Appendix D

Other SWEEP Program Equipment Findings

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The data presented in this appendix supplement the data found in the main report. The purpose of presenting these data is to provide more detail as well as the accompanying statistics.

While each chart below presents different data, the general format is consistent. The x-axis of each graph represents the home number. Homes 1-25 are the Lafayette participants; homes 26-50 are the Wilsonville participants. The y-axis of each graph is one of the evaluation metrics. These metrics include water use, water savings, energy use, and energy savings for the different program appliances. The numeric value on the graph represents that home's mean use, or savings, over the study period.

The solid lines shown on each graph represent the study-wide mean savings for the particular metric reported. On the charts reporting savings, each mean savings line is bracketed by 95% confidence intervals. These intervals represent the range of values that the reported value could statistically take, with 95% confidence. Another way of thinking of this interval is as follows. If we were to conduct this same test 100 times, we would expect the resulting values to fall with this range 95 of the 100 times. Recall the confidence interval discussion at the beginning of the End Use Data subsection on page 27 of the main text. The solid line indicates the estimated mean of the average savings, D-bar. The standard deviation S_d is the variability between the observed average household savings. The standard error of the mean savings is then S_d/sqrt(50), which leads to the upper and lower 95% confidence limits indicated by the red dotted lines.

Clothes Washer Data

Figure D.1 presents the mean per-cycle clothes washer water use. Note the significant home-to-home variance in the *baseline* water use compared with the *retrofit* water use. This variance is likely due to the *baseline* clothes washers being a mix of washer models and ages, whereas the retrofit clothes washers are all the same age and model.

Figure D.2 presents the mean per-cycle clothes washer water savings. The mean savings are 15.2 gallons/cycle. The upper and lower 95% confidence intervals, 13.3 and 17.1 gallons/cycle, respectively, are indicated by the red dotted lines. We can thus conclude with 95% confidence that the mean savings is not only greater than zero, but is actually greater than (or equal to) 13.3 gallons/cycle. The home-to-home variance is again likely due to the *baseline* clothes washers being a mix of washer models and ages, whereas the retrofit clothes washers are all the same age and model.

