



# MEMO

**DATE**           **October 23, 2014**

**TO**               **Kathy Kuntz, Raj Shukla, and Emily Loew**  
**Cool Choices**

**FROM**           **Ingo Bensch**

**SUBJECT**       ***Impacts of Cool Choices' Game: Sustainable Fox Valley***

## **Executive Summary**

This memo reports the results of a billing analysis conducted by the Energy Center of Wisconsin to estimate the electricity savings experienced by players of a Cool Choices game administered among schools in Menasha and Kaukauna, Wisconsin, in the spring of 2013. Participating households used, on average, 2.1 percent less electricity (248 fewer kilowatt-hours) during the 12 months after the game than they had consumed during a comparable period before the game. Two different comparison groups of non-players experienced essentially no change in their usage. When taking into account statistical uncertainty, this result suggests that the first-year electricity savings associated with the game was somewhere between -1 and 5 percent of players' pre-game usage.

## **Background**

In 2013 Cool Choices launched a school-based game in partnership with Sustainable Fox Valley (SFV), an Appleton-based nonprofit promoting sustainability in the Fox Valley region, Kaukauna Utilities, Menasha Utilities and UW Extension of Outagamie County. Two hundred and twenty-four teachers and students at primary schools in the Wisconsin cities of Kaukauna and Menasha played the Cool Choices game from February to May 2013. As in other Cool Choices games, players took sustainable actions in their personal lives—primarily at home and on the road—and received points for the actions they reported. Players reported a total of 4,743 unique actions—1,928 of them newly taken—during the period of the game. The participation of the two local electricity providers offered an excellent opportunity to compare pre/post changes in players' usage to non-participant groups in those communities, which are often not available to Cool Choices. That billing analysis is the focus of this memo.

In a previous analysis of Cool Choices-related impact, a billing analysis showed electricity savings between one and eight percent (100 and 800 kWh) per active player. For those results, please see the Energy Center report titled *Identifying the impacts of Cool Choices' game at Miron Construction*.

For reasons we highlight below, Cool Choices had reason to believe that the SFV games would result in less impact in players' homes than games delivered in workplace settings such as at Miron.

The Cool Choices game in Kaukauna and Menasha was a follow up to an earlier SFV initiative promoting energy efficiency to households via classroom activities at local schools. As part of the partnership with Cool Choices, SFV staff recruited elementary schools in Kaukauna and Menasha to participate in the game; in some cases principals committed that whole schools would participate while in other cases a single teacher committed to the program, which involved teachers supporting a twelve-week game implementation where students reported on Cool Choices they and their families took at home. Prior to the launch of the game, participating teachers asked families to complete pledge forms that signaled their commitment to playing the game and also served as releases of utility billing data. One hundred and eighty-six households submitted pledge forms.

Cool Choices staff reported that this game differed significantly from the organization's standard workplace games. The target audience here was elementary school students, who took the game home to their families. Participants who recorded energy-saving actions (often the parents or guardians of the elementary school students more directly exposed to the game) did not benefit from the social dynamics that facilitate engagement in typical implementations. While all participants got in-game email communications, the frequency and quality of other game communications with participants varied from classroom to classroom and school to school. Further, administrative responsibilities for the program were fragmented compared to typical games. With these differences from standard workplace games in mind, Cool Choices was curious to find out how much of an impact on measurable household energy usage this game had.

## Methodology

Our analysis consisted of the comparison of pre- and post-game electricity consumption of three different groups of households. These groups were:

- 75 of the participating households;
- the entirety of residential accounts of Kaukauna Utilities; and
- the entirety of residential accounts of Menasha Utilities.<sup>1</sup>

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<sup>1</sup> The 75 participating households are included in this comparison population. We did not remove them because their inclusion is inconsequential to the cities' total residential energy consumption and the per-household averages. Participants make up less than one percent of the cities' households, and we estimated that their inclusion in the comparison population affected the pre/post statistics for the comparison populations by only about a hundredth of a percentage point.

