Exhibit No. ___ (MSK-7)

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

DOCKET NO. UE-100176

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REPRESENTING

THE CADMUS GROUP, INC.

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**Date:** **May 1, 2012**

**To:** **Avista Technical Committee**

**From:** **M. Sami Khawaja, Danielle Kolp, Cadmus**

**Re:** **CFL Input Clarification from April 26th Webinar and Other Topics**

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This memorandum is intended to provide further clarification on key issues discussed at the April 26th webinar. In addition we provide summaries of the proposed approaches for: 1) the commercial segment of the Contingency Plan, 2) inputs to the Simple Steps, and 3) analysis of the clothes washer impacts.

# Contingency Plan

## Hours of Use (HOU)

Cadmus recommends using 2.45 hours per day. The following are the drivers for this recommendation:

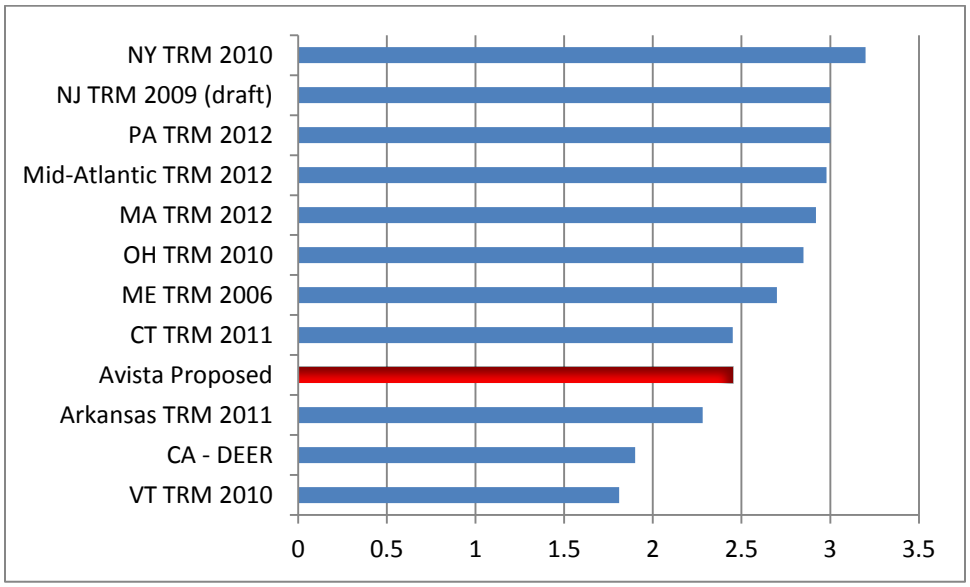
- The 1.9 value referenced by the RTF is an average across ***all*** bulbs in CA. One would expect CFLs to be placed in higher use area than the average bulb. The Contingency Plan included instruction regarding where the bulbs should be installed. A large number (61%) of survey respondents (sample size 676 residential customers) indicated they had read the instructions.
- The 2.45 number is based on recent metered HOU of CFLs (204 homes and 749 loggers in Missouri, Michigan, Ohio, and Maryland). The data were combined into a regression model with HOU as the dependent variable. Explanatory variables included day light hours, presence of children, education levels, urban/rural indicator, and room type. The model was used to estimate HOU for room type in Spokane. HOU by room type were then weighted to an overall average of 2.45. We also estimated a 2.1 HOU weighted average using the RTF room type HOU and Avista distribution.
- While Cadmus believes that market saturation does impact *where* the CFLs get installed, it does not impact the hours of use *within* a particular room type. In other words, a bedroom light is likely to be on the same number of hours in Ohio as it is in Washington (after correcting for time of year, hours of daylight, latitude, etc.). Table 1 shows the distribution of CFLs by room type in Avista's program compared to the logged data. Again, please note that we use average HOU by room type weighted to the Avista program to compute the 2.45 hours.

**Table 1: Distribution of CFLs by Room Type**

| Room | Avista | Multi-State Sample |
|---|---|---|
| Living Space | 38% | 41% |
| Kitchen | 11% | 17% |
| Basement | 10% | 5% |
| Outdoor | 5% | 15% |
| Bedroom | 16% | 12% |
| Bathroom | 12% | 4% |
| Other | 8% | 5% |

- We advocate the use of the mid-west, multi-state study over the CA study for several reasons. The multi-state study controls for not just room type, but existing CFL saturation, the presence of children in the home, and day type (weekday/weekend). Not only does this result in more precise estimates than one would achieve by simply taking a weighted average, but it allows us to estimate a value more appropriate to Avista's customer base.
- When compared to various technical reference manuals (TRMs) across the country, our value of 2.45 is in line with others, and appears on the conservative side.

**Figure 1: HOU By Jurisdiction**[1]




## In Service Rate

Recommended values for installation rates are based on actual survey data (which also happened to correspond exactly with the RTF year 1 installation rates). Cadmus constructed a logistic regression model survey data based installation rates over time. At the meeting, we discussed re-estimating the ISR model in a couple of different ways:

