How Many Points for That? A Game-Based Approach to Environmental Sustainability

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ABSTRACT

There are substantial energy savings opportunities associated with human behaviors; the challenge, of course, is making change happen. This paper details lessons learned from an innovative approach utilizing game mechanics to reward participants for changes that they make in their real lives. The authors demonstrate that a well-designed game-based approach can deliver results that are both deeper and broader than traditional information-and-incentive-based approaches. Deployed in a corporate setting as a means of influencing employee behaviors outside of the workplace (household energy and water usage, transportation, waste management, and food choices), the voluntary program has engaged more than 60% of eligible participants with most making multiple changes to reduce their energy usage along with water usage and fossil fuels for transportation. Indeed, multiple measures were the norm. The initiative also yielded substantial work-place benefits for the company involved as well as measurable changes in employee attitudes toward environmental sustainability. Ultimately, the authors argue that games work, at least in part, because a game-based approach is more participant-centric and behavior-savvy than traditional energy efficiency program models. Examples illustrate how program planners can increase their effectiveness by thinking like game masters.

Introduction

Energy efficiency program savings are typically associated with replacing inefficient equipment with more efficient models, an approach sometimes referred to as the physical-technical-economic model or the techno-economic model (Ehrhardt-Martinez, 2010b; Lutzenhiser, 2009). The model, built on specific economic and engineering assumptions, has deep roots in the existing demand-side management (DSM) regulatory framework and presumes that consumers are conscious and economically rational users of energy services (Lutzenhiser, 2009). Accordingly, most program interventions involve some form of information and incentive to prompt change. Critics of the model have long argued that it does not take into account the full complexity of human actions. And, as utilities and other program implementers face ever-higher savings goals, those criticisms take on new importance.

Increasingly, experts agree that there is substantial energy and resource savings of 25-30% associated with behavior or "people-centered" changes and that, especially in light of climate change concerns, these savings opportunities merit more attention (Dietz, 2009; Ehrhardt-Martinez, 2010b; Gardner, 2009). Significantly, these savings are available right now—using current technologies and often without additional financial expenditures. Washing clothes in cold water, for example, saves money on water heating and can extend the useful life of the washed clothing. And the switch from a hot/warm cycle to a cold/cold cycle requires no up-front cash investment; the change depends on the consumer's behavior at the washing machine.

Additionally, some research suggests that changes in behaviors can lead to subsequent changes in attitudes, rather than attitudes driving behavior (Garrison Institute, 2011). The juxtaposition—that behaviors influence attitudes and beliefs—is significant because it suggests that efforts to increase and expand environmentally sustainable behaviors can, over the longer run, lead to increased public support for additional energy efficiency and sustainability policies (Garrison Institute, 2011).

Given these substantial advantages—the immediacy of savings and the potential for broader public policy shifts—one might wonder why more behavior change efforts are not already underway. The simple answer is that behavior change is difficult and unpredictable, especially for an industry built on a model of conscious and rational energy consumers.

Ultimately, though, all energy efficiency and conservation is about behavior. Purchasing a high efficiency clothes washer or hiring someone to increase the insulation and air sealing in the consumer's home requires a series of one-time behaviors, much like re-setting the thermostat on the water heater. So becoming more effective at affecting behaviors ultimately increases the efficacy of all efficiency and conservation efforts.

We cannot afford to ignore behavior. Fortunately, various social sciences offer insights and tools for affecting behavior change (Lutzenhiser, 2009; Wilhite, 2000). The next section reviews behavior change strategies briefly and then outlines the advantages of gamification as a behavior change approach. The third section is a case study with the fourth section discussing results from that case study that illustrate how gamification can utilize behavior change strategies to achieve significant and persistent adoption of environmentally sustainable behaviors.