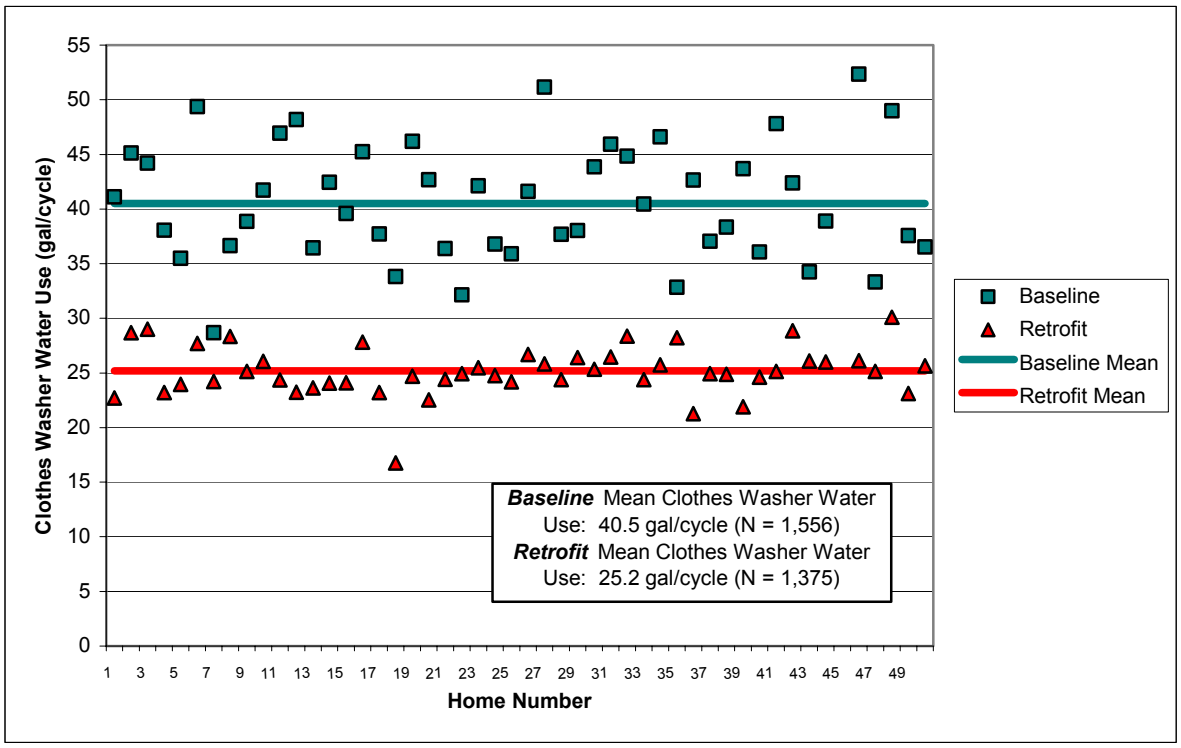

Figure D.1. Mean Per-Cycle Clothes Washer Water Use

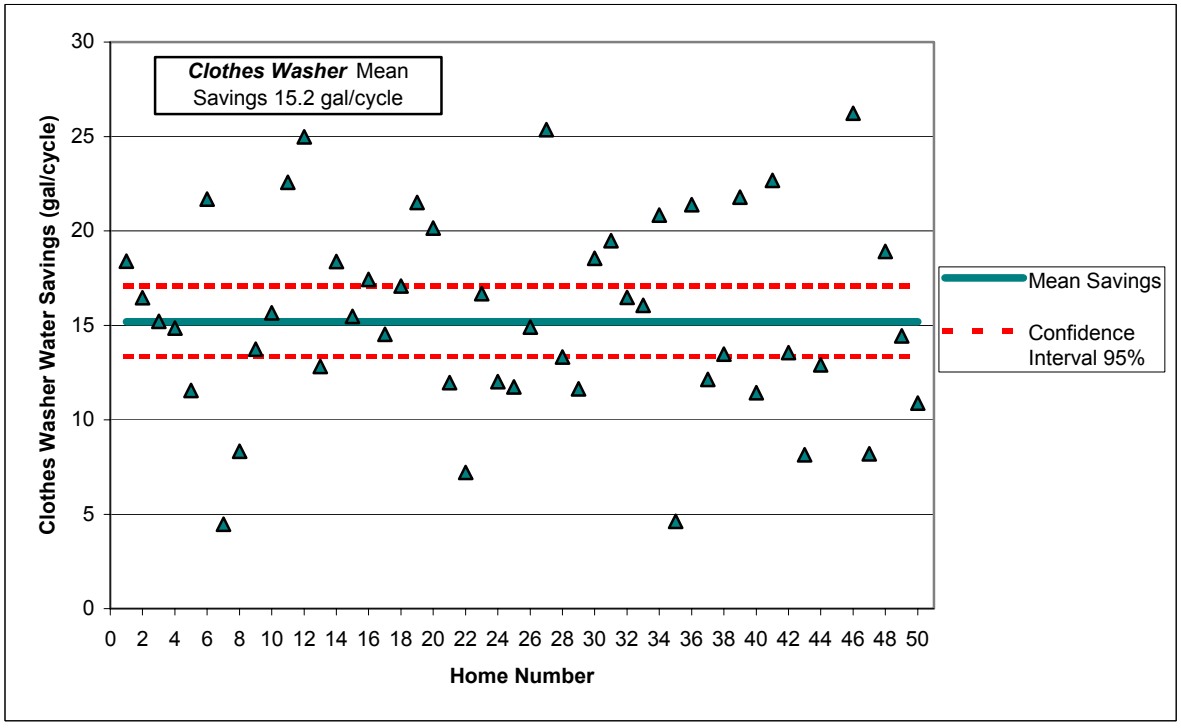

Figure D.2. Mean Per-Cycle Clothes Washer Water Savings

Figure D.3 presents the mean per-cycle clothes washer energy use. Recall that only a subset of the 50 homes received end-use metering capable of monitoring the energy use at the washer and dryer. Again, note the significant home-to-home variance in the *baseline* energy use compared with the *retrofit* energy use. This variance is also a likely a function of the *baseline* clothes washer age and water use characteristics in each home. Home 34's *baseline* washer was found to use and excessive amount of hot water—on the order of 20 gallons/cycle. Initially, it was thought that this was a problem with the metering equipment; however, it was checked and found to be operating properly. Its proper function was also confirmed when the retrofit data were collected and values were as expected. It is not clear why the baseline washer used so much hot water—possible explanations include a faulty hot-water control valve (solenoid), or a problem at the hose-bib connection.

