Collection Location | Savings Value | Calculation Case | IOU | | | |
| SCE | PG&E | SDG&E | SCG |
| Individual Dwelling Unit | kWh | Workpaper Gross | 312 | 596 | 326 | 247 |
| **EAR Team Gross** | **23** | **58** | **28** | **16** |
| **EAR Team NTG** | **0.90[[1]](#footnote-1)** | | | |
| kW | Workpaper Gross | 0.162 | 0.301 | 0.177 | 0.131 |
| **EAR Team Gross** | **0.0034** | **0.0082** | **0.0041** | **0.0024** |
| Therm | Workpaper Gross | 18.6 | 4.3 | 17.4 | 21.4 |
| **EAR Team Gross** | **3.5** | **2.1** | **3.3** | **3.8** |
| Multifamily Common Area | -- Measure Not Approved -- | | | | | |

**Summary of Issues Identified in this Review**

1. A primary contributor to savings is the assumption that there will be a 50% reduction of laundry loads as appliances are recycled. All of the energy associated with the 50% reduction of laundry loads is included in the estimated energy savings, which can only happen if the loads that would have been done by those units are not done at all. This is not a credible assumption.
2. The analysis assumes that all collected appliances have market viability and should receive some level of savings, which is not a reasonable assumption. The workpaper authors’ analysis suggests that, at the most, about 50% of discarded appliances currently make it back into the market. Put another way, at least 50% of all discarded appliances are currently being destroyed even though there are no energy efficiency programs in place to support this activity. Any recycling program will likely collect some fraction of the 50% that would have never made it to the secondary market without the program. Since these are currently being discarded as a matter of standard practice, they should be assigned no gross savings as they represent “standard practice” for the measure.
3. The selection of values for base case and measure energy use are based on non-comparable source data and as a result over-estimate savings.
   1. The use of the 2006-2008 Residential Retrofit evaluation findings for non-EnergyStar clothes washer and paired dryer energy use as representatives of the proposed program collected appliances (the base case assumption) results in a pessimistic (high) energy use assumption. However, the 2006-2008 Residential Retrofit evaluation only examined 24 non-EnergyStar appliances so the results may not well represent the probable participant population of the proposed program.
   2. For the measure side of the savings calculation, the use of the Department of Energy (DOE) standards calculation applied to a minimally compliant unit for the measure case (the energy use by the washer (and associated companion dryer) in place of the collected washer) results in an optimistic (low) energy use assumption for the measure case. The 2006-2008 Residential Retrofit evaluation showed that measured usage is significantly higher than the DOE rating, thus it is not appropriate to intermix purely field measurements with rating calculation values. In this case the choice of field measurements along with standards calculations likely results in over-estimation of the savings.
4. The application of interactive effects is incorrect in assuming that all energy use is within the conditioned space, thus incorrectly elevating kWh and kW (as well as increasing the heating energy takeback) savings by as much as 20%.
5. The demand calculation is incorrect. The workpaper must follow DEER methods for individual dwelling units. The workpaper method for multifamily common units is incorrect, overestimating the CDF by at least a factor of 3.
6. The individual dwelling unit savings are based on 295 annual cycles which is the value used in the DOE rating calculation for residential laundry appliances. However, 2009 Residential Appliance Saturation Survey (RASS) findings include lower annual cycles with 269 for single family, 217 for multifamily and 214 for manufactured homes. The 2010-2012 WO35 Appliance Recycling Program (ARP) evaluation analysis shows that most program participants and that over 90% of used appliance acquirers were single family home occupants. Additional research may be needed to estimate participant fractions for clothes washer recycling as well as the characteristics of typical used clothes washer acquirers. At this time, CPUC staff accepts the use of the number of cycles for single family homes published RASS (269 annual cycles).
7. At this time, CPUC staff does not approve the savings values for units collected from multifamily common areas and will re-consider this collection point when additional supporting information is provided. The workpaper includes limited information to support the inclusion of units collected from multifamily common areas in the program. Workpaper references provide information about the market for used appliances in individual dwelling units. Some available market data indicate that multifamily common laundry appliances are not usually re-sellable upon retirement due to their higher than normal use, thus lower expected years of life compared to in-unit residential appliances. The savings calculations assume the DOE rated annual cycles for commercial clothes washers, but use calculation methods and other assumptions for residential clothes washers. It is not clear if the units collected will be actual commercial grade units or residential units adapted for common area use, such as by the addition of a coin operating box. As in the next bullet, there are several technical problems with the savings calculation. For now, SCG may use the savings for individual dwellings units for clothes washers collected from multifamily common areas.
8. The multifamily common appliance savings are based on 1,095 annual cycles, which is the value used in the DOE rating calculation for commercial laundry appliances. However, the data submitted from SCE field monitoring of multifamily common area laundry appliances indicates a much lower number of cycles for these installations. A simple extrapolation and average (assuming all clothes washers were monitored for two weeks as summarized in the SCE report) yields an average number of annual cycles of 548 or about half the workpaper assumed value.