Behavior Change and Gamification

Entities promoting environmental sustainability tend to use a variety of behavior change models including Doug McKenzie-Mohr's community-based social marketing (CBSM), Les Robinson's enabling change model, the MINDSPACE model from the United Kingdom's Institute for Government, The Resource Innovation Group's model and the theories proposed by George Marshall at the Climate Outreach and Information Network (Dolan, 2010; Marshall, 2012; McKenzie-Mohr, 2000; Robinson, 2012; TRIG, 2012). While the specifics of the models vary, most agree that change is most likely to occur when individuals recognize a need for change, when there is support for making change, and when the individual feels competent to change. Some theories, like CBSM, emphasize the need for research on barriers to optimize the environment for change while others emphasize framing and social support mechanisms (Marshall, 2012; McKenzie-Mohr, 2000). Social marketers argue that change should be fun, social and easy (Making Behavior Change Fun Popular and Easy, 2012; The Fun Theory, 2012).

Some of these models are used by behavior-focused energy efficiency programs operating within state regulatory frameworks although efficiency programs tend to emphasize information, consistent with the techno-economic model, rather than fun or social interactions (Lutzenhiser, 2009). There is, for example, a growing emphasis on feedback about energy usage as a means of motivating change (Ehrhardt-Martinez 2010a; Foster, 2012).

There is also a good deal of literature about why change is hard. Dan Ariely notes that we not only have many irrational tendencies but we also do not typically understand those tendencies, which complicates change greatly (Ariely, 2010). Behavioral economists have documented, for example, a variety of irrational biases that complicate the adoption of energy efficiency measures as well as conservation behaviors. The human propensity to value the

present over the future, for example, helps to explain why few homeowners make seemingly rational investments in energy efficiency today that will pay off in the future (Ariely, 2010; Cialdini, 2007). Researchers also note that reports highlighting the energy wasted in the country reinforce the idea that everyone wastes energy and help make waste as the norm (Cialdini, 2007).

Ariely writes explicitly about the irrationality of human behaviors associated with responding to climate change, in part because the climate change issue is a good example of a situation where vague, disaggregated, long term benefits accrue from specific, immediate investments in a problem that is not local, vivid or immediately observable (Ariely 2011). More, given the scale of the issue, people often feel their own actions are too small to matter and thus do not act (Ariely, 2010; Marshall 2012). In a related issue, a few researchers are also documenting that there is a segment of consumers who have taken some action and then concluded that "I've done my share," believing that further action is not necessary unless or until others take substantive action (Doughtery, 2010; Marshall, 2012; Miller, 2011).

Using Gamification

Cool Choices is a Wisconsin-based nonprofit organization established in 2009 to achieve greenhouse gas emission reductions through behavior change; our targets are individuals, communities and small businesses. Because the aim is emission reduction, the project addresses behaviors associated with household energy use (all fuels), transportation, water usage, waste management, and food choices.

In strategizing about how to motivate individual actions, Cool Choices reviewed a wide variety of literature on behavior change in various environmental and public health contexts and determined the project should aim to leverage community identification and norms as part of the approach (Cialdini, 2007; Wilhite, 2000). Exploring specific program options staff identified "gamification" as a viable approach. Gamification is the process of applying game-design strategies to non-game situations to make those efforts more fun and engaging; while efforts to use games to address real-world issues have been around for more than a decade, the strategy has received substantial attention in the last two years with the publication of several best-selling books and new gamification initiatives in a variety of arenas ranging from public health to retail (McGonigal, 2011; Wikipedia, 2012). Cool Choices' idea was relatively simple: create a game where people earned points for taking environmentally sustainable actions in their real lives.

The benefits of a game-based approach were that it created both a momentum for change and a means of tracking those changes. A game format made an often inaccessible topic more accessible—because it avoids technical jargon and focuses instead on simple actions and the associated point values. More, framing actions within a game provided opportunities to motivate players and to make environmental sustainability fun. And playing the game within a specific community let the project tie the game to existing community values and norms.