[1] VT TRM 2010: Projected estimate for 2011. Daily usage is DPS-VEIC agreement March 2009 (see ref doc). Based on November 2008 CFL Reduction Model. Annual operating hours are calculated as (Daily usage * 365). CA (DEER): 2008 metered evaluation of an average across all bulbs in CA. Arkansas TRM 2011: CFL METERING STUDY FINAL REPORT 2005, Pacific Gas & Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company, 2005. CT TRM 2011: Residential Lighting Markdown Impact Evaluation, Nexus Market Research, January 20, 2009. Maine TRM 2006: Impact evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Nexus Market Research & RLW Analytics. October 1, 2004. OH TRM 2010 (draft): Based on weighted average daylength adjusted hours from Duke Energy, June 2010; "Ohio Residential Smart Saver CFL Program" MA TRM 2012: Nexus Market Research and RLW Analytics (2008). Residential Lighting Measure Life Study. Prepared for New England Residential Lighting Program Sponsors. Mid-Atlantic TRM 2012: Based on EmPOWER Maryland DRAFT 2010 Interim Evaluation Report; Chapter 5: Lighting and Appliances. PA TRM 2012: US Department of Energy, Energy Star Calculator. Accessed 3-16-2009. NJ TRM 2009: US Department of Energy, Energy Star Calculator. NY TRM 2010: "Extended residential logging results" by Tom Ledyard, RLW Analytics Inc. and Lynn Heofgen, Nexus Market Research Inc., May 2, 2005, p.1.

a. **Logistic regression:** This is essentially the same model we presented last week, but with the modification to assume the maximum achievable ISR is 98% rather than 100% as previously stated to account for breakage. This change results in a 1% decrease in the ISR for PY2013.

b. **Linear:** Assume the installation service rate is a linear function with a maximum ISR of 98% rather than a logistic regression as stated above. This change results in a 1% decrease in the PY2012 ISR and a 7% increase in the PY2013 ISR compared to the logistic regression with a maximum ISR of 98%.

Cadmus continues to believe the weighted logistic regression is the best curve for modeling ISR. Cadmus proposes assuming a 39% ISR for PY2011 and completing additional surveys later in 2012 to improve our model of ISR over time.

**Table 2: ISR by Year**

| Year Installed | Original Logistic | 98% Max Logistic | Linear |
|---|---|---|---|
| 2011 | 39% | 39% | 39% |
| 2012 | 35% | 35% | 34% |
| 2013 | 19% | 18% | 25% |
| Total | **92%** | **91%** | **98%** |

Table 3 summarizes the residential input components as presented at the meeting.

**Table 3: CFL Savings Input Values**

| Component | Cadmus Analysis | Source | RTF |
|---|---|---|---|
| HOU | 2.45 | Avista data, multi-state study | 1.9 |
| DWM | 2.63 | Avista data, RTF method | 2.60 |
| WHF | 89.8% | Avista data, RTF method | 86.4% |
| DAYS | 365 | RTF | 365 |

## Commercial Program

We did not discuss the commercial program at the meeting, but we intend to use the 6th Power Plan inputs as follows.

**Table 4: Commercial Savings Input Values**

| Component | Cadmus Analysis | Source | 6th Plan |
|---|---|---|---|
| HOU | 10.02 | Avista data, 6th Power Plan (Weighted average by building type from survey) | 10.16 |
| DWM | 2.70 | 6th Power Plan | 2.70 |
| WHF | 85.5% | 6th Power Plan | 85.5% |
| DAYS | 365 | RTF/6th Plan | 365 |

The in service rate for commercial is based on Avista survey results. A logistic regression function similar to the residential model was developed, but our confidence in the long term ISR is low due to the late and tightly clustered shipment of bulbs in 2011. Cadmus proposes using the PY2011 ISR determined by the model of 33% and ***completing additional surveys later in 2012 and 2013 to more confidently estimate ISR for those years***.

## Unit Savings

The Unit Energy Savings (UES) per *installed* bulb are computed as:

$$UES = \frac{CFL\ Watt * Delta\ Watt\ Multiplie * HOU * 365\ days * Waste\ Heat\ Factor}{1{,}000}$$

$$UES = \frac{18.3 * \ 2.63 * 2.45 * 365 \ * 0.889}{1{,}000} = \ 38.65\ kWh$$

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The commercial UES is computed in a similar manner.

$$UES = \frac{18.3 * \ 2.70 * 10.02 * 365 \ * 0.85}{1{,}000} = \ 153.60\ kWh$$

**Table 5: UES Values**

| | Residential Per Unit Savings (kWh) | Commercial Per Unit Savings (kWh) |
|---|---|---|
| Total UES | 38.65 | 153.60 |

The final input into the program savings includes the installation rate as follows.

$$Program\ Savings = UES * ISR * Distributed\ Bulbs$$

As mentioned above, we are proposing a 39% installation rate for 2011 for residential and 33% for commercial. The remaining bulbs will be installed primarily in 2012 and 2013. The associated savings will be estimated using residential and commercial surveys.

# Simple Steps

Our recommendations for the critical components are:

- Use the same HOU as above (2.45 hours).
- Use the same in service rates as the residential Contingency Plan above. This is likely to be conservative as the delivery mechanism (participants paying for the bulbs and the fact that one third of the total is expensive specialty bulbs with likely installation rate of 100%). We propose using 91% (from the logistic model with the upper limit being 98% to account for breakage/removal). We feel that the Simple Steps program is sufficiently different from the one-time Contingency Plan program and does not need a segmented 3-year installation rate. This is due to the fact that Simple Steps is a continuous program so for any given year, there will be bulbs being installed from the current year, one year prior, and two years prior.

# Clothes Washers

Cadmus assumes a market baseline of Non-Energy Star qualified units and a market efficiency level of qualified units. The difference in modeled consumption is the gross energy savings achieved through the purchase of an Energy Star qualified appliance. The RTF methodology includes units that qualify for rebates in the average market baseline efficiency level. The use of this baseline results in an approximation of the net energy savings achieved by rebating an Energy Star appliance. To calculate the net savings achieved, Cadmus applies a net-to-gross ratio to the gross energy savings. We believe this method is consistent with the mandate to report gross savings for I-937 and IRP goals.