For each of these groups, we compared mean annual consumption per household for the 12 months before and after the game, respectively, and computed the change in usage. The pre-game period of comparison was February 2012 through January 2013, while the post-game period was June 2013 through May 2014.

## Data sources and preparation

For the participating households and the non-participants who had signed billing releases, we requested and received monthly consumption data from the municipal utilities serving Kaukauna and Menasha for the periods of February 2012 through May 2014. We also received from Cool Choices a player scoring database that indicated who participated in the game and the various actions they claimed.

Because the game was active from February 2013 through May 2013, we compared electricity consumption during the 12 months after the game (June 2013 through May 2014) to the 12 months prior to the game (February 2012 through January 2013).

Although there were 224 players, we were able to analyze only 103 of them representing 75 different households.<sup>2</sup> We dropped 89 players from the analysis whom we could not match to billing data, either because they were not customers of the two local utilities, had utility accounts registered in names that we could not match back to player identities, or did not provide billing releases. We also dropped 31 households for which available consumption data was not complete for the analysis period—presumably because they had moved into or out of the residence they held during the game. Finally, we dropped one household whose electric consumption changed by more than 50 percent, which suggested a major household change that would be unrelated to the Cool Choices game, such as a change in the number of people living in the home or in their use of the home.<sup>3</sup>

For the two aggregate comparison groups—residential electric customers in Kaukauna and Menasha—we requested and received monthly total residential consumption and the corresponding number of residential accounts for each month during the analysis period.

## Results

As summarized in the table below, mean average consumption per participating household dropped by 248 kilowatt-hours from a pre-game level of 11,820 kWh—a drop of 2.1 percent. The 95 percent confidence interval for that savings percentage ranges from -0.9 percent to 5.1 percent, indicating that the change in usage for this group fell somewhere within that range.

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<sup>2</sup> Some players, such as students who are siblings, live in the same households. When there was more than one player from a household, we combined their records. Similarly, when a household had more than one electric account, we combined the electric accounts.

<sup>3</sup> We have no indication that the unmatched players are systematically different from the players and households we analyzed. The households with incomplete billing records could be more transient, however, and possibly more likely to live in smaller, rented housing.

**Table 1: Electricity usage among participating households and comparison groups: pre-game (Feb 2012 to Jan 2013) and post-game (Jun 2013 to May 2014)**

	n	Pre-game consumption	Savings (reduction in consumption)		95% confidence interval for % savings	
		kWh/yr	kWh/yr	Percent	low	high
Participating households	75	11,820	248	2.1%	-0.9%	5.1%
Residential population – Kaukauna	13,106	9,193	-30	-0.3%	n/a	n/a
Residential population - Menasha	8,249	7,385	25	0.3%	n/a	n/a

The overall residential populations of Kaukauna and Menasha use substantially less electricity than the participating and non-participating households—most likely because the overall utility populations include smaller households and rental units that are less common among households with children in the local schools. However, average usage for both utilities remained effectively unchanged in the post-game period, suggesting that there was no substantial external factor, such as weather or economic conditions that would otherwise account for the drop in electricity consumption observed for participating households during the period of analysis.<sup>4</sup>

Finally, we examined the distribution of changes in electric consumption among participating households. As one would expect, there is substantial variation. Thirty-nine of the 75 participating households experienced reductions in electric consumption, while 34 experienced increases. Most change ranged from 0 to  $\pm$  10 percent, but some households experienced increases up to 21 percent and decreases up to 35 percent. (We excluded one household with changes greater than 50 percent from our analysis, as explained in the methodology section.) This variation is typical for electric usage and is reflected by the uncertainty range described above.

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<sup>4</sup> We also reviewed weather metrics for the pre- and post-game periods. Overall, weather at the Green Bay weather station was somewhat warmer during the post-game period, both during the heating and cooling seasons. Heating degree days increased from 6,676 during the pre-game period to 8,922 during the post-game period. Cooling degree days decreased from 977 to 697. These conditions would have affected the participating households and the comparison groups equally unless there are differences in their use of electric heating or cooling.

Figure 1: Distribution of changed electricity usage (12 months post-game vs. 12 months pre-game)