Working with game developers, Cool Choices created a game where points are based on a combination of dollar savings and level of difficulty, so an action that has substantive savings and is difficult—like biking to work rather than driving—has more points than turning off lights when no one is in a room. The game referenced points rather than dollars or carbon to mitigate the sense that single actions were "a drop in the bucket" and to make the game more accessible. Cool Choices designed the game for individual and team play to leverage social networks to influence participation. To mitigate the potential for cheating (where players would report actions they did not perform), Cool Choices designed the game to be transparent so that players

could see what actions other players were reporting. The transparency also created a public record of each player's actions, which enabled Cool Choices to leverage another human bias—consistency: humans value consistency and will make efforts to ensure that future actions are consistent with past actions, especially if they think others are watching (Cialdini, 2007). A game framework created natural opportunities to celebrate successes and to push players to continue to look for new opportunities to take action.

Table 1 summarizes how Cool Choices' gamification strategy addressed the various challenges associated with making change happen at the individual level.

Table 1. Challenges to Change and Related Gamification Strategies

Challenges of Motivating Action on Climate Change	Cool Choices Gamification Strategy
Assume climate change is not local	• Play a game in one's local community
Cannot see emission reductions Outcomes not visible	• Points earned and status in game on the leaderboard is very visual • Players get bonus points for sharing stories and photos—vivid stories of change
Climate change is gradual, slow	• Game statistics change weekly, creating an immediate story of progress
Negative effects of emissions are far in the future	• Focus is on activities and benefits now versus negative impacts in the future
Individual sense that I can't make a difference	• Game reinforces how small actions add up across players and teams
Individual sense that I've already done my part	• Players get credit for actions already taken but, to prevail, they need to do new things
Messages about what to do are confusing	• Points associated with clear actions (e.g., "turn off water while brushing your teeth")
Individual sense that others not doing their share	• Transparency and leaderboard show actions of others, provide competitive motivation • Competition transforms this from "I've done my part" to "I need to do more to win"

Case Study: Cool Choices Approach

When considering a gamification approach Cool Choices turned to experts in game development for ideas, rather than looking at past energy efficiency contests as a model. Staff was concerned that most of the energy efficiency models found—usually framed as energy reduction contests—tended to encourage extreme short-term behaviors rather than sustained change. More, brief conversations with game developers demonstrated that it was worthwhile to use their expertise rather than imposing ideas from the techno-economic model. The team did, though, rely on staff experience and DSM literature in determining the kinds of communities to target. Wisconsin has three decades of experience with community-based energy efficiency programs in geo-political communities and, in addition, the statewide energy efficiency program, Focus on Energy, experimented briefly with work-based initiatives to promote compact-fluorescent lighting in the last decade. Based on those experiences Cool Choices determined that workplaces presented an under-utilized opportunity to influence social norms, especially those workplaces where corporate leaders had prioritized environmentally sustainable actions. So Cool Choices created a model that leverages workplace infrastructures to influence what employees do in their personal lives as well as at work. Utilizing workplaces—rather than neighborhoods,

reflected recognition that most of us spend a good deal of time with our co-workers and that they are influential peers in our lives. More, staff knew corporate leaders would benefit from a bottom-up employee commitment to sustainability and staff anticipated that corporate hierarchies might facilitate a smoother program implementation than democratically organized geo-political communities. As part of planning, staff developed four criteria for identifying potential corporate partners. Cool Choices sought partners that:

1. demonstrated a meaningful corporate commitment to sustainability;
2. understood the value in engaging employees in their efforts;
3. were a leader within their field so that others would follow their actions; and
4. embraced innovation and were open to participating in the pilot project.