**Detailed Review**

1. **Standard Practice Baseline**

The workpaper cites several sources for information about what fraction of replaced clothes washers remain in service:

In the Technical Description section: *“surveys suggest more than half of working top-loading clothes washers being replaced likely remain in use through the secondary market.”*

In the Program Implementation Overview: *“Interviews with industry experts suggest that 25% of the used clothes washers that recyclers receive from retailers and residential households are resold and remain in use. More broadly, approximately 30-40% of all used appliances picked up by retailers are resold instead of recycled.”*

The cited research within the workpaper indicates an opportunity to intercede in the secondary market as a means to reduce supply of used units and, by limiting supply of inefficient top-loading machines, causing the acquisition of newer, more efficient units. However, the cited research also indicates that 50% or more of replaced units are currently being permanently removed from service as a matter of standard practice. As adopted in the recent Phase 2 rolling portfolio decision, savings from ARP collection of used refrigerators and freezers that would have been otherwise discarded with or without the program shall not be included in the calculation of gross savings[[2]](#footnote-2),[[3]](#footnote-3). In the case of refrigerator and freezer recycling, the ex post research indicates that the programs are collecting a large number of units that would have been permanently removed from service, without program intervention, because they had little or no value in the secondary appliance market, either through peer-to-peer or retail channels[[4]](#footnote-4). However, since incentives are offered for any operating used appliance, the programs, at this time, cannot discriminate between these otherwise standard practice discarders. PG&E’s recently published market research for “Retailer Haul-Away Market Intervention” (RAHMI) indicates that all but a small fraction (<10%) of refrigerators and freezers collected by retailers are permanently removed from service and processed for recycling and disposal[[5]](#footnote-5). Additionally, three separate appliance recycling impact evaluations, for program years 2004-2005, 2006-2008, and 2010-2012, found the cut-off age of 10 years for used unit viability in the second-hand market (i.e. people looking to buy a used refrigerator, whether residential customer or used appliance retailer, are not interested in units older than 10 years, meaning it is quite likely that all units older than 10 years would be recycled in the absence of a recycling program). We expect a clothes washer recycling effort to face the same challenge and that the program will likely collect a portion of units that would have been permanently removed from service, regardless of the program. As part of this workpaper review, CPUC staff contacted a limited group of contractors engaged by major retailers in northern California to haul away appliances for customers who purchased new units. All of these contractors indicated that the units they collected were sent to recyclers for destruction.

1. **Savings Values for Disposition Paths**

A primary component of the savings of this measure is based on the assumption that 50% of collected appliances would have stayed in service without the program. The program logic presented in the workpaper assumes that the proposed program intervention causes these units to be removed from service completely, and nothing is installed in their place. The workpaper proposes that this disposition path receives full savings in the gross savings calculation. However, full savings in this gross savings scenario assumes not only that the unit is never replaced, but the loads of laundry that were once cleaned by the destroyed appliance when it was in service are never again washed by another appliance, which is not a plausible outcome of the program.