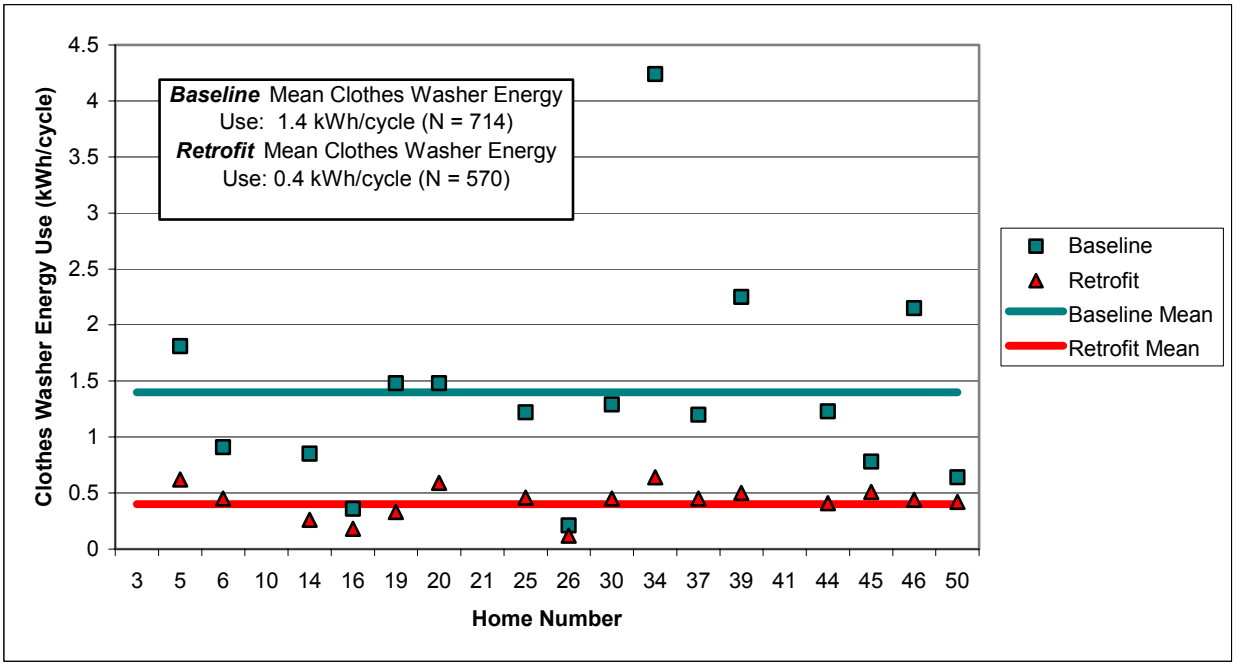

Figure D.3. Mean Per-Cycle Clothes Washer Energy Use

Figure D.4 presents the mean per-cycle clothes washer energy savings. The mean savings are 0.9 kWh/cycle. The upper and lower 95% confidence intervals, 1.3 and 0.6 kWh/cycle, respectively, are indicated by the red dotted lines. We can thus conclude with 95% confidence that the mean savings is greater than (or equal to) 0.6 kWh/cycle. The home-to-home variance is expected because the per-cycle energy use is a function of the wash cycle selected (hot, warm, or cold) as well as the load size. This is true in both the *baseline* and *retrofit* cases; therefore, the savings variance capture these differences.