Cool Choices first partner was Miron Construction. Miron is a hundred-year-old, family-owned commercial construction firm with approximately 330 office and operations employees in five locations, headquartered near Green Bay in Neenah, Wisconsin. In 2011, Miron was the sixth-largest contractor in the Midwest and ranked 94 in the top 400 contractors nationally according to *Engineering News Record* (Miron, 2012). The Miron office and operations teams include all project management staff, construction superintendents, their yard personnel and support services. In recent years, Miron has been very successful in delivering LEED construction to its customers; Miron leadership talks openly about how LEED projects helped the firm survive the recession.

Cool Choices presented a vision to Miron—a collaborative process that would transform corporate culture so that employees equated sustainability with 'the Miron way' to do things—and Miron's leadership embraced the opportunity. Cool Choices then asked Miron to identify a group of opinion leaders—defined as people other people listen to, not people with fancy titles—to help Cool Choices create the initiative. Leadership identified people from throughout the organization and made clear to the group (ultimately called the Action Team) that they were responsible for helping to create something that would work for their colleagues. Cool Choices met with the Action Team bi-weekly for several months to learn more about Miron's culture, to understand what had worked (and not worked) in past employee engagement initiatives and to test out potential approaches. At the same time, Cool Choices conducted a baseline survey of all Miron employees to understand current practices, attitudes, and opportunities.

The baseline, which was completed by 230 of the 330 staff, gave Cool Choices a good sense of their audience. Of respondents, 86% reported living in a single-family detached house and 91% said they owned their home. Consistent with most surveys in Wisconsin, 77% said they thought their household energy usage was average or lower than average, even though only 4% said they were extremely familiar with strategies to save energy and just 1% reported that they had taken all the actions they could to save energy and 94% of respondents said they had never had an energy assessment of their home. (When asked about specific energy-related issues, 60% reported at least one issue such as ice dams, uneven heating, or moisture on windows.)

In the baseline, Cool Choices asked respondents to rate their agreement with a series of statements "Sustainability is important to…" The responses, summarized in Figure 1 below, show that while staff believed sustainability mattered to Miron's leadership and asserted that it mattered to them, they expressed considerable skepticism about the priorities of their coworkers. This gap was one of the findings Cool Choices highlighted in their reporting back to employees and it is illustrative of the challenges of promoting environmentally sustainable actions. The

behavioral literature is clear that individuals are influenced by social norms—real or perceived. If the majority of employees think that sustainability is not important to their peers, they are less likely to talk about it and to pursue it. Part of Cool Choices' challenge was changing how Miron employees thought about each other.

Figure 1. Employee Perceptions of the Importance of Sustainability to Themselves, Others
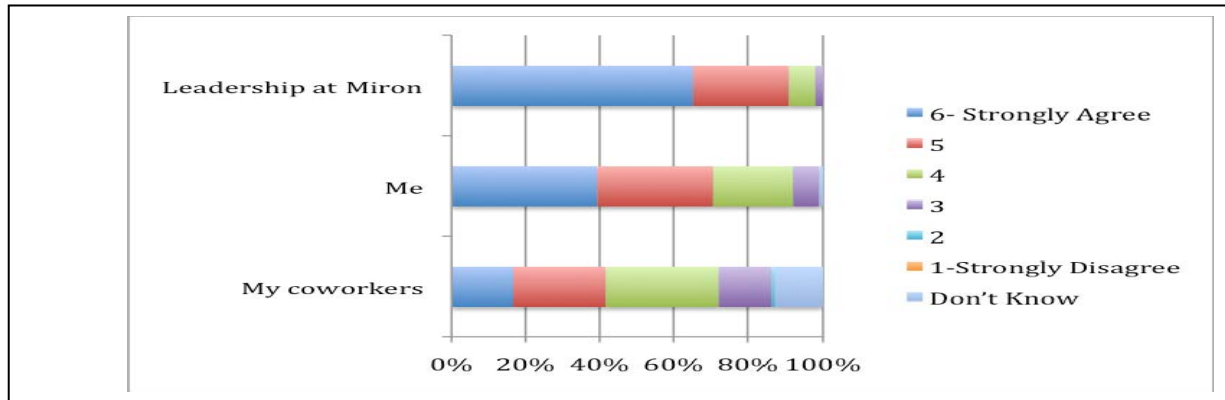
Employee responses to a question, "I believe sustainability is important to…" on a 1-6 scale.