1. **Unit Energy Consumption of Baseline and Measure Appliances**

The baseline for all measures is the UEC of non-EnergyStar rated appliances, as measured in the 2006-2008 residential retrofit program evaluation[[6]](#footnote-6) (Cadmus). This evaluation included field monitoring of top loading clothes washers that were not Energy Star qualified. The Cadmus study also included field monitoring of a large group of Energy Star and CEE qualifying clothes washers. The final UEC values for all efficiency classes of clothes washers from the Cadmus study are included in . For the workpaper, measure UEC values are either:

1. Zero for cases where the discarder acquired no appliance after discarding the clothes washer through the program, or
2. The same as the baseline for cases where the discarder acquired another used appliance, or
3. The UEC of a new, minimally code compliant clothes washer for cases where the discarder acquired a new appliance

For case 3 (the installation of a new, minimally compliant appliance), the workpaper uses a UEC value from the DOE Technical Support Document that represents the minimally compliant top-loading clothes washer. The EAR team is concerned that the UEC for the baseline and measure cases are determined from fundamentally different methods and that the proposed savings in the workpaper may be due to the differences in those methods rather than the actual performance of new versus collected clothes washers that can be expected in actual installations. To illustrate this, includes results from the Cadmus study along with values calculated according to DOE rating methods for units of the same minimum efficiency levels. The average energy use per appliance from the research is about 50% higher than the rated energy use. The research findings show that dryer energy use is much higher. This may be an indication of poor dryer condition or maintenance, but it does not appear this was investigated as part of the Cadmus study.

The recently adopted DEER measures utilize UEC values calculated using identical methods[[7]](#footnote-7), following methods utilized for estimating savings in the USDOE’s Build America program. The baseline is the UEC of a minimally compliant appliance of the same class (top- or front-load and small, medium or large tub size) while the measure is clothes washer that meets CEE Tier 1, 2 or 3 requirements for front loading units. For top loading units there are two measures: one meeting Energy Star requirements and a second measure developed based on the most efficient top-loading units currently available. While the Cadmus research may indicate that actual energy use may differ significantly from the estimates developed from DOE methods, the DEER team chose to use the DOE rating methods for DEER clothes washer measures in order to maintain consistency of calculations between the measure and the baseline UEC, thus avoiding the possibility that energy savings could be due to differences in determination methods rather than actual operations.

As part of this workpaper review, the EAR team searched for any field monitoring studies or research findings of older clothes washers and did not locate any. The EAR team cannot accept the workpaper assumption of the most pessimistic (highest) energy use for the discarded appliance and paired with the most optimistic (lowest) energy use for the new appliance. One possible approach to addressing this is to assume increases (or decreases) in the measure clothes washer energy use in the same proportions as were observed in the Cadmus research. For example, for the CEE Tier 3 (2007-2008) units, field studies observed domestic hot water energy use was about 14% lower in the Cadmus study, dryer energy use was about 78% higher and clothes washer machine energy use was about 40% higher.

Table - Clothes Washer Energy Use, Evaluation Findings vs. DOE Ratings



1. **Demand Savings**

Demand savings are estimated based on data collected as part of an SCE field monitoring study of several multifamily common area laundry facilities[[8]](#footnote-8). The workpaper develops a demand impact estimate from an SCE field study of clothes washers in multifamily common laundry facilities as follows:

*“ … on average, 36.7% of the cycles occurred during the period of 2pm to 5pm on weekdays; this is the coincident demand factor (CDF). The data also showed that the average washer cycle was 30 minutes. The following equation is used to estimate peak demand savings for residential clothes washers in a multi-family common area:”*

This equation for demand was developed from the SCE multifamily study, but is also used for the individual dwelling unit demands by using a value for ‘kWH savings’ based on 295 cycles per year instead of 1,095. The demand calculation is not acceptable for the following reasons:

1. Individual Dwelling Unit Demand Impacts are Included in DEER: DEER modeling methods incorporate usage profiles for clothes washers from the Build America modeling guidelines[[9]](#footnote-9). The normalized daily profile, shown in , is used for all end uses associated with clothes washers including washing machine energy, dryer machine and drying energy, and hot water usage.