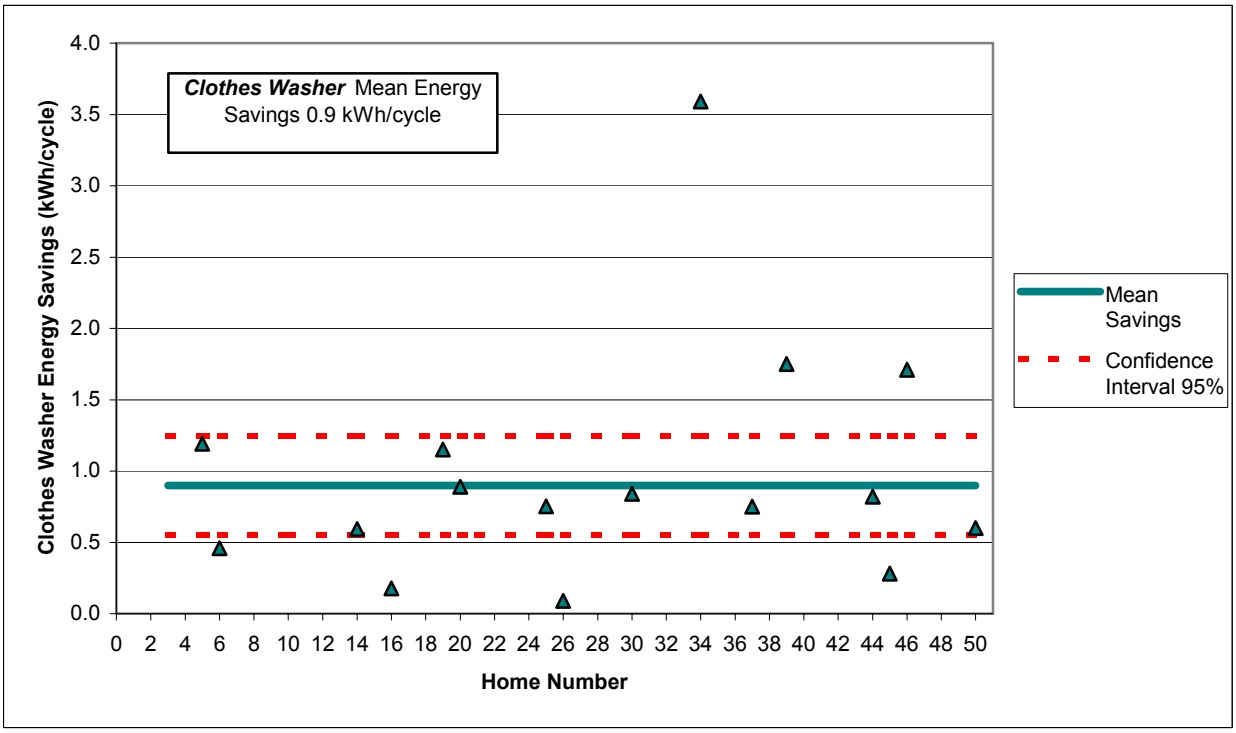

Figure D.4. Mean Per-Cycle Clothes Washer Energy Savings

Clothes Dryer Data

Figure D.5 presents the mean per-cycle clothes dryer energy use. In this case, the data show significant home-to-home variance in both the *baseline* dryer energy use and the *retrofit* dryer energy use. This variance is a likely function of clothes dryer use, settings, and load size/type.

Figure D.6 presents the mean per-cycle clothes dryer energy savings. The mean savings are 0.8 kWh/cycle. Note that included in these savings are two homes that showed increased mean clothes dryer energy use in the *retrofit* case over the *baseline*. The upper and lower 95% confidence intervals, 1.2 and 0.4 kWh/cycle, respectively, are indicated by the red dotted lines. We can thus conclude with 95% confidence that the mean savings is greater than (or equal to) 0.4 kWh/cycle.

In the raw data there was noted a significant variance in the per-cycle energy use of the clothes dryer. This variance is likely a function of the many different ways a clothes dryer is used, e.g., drying a full load of light-weight clothing (t-shirts, socks, etc.) versus a full load of heavy-weight clothing (jeans, work shirts, etc.), or drying a full load of general mixed clothing versus drying a light jacket wet from rain. These different clothes drying events typically use vastly different amounts of energy. It is these types of differences that result in significant variance in the data set and a correspondingly larger confidence interval.