Using the baseline findings and input from Miron's Sustainability Action Team as well as insights from a game development firm, Cool Choices staff created a game that leveraged Miron's competitive culture and that utilized best practices from the behavioral literature. The *iChoose* game was relatively simple: people earned points for themselves and their teams by taking sustainable actions in their personal lives—by turning off lights at home or reducing their speed on the highway, for example. Participants received a deck of cards each month describing possible actions in short, clear terms with designated point values; players reported their actions on a weekly basis, either by turning in cards or using an online system. Teams were organized by work units so that employees were on a team with the co-workers they worked with most regularly. Over the course of a six-month game there were small monthly cash prizes for individuals in the lead as well as game-end team prizes and plenty of opportunities for bragging rights. As part of iChoose, employees also earned points for sharing photos and stories about their actions, which added to the fun factor—one creative employee sent postcards to her family's less-used television and another submitted an argument for extra points when eliminating his beer fridge prompted fewer trips to the bathroom and lower water usage. Cool Choices shared these photos and stories via a customized website, essentially creating an ongoing record of employee actions that helped to reinforce changes and make slippage back into old habits less comfortable. Scoring for the game was completely transparent so that any player could see the actions and points accrued by other players; this strategy helped mitigate the potential for cheating and, again, created more potential for persistence.

Cool Choices structured game features in ways that would appeal to players and increase opportunities for ongoing reductions in emissions. In the game, employees could claim points for both new sustainable actions and ongoing habits that pre-dated the game. Reporting conventions enabled Cool Choices to separate new actions from existing habits when aggregating savings numbers. Allowing credit for existing habits mitigated cheating and helped to create a level playing field between those already interested in efficiency and those who had done little in the past. Given Miron's competitive culture, making the game fair was critical. The game also featured a unique pacing structure where employees could adopt new actions each week while

also getting ongoing credit for habitual actions that they had started in previous weeks. This process enabled Cool Choices to reinforce habits (like driving the speed limit) while also encouraging one-time actions (such as programming the thermostat). From a player perspective, the pacing kept the game competitive.

Miron and Cool Choices rolled out the iChoose program to all office and operations employees on Earth Day, April 22, 2011. At the launch, top management emphasized that iChoose was an opportunity for employees to see the benefits of sustainable actions on a personal level. Leaders also noted that Miron and its clients had already seen the financial and non-financial benefits from sustainability; the iChoose game represented an opportunity for employees to see similar benefits.

The iChoose game was organized thematically, with a new round of actions available for play each month. The themes corresponded to the LEED categories—energy use, water, etc.—so that the game would reinforce a model important to Miron.

Outcomes

About 230 of the 330 total office and operations staff actively played the game. This amounts to a 67% participation rate after 75% of eligible employees initially signed up to play. Participation comprised taking one or more of the actions that had been rolled out to-date and reporting it at the end of the week. About half of the players (47%) did so at least once per month, while more than a quarter (29%) played almost every week. In addition, a substantial share of players (more than 40%) reported in a post-game survey that they took actions related to the game that they did not claim and for which Cool Choices has no record.

The savings estimates presented here represent an initial effort to quantify the effects from the game. They are based on self-reported actions and typical baseline conditions we would expect to find in the general population. As noted, the scoring system was transparent to discourage exaggerated self reports. Cool Choices is pursuing a billing analysis to investigate the actual energy savings obtained, once enough time has passed since the game ended.