Figure - Clothes Washer Usage Profile for Individual Dwelling Installations



The DEER CDF is the average of the values for the three hour demand period, hours 15, 16 and 17:

The end use demand savings, before interactive effects are added, is then calculated according to the following equation:

1. Monitoring Period for Coincident Demand Factor: It is not clear what the measurement period was for determining the demand calculations. The first record in the data summary spreadsheet shows 569 minutes of operating during the demand period. It is not clear if this is the monitored operating time for the full two week monitoring period. Other data records show very small amounts of operation during the peak demand period, with values as low as 56 minutes. It is not possible to correctly calculate the peak period operation without additional information concerning the periods of recording. Some data appears to be entirely unusable. For example, one record shows 60 minutes of operation with all operation occurring during the demand period. This results in a CDF of 100% that gets equally weighted with the 39 other appliances in the dataset.
2. Calculation Method for Coincident Demand Factor: Including the value of 0.5 hours per cycle in the denominator of the demand calculation is incorrect. The demand is calculated as the average kW demand occurring between the hours of 2-5 pm during the three hottest week days of the year. For direct impacts, it is reasonable to calculate an average over any period of weekdays. For example, for a Monday-Friday period, there would be 15 hours of peak demand operation and the CDF would be calculated as:

There is not enough data or information provided with the SCE multifamily study to properly calculate the demand impacts based on the study. Therefore, the EAR team has recalculated the demand impacts following DEER methods, adjusted for the larger number of annual cycles, as described below for individual dwelling unit collections.

1. Approach for Using Building America Profiles for Multifamily Common Measures: The Building America support documentation was recently updated in 2014[[10]](#footnote-10) to include usage profiles for multifamily common clothes washers. Figure 2 is taken directly from the Building America simulation protocols and shows that the typical usage during the demand period appears to be slightly higher than individual dwelling unit applications at 0.061.

Figure – Weekday Clothes Washer Usage Profile for Multifamily Common Laundry



1. **Interactive Effects**

The workpaper states that “interactive effects specific to clothes washers are unavailable” and proposes the use of DEER CFL interactive effects, using residential values for units collected from individual dwelling units and small office values for multifamily common units. The annual direct savings are multiplied by these interactive effects to calculate final, whole building impacts.

DEER includes clothes washer measures, but the interactive effects for these measures are not included with the measure impacts, and it would be a significant effort to develop them. Therefore, the use of the proposed CFL interactive effects is acceptable at this time. However, the workpaper approach of applying interactive effects to the entire end use savings is not correct as it assumes all end uses are within the conditioned space. All DHW systems are assumed to use storage type water heaters with standby losses that are constant and do not vary with DHW consumption since the tank is maintained at a constant temperature. Therefore, HVAC interactive effects due to DHW savings are negligible. Furthermore, DEER assumes that most energy associated with the clothes dryer is vented to the outside and therefore does not interact with HVAC systems. The space heat gain assumptions for clothes washers are included in the 2008 DEER update documentation and also included in [[11]](#footnote-11).

Table - DEER Internal Gain Fractions of Residential Appliances

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Electric Internal Gains | | Gas Internal Gains | |
| Appliance | Sensible | Latent | Sensible | Latent |
| Refrigerator | 1.00 | 0.00 |  |  |
| Clothes Washer | 1.00 | 0.00 |  |  |
| Dishwasher | 0.60 | 0.15 |  |  |
| Misc Loads | 0.81 | 0.02 | 0.13 | 0.25 |
| Clothes Dryer Elec | 0.15 | 0.05 |  |  |
| Cooking Elec | 0.40 | 0.30 |  |  |
| Clothes Dryer Gas | 1.00 | 0.00 | 0.10 | 0.05 |
| Cooking Gas | 0.00 | 0.00 | 0.30 | 0.20 |