One striking dynamic of the game was the importance of social support to player engagement. iChoose players who felt encouraged by peers played more frequently. As shown in Figure 2, 77% of Miron employees reported in a post-game survey[1] that they had felt encouraged to play by one or more colleagues, and two-thirds of them played frequently (monthly or more). It did not seem to matter whether the encouragement came from team leaders, teammates, or other colleagues. In contrast, only a third of Miron employees who had not felt encouraged played frequently.

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[1] The Energy Center of Wisconsin administered an online post-game survey two months after the game concluded. One hundred and fifty-seven Miron employees took the survey for a response rate of about 50%.

Figure 2. Role of Encouragement in Game Participation
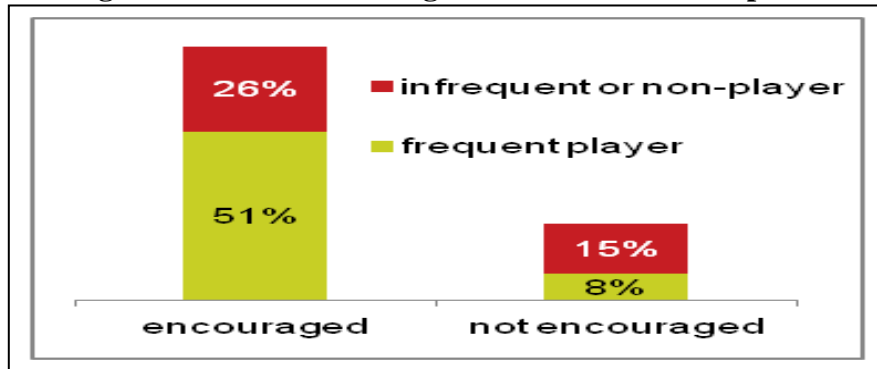
Players reported a total of nearly 3,500 sustainable actions. Of these actions, 52% were reported by players to be new efforts taken as part of the game. Cool Choices projects that new actions adopted during the game will save employees 463 megawatt hours of electricity, 693,000 gallons of water, 17,500 gallons of gasoline, and 4,300 therms of natural gas annually. Cumulatively these actions will reduce CO_2 emissions annually by 1.33 million pounds. The majority of actions fell into the electricity and transportation categories, as shown in Figure 3 below. These categories had been staged early in the game deliberately for their high potential for emissions reduction, which is an organization focus for Cool Choices.

Figure 3. Share of Unique Actions by Category
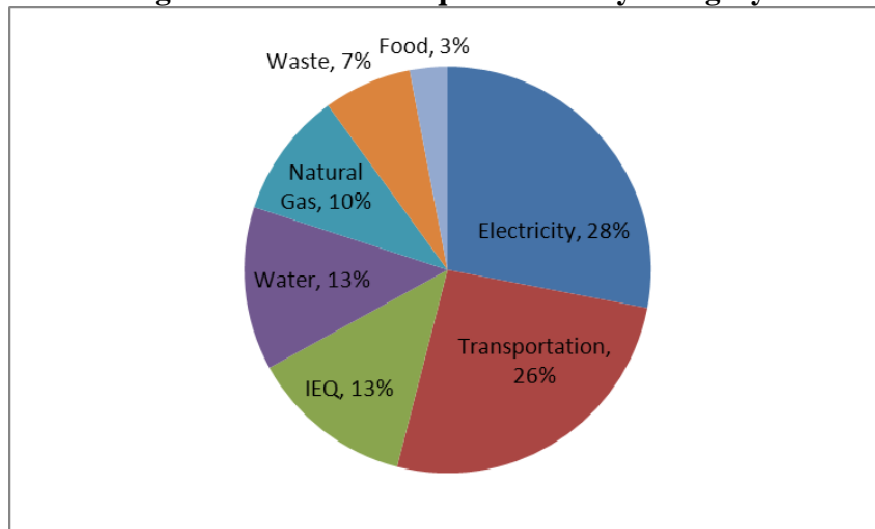
It is noteworthy that more players chose to take actions associated with indoor air quality (introduced in September) than water (introduced in July and thus available for play much longer). This is consistent with Cool Choices' anecdotal observations that people were especially interested in efforts associated with their household well-being and that a good portion of participants were not concerned about water issues. (Wisconsin has not seen the kinds of drought conditions that plague other parts of the country and water rates tend to be quite low.)