The correct approach for calculating whole building impacts is to multiply the component energy uses that occur within the condition space by the interactive effects factors. For example, the following equation should be used to calculate the whole building electricity use of a clothes washer installed with an electric dryer and electric water heater.

where:

*∆kWh* = Total electricity energy savings attributable to removing the appliance from the market so that it cannot be re-acquired

*∆kWhwasher* = The electricity savings due to lower washing machine energy use attributable to appliance collection

*0.20* = The fraction of the electric dryer energy use that is rejected to condition space (from Table 2: *0.15sensible + 0.05latent = 0.20*)

*∆kWhdryer* = The electricity savings due to lower electric dryer energy use attributable to appliance collection

*0.80* = The fraction of the electric dryer energy use that is exhausted and not seen by the conditioned space (from Table 2: *1.0total  - 0.15sensible - 0.05latent = 0.80*)

*∆kWhDHW* = The electricity savings due to lower demand for domestic hot water use attributable to appliance collection

1. **Annual Laundry Cycles**

The annual energy savings in kWh for individual dwelling unit installations assumes 295 annual cycles, which is the value used in the DOE rating for residential clothes washers. The 2016 DEER update used the following annual cycles reported in 2009 RASS:

Single family: 269

Multifamily: 217

Manufactured home: 216

The EAR team is not aware of any data that indicates where used clothes washers are eventually installed. The results from surveys of acquirers of used refrigerators and freezers indicate that about 90% of all used refrigerators are placed into single family homes, while the rest are split between multifamily and manufactured homes as well as a small number commercial uses. Given that transferred used clothes washers are likely to be placed in service in single family homes, the available data from RASS indicates that annual number of cycles assumed by the workpaper may be too high by at least 10%.

The annual energy savings in kWh is estimated using the annual cycles used in the DOE rating for multifamily commercial washers (1,095 cycles/year). It is not clear that multi-family common laundry facilities fall into this category of use, even if the installed clothes washers are categorized as commercial grade. There are many monitored appliances in the SCE field study where as few as two cycles were observed during the two-week monitoring period. A simple extrapolation of the measure cycles to a full year, then calculating an average yields only 547 annual cycles[[12]](#footnote-12). Direct substitution of this value for the number of cycles would reduce the savings of the “new replacement” scenario by 50%. (NOTE: multifamily savings values are not approved at this time.)

1. **EAR Team Calculations and CPUC Staff Approved Values**

The EAR team developed an alternative set of savings values for units collected from individual dwelling units, provided in the attached workbook “Attachment\_NRDC\_CW\_recycling\_WP\_rev2-EARTReview-8Jan2016.xlsx.” The adjusted values are based on the original analysis workbook submitted with the workpaper. The EAR team made the following changes to the assumptions and calculation methods:

1. Disposition Paths: As discussed in items 1 and 2 above, savings of these measures are attributable to only certain counterfactual disposition paths. Similar to analysis performed for the ARP savings, the EAR team has developed inputs for the fractions of collected appliances that would have flowed through different disposition paths (or counterfactual actions) without the program. lists each of these disposition paths, followed by a description of each path. The disposition paths in rows labeled “Transfers (retail & peer-to-peer)” are transfer paths that result in net savings. The EAR team adjusted these percentages to reflect the workpaper assumption that up to 50% of all used refrigerators are transferred to new owners through the secondary market. One of the requirements of this disposition is for the PAs to conduct research to further identify consumer preferences and behavior with respect to discarding, transferring and acquiring used clothes washers.

Table – Workpaper and EAR Team Alternative Disposition Paths



Descriptions of Disposition Paths:

*Keep in use by participant:* The discarder would have kept the appliance in use without the program. For refrigerators and freezers, the savings is equal to the UEC of the discarded unit adjusted for the fraction of time it is unplugged in the event the unit is kept as a second appliance. The UEC for this path is more difficult to determine for clothes washers. At this time, there is no data available that supports an increased number of wash loads when there is more than one clothes washer in the house. For common laundry spaces, the number of wash loads per appliance appears to be a function of the number of dwelling units and total number of available clothes washers. The workpaper assumes this disposition path to be empty and designates it as a research area for the proposed secondary market research.