The most common actions reported overall were switching the furnace fan to auto (reported by 147 players), avoiding sudden stops and starts of vehicles (145), removing excess weight from vehicles (129), using windows to cool a car's interior at speeds below 40 miles per

hour and air conditioning at higher speeds (117), and turning off the TV when no one is watching (113). Some players had already been taking these actions previously, however, so the game's effect may have been more to reinforce their habits and build on them than to create new actions.

The new actions that earned the most points (which are roughly correlated with our estimate of their relative impact) fell mostly in the transportation and electricity categories. Table 1 lists the top 10 *newly* initiated actions taken in the game.

Table 3. Most Common Actions Reported as *Newly Taken*

Action	# of Players Reporting as a New Action	Savings Category	Type of Action
Remove excess weight from vehicle	93	Transportation	One-Time
Turn off TV when no one is watching	76	Electricity	Habitual
Avoid sudden stops and starts	71	Transportation	Habitual
Switch furnace fan to auto	69	Electricity	One-Time
Use A/C over 40 mph, windows under 40 mph	67	Transportation	Habitual
Watch 2 hrs less TV on 4 days per week	65	Electricity	Habitual
Turn off game console	64	Electricity	Habitual
Remove/unplug 2nd refrigerator	62	Electricity	One-Time
Slow from 75 to 65 on the highway	61	Transportation	Habitual
Address household water leaks.	58	Water	One-Time

While Cool Choices staff watched the game's action cards being played and tallied up the team scores, the players noticed differences in their personal lives. In the post-game survey players reported higher levels of activity to save energy in the home, water in the home, and gasoline two months after the game ended than before it began. As shown in Figure 4, on average, players rated their pre-game activity similarly across saving energy (2.8 on a 5-point scale), saving water (2.7) and reducing gasoline use (2.7). Self-reported increases in these scores averaged 1.1 for saving energy, 0.9 for saving water, and 0.8 for reducing gasoline use. Those who played the game most often reported both slightly higher pre-game levels of activity (generally 0.3 points higher than infrequent players) and modestly higher increases in their self-reported scores (greater average increases by 0.1, 0.2, and 0.3 points for home energy, home water, and gasoline, respectively).

Beyond the actions, however, Cool Choices was also interested in the social dynamics. This matters because part of the behavioral theory behind the game's design is that the game will facilitate new social norms that will sway action. In the post-game survey, respondents reported that they did have regular conversations about sustainability during the game—both at home and at work. In fact, 60% of players said that they had such conversations at least weekly. Since the game ended, the frequency of conversations about sustainability has slowed to monthly, at least at work for many players. Only one in five players who had talked about sustainability several times a week during the game still talked about the topic "frequently," which respondents appeared to define as being approximately weekly. While this suggests diminished persistence of the social effects of the game, it also suggests to us that the game was the driver behind the conversations about sustainability rather than some pre-existing tendency or habit.