*Keep unused by participant:* The discarder would have kept the unit but never used it. For ARP, this path has no gross savings.

*Destroyed by discarder (non-viable units):* This path represents the units that have no value in the secondary market and, therefore, would never be transferred to a new owner. The workpaper assumes this path to include no units. The ARP analysis shows that programs are collecting units that have no secondary market value (though there is uncertainty about the total number of non-viable units collected by the program). It is not reasonable to assume that a mass-market program would only collect units that would be transferred to new owners via the secondary market. As discussed above, the adopted DEER2016 values for ARP assume program collection of non-viable units ranges between 21% and 35% depending on the IOU. These units would either be destroyed by the discarder or secondary market actors.

*Destroyed by discarder (viable units):* This path represents viable, less efficient units that would have been discarded anyway, even if the program had not collected them. For refrigerator and freezer recycling in the adopted DEER 2016 update, this path is the only free-ridership path. This path represents the units that still have viability in the used appliance market place, the program collected them, but the discarder would have had the appliance destroyed without the program. In the alternatives analysis worksheet, the EAR team adjusted the portion of units that are collected through this disposition path so that the final NTG was 0.70, which is the default NTG value for all unevaluated measures that have been in programs less than two years.

*Acquires similar unit:* Acquirers purchase a used unit very similar to the discarded unit. The workpaper identifies this path as having no gross savings. The ARP analysis for DEER 2016 assumes that the program is likely having enough impact in the secondary market that is causing the overall efficiency of used appliances to improve over time. The ARP UEC for the similar unit was determined by estimating the average UEC based on previously collected appliances that were 8 years old and less.

*Acquires a new unit:* Acquirers purchase a new unit that minimally complies with the current efficiency requirements for clothes washers.

*Acquires nothing, Laundry washed by another appliance:* The acquirer does not purchase a unit due to lack of availability of used appliances. Instead, the acquirer washes clothes using some other means such as a laundromat or an acquaintance.

*Acquires nothing, Laundry loads not washed:* The acquirer does not purchase a unit due to lack of availability of used appliances and the number of overall laundry loads is decreased due to no clothes washer being acquired. The workpaper assumes that this disposition path makes up 50% of the savings. As discussed above, CPUC staff finds this assumption highly unlikely as it implies that the overall quantity of wash loads decreases in proportion to the number of collected appliances.

*Destroyed by secondary market actors (non-viable units):* This path represents units destroyed by secondary market actors, such as used appliance retailers, who destroy collected appliances that presumably cannot be resold. The DEER 2016 ARP savings assume that 21-35% of all collected appliances have no secondary market value and would be destroyed by either the discarder or secondary market actors, as standard practice, without the program.

1. Measure Case Unit Energy Consumption: As discussed in item 3 above, the Residential Retrofit evaluation findings indicate that actual energy use associated with clothes washers, particularly dryer energy use, is higher than is estimated using the DOE rating methods. The EAR team has adjusted the measure case energy use so that it is higher than the DOE rated values by the same proportions observed in the Cadmus study.
2. Demand Savings: As described in item 4 above, demand impacts for laundry appliances in individual dwellings are included in DEER. The EAR team recalculated demand impacts using the DEER laundry usage profile. While savings for multifamily collections are not approved at this time, the EAR team also recalculated demand impacts for those measures using the Building America laundry profile for multifamily common areas.
3. HVAC Interactive Effects: As discussed in item 5 above, calculations for whole building impacts are revised to apply interactive effects only to the energy use components that occur within conditioned space.
4. Annual Cycles: As discussed above in item 6 above, the EAR team revised the assumption for the number of annual cycles in individual dwelling units to 269 cycles per year. While savings for multifamily collections are not approved at this time, the EAR team is concerned that the proposed value for the number of annual cycles (1095) is too high. To examine the impact of reduced annual cycles, the EAR team developed three alternative sets of values for 1095, 821 and 548 annual cycles for multifamily common laundry installations. These are the EAR team’s exploratory calculations provided for reference only.

1. Typically, this measure would get the default NTG of 0.70, which is the default value for measures that have no other supporting EM&V and have been in programs less than 2 years. For this measure, however, there is a substantial body of evaluation work available, including evaluation research cited by the workpaper as well as recent evaluation work covering the refrigerator and freezer appliance recycling program. The EAR team utilized this research to develop a new NTG value. The development of this NTG is included in the attached workbook “Attachment\_NRDC\_CW\_recycling\_WP\_rev2-EARTReview-8Jan2016.xlsx.” [↑](#footnote-ref-1)
2. D.15-10-028 at 111: *To amplify: ostensible savings from non-viable units discarded or destroyed – that is, refrigerators that certainly would have gone out of service even without a program – get removed from the baseline savings. Eliminating such ostensible savings, which are not really savings at all, requires removing them from the calculation of the gross baseline.* [↑](#footnote-ref-2)
3. FOF 28: *Commission Staff’s proposed DEER values reflect that used appliances of different ages have different probabilities of being able to be transferred to new service locations when retired from service at their current location. Some of the assumptions Commission Staff would have us make regarding what would have happened to refrigerators and freezers absent appliance recycling programs should change to better reflect the uncertainty in the data currently available or the rate at which the odds of selling an old appliance deadline.* [↑](#footnote-ref-3)
4. The staff analysis for proposed ARP savings values for DEER2016 showed a range of 37-48% of all collected appliances (depending on IOU) likely have no value in the secondary market. As discussed in FOF 28, the final assumptions for secondary market viability were adjusted, resulting in a range of 21-35% of all collected appliances having no secondary market value. [↑](#footnote-ref-4)
5. “Pacific Gas & Electric Appliance Recycling Program Process Evaluation Research: Retailer Haul‐Away Market Intervention” prepared by The Cadmus Group, Inc. for Pacific Gas and Electric, January 27, 2015. [↑](#footnote-ref-5)
6. “Residential Retrofit High Impact Measure Evaluation Report (2010)” prepared by The Cadmus Group, Inc. [↑](#footnote-ref-6)
7. “DEER2016 Residential Clothes Washer Update” workbook published with the DEER2016 update and adopted with D.15-10-028, http://deeresources.com/files/DEER2016/download/DEER2016-ClothesWasherUpdate-15May2015.xlsx [↑](#footnote-ref-7)
8. “Multifamily Laundry Equipment Operational Data Collection” prepared by Partner Energy for Southern California Edison, April 2014 [↑](#footnote-ref-8)
9. “Building America Research Benchmark Definition, Updated December 20, 2007”, United States Department of Energy, Building Technologies Program; NREL/TP-550-42662 [↑](#footnote-ref-9)
10. “2014 Building America House Simulation Protocols,” United States Department of Energy, Building Technologies Program; NREL/TP-5500-60988 [↑](#footnote-ref-10)
11. “2008 DEER Update - Summary of Measure Energy Analysis Revisions, Version 2008.2.05 for 2009-2011 Planning/Reporting”, December 2008, updated January 2010. http://deeresources.com/files/deer0911planning/downloads/DEER2008UPDATE-EnergyAnalysisMethodsChangeSummaryV9.pdf [↑](#footnote-ref-11)
12. Two documents were provided covering the SCE multifamily laundry equipment field study: a three page summary of the data collection process and a spreadsheet providing overall operating data, in terms of total minutes, minutes per cycle and total number of cycles. The summary states that data collection was performed over a “typical two week period” and includes a summary of the number of units and bedrooms in each apartment building. However, no information is provided about vacancy, occupant demographics or condition of the monitored machines and there is no discussion of how the appliances monitored may represent the overall population of multifamily common clothes washers. Nevertheless, to the extent that the demand values were estimated from this research, it is reasonable to expect that the observed number of cycles should have at least been considered as an input to the savings calculations. [↑](#footnote-ref-12)