Figure 4. Comparison of Pre- and Post-Game Activities Reported by Players
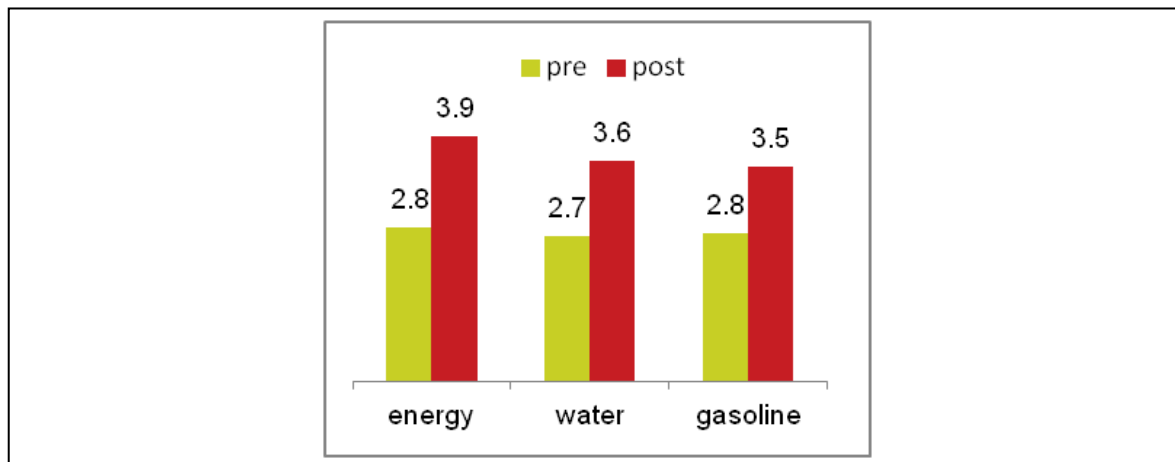
Respondents ranked their efforts to save on a 1-5 scale where 1= did nothing and 5=did a lot

Anecdotal stories shared by players in the post-game survey reveal that these conversations encompassed specific actions that people were taking or learning about, but also highlighted some of the social dynamics at play during the game, both at work and at home. Players reported stories about children getting involved in the game at home and even helping to "remind" their parents to practice what they were preaching. One player told us that teammates played jokes on one another, while others spoke of more substantive discussions about specific topics. All of these interactions—so goes the theory—represent public declarations about a player's changed behaviors and should, therefore, drive additional actions and persistence.

Significantly, then, the conversations appear to have heightened the sense of Miron employees that others around them care about sustainability, too. As noted, Miron employees were skeptical about their peers' commitment and interest in sustainability before the game. Their interactions with colleagues during the game appear to have changed their minds. An unintentional change in response scales makes a direct comparison of baseline and post-game survey results difficult, but we can compare perceptions about peers to perceptions about Miron leadership, whose commitment and interest in sustainability appeared to be overwhelmingly clear to staff even before the game. Whereas only 29% of baseline respondents thought peers considered sustainability as important as Miron's leadership does, 49% of respondents to the post-game survey equated the commitment of the two.

Feedback from Miron leadership to Cool Choices regarding the game has been very positive; they report an increase in environmentally sustainable actions around the office (turning off equipment and lights) and an increase in employee interactions around sustainable practices.

Lessons Learned

For Cool Choices the big lessons are that gamification is a promising strategy for influencing behavior and workplaces provide viable community spaces to influence individuals. Cool Choices plans to continue to refine and expand this model in other workplaces going forward; one arena of experimentation will be the efficacy in various kinds of workplaces.

Cool Choices believes this pilot illustrates the potential results associated with a community-leveraging fun and social approach to environmental sustainability. Too often we frame efficiency efforts in a techno-speak aimed at rational consumers; this effort suggests that

implementers can achieve better results by facilitating a pleasant (or even fun) way for people to explore options, have conversations about their actions and, ultimately, create new social norms within their community. Certainly these results affirm that, as social scientists have urged, more research and experimentation in these areas is merited.

We would also argue that this model suggests the efficacy of a holistic approach to environmental sustainability rather than the silo approach of one effort targeting electricity, another natural gas and yet others water and transportation. In our experience regular people do not think about environmental issues in silos and they express frustration when programs offer piecemeal solutions. By giving people credit for using re-usable shopping bags at the grocery store, we created space for them to think about other actions like re-programming their thermostats or even carpooling. Implementers and policy makers need to think seriously about how we can integrate funding sources to facilitate more holistic approaches.

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