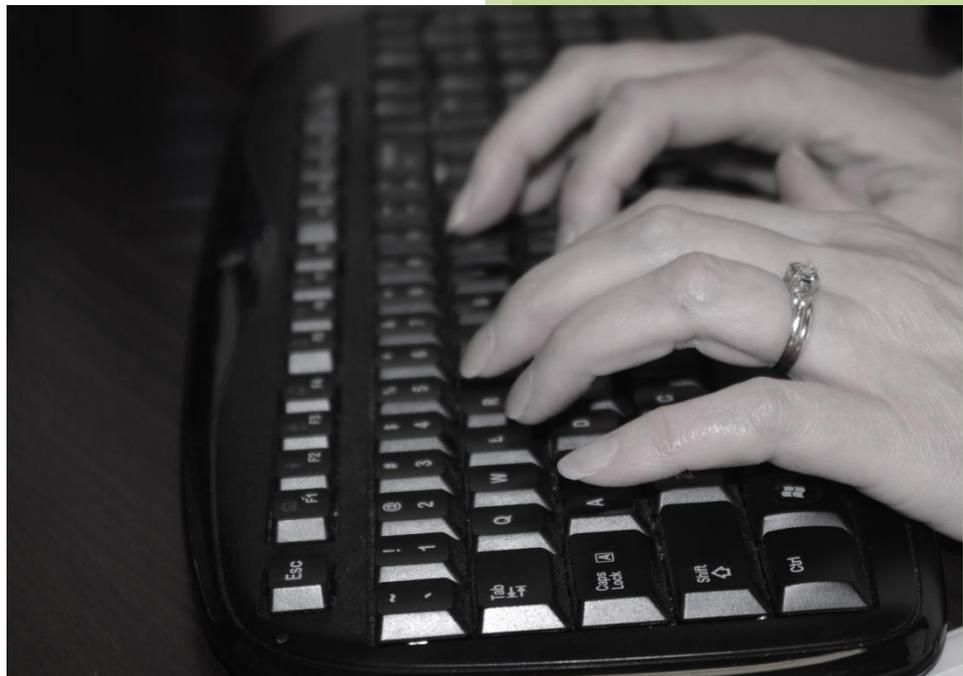


# Urban Sustainability Directors Network

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## Community-Based Social Marketing Municipal Employee Computer *and* Monitor Shutdown Pilot



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Research • Social Marketing • Results

*This project was completed with a generous grant from the Kendeda Fund.*



## Table of Contents

Table of Contents .....	i
Table of Tables .....	ii
Table of Figures .....	iii
Acknowledgements.....	iv
Executive Summary .....	v
Background and Purpose .....	1
Participating Municipalities .....	1
Community-Based Social Marketing Process.....	2
Project Goals.....	2
Step 1: Identify a Clear Target Behavior .....	3
Workstation Power Management and Shutdown.....	3
Potential Impacts.....	3
Target Audience.....	3
Step 2: Foundational Research to Identify Barriers and Benefits .....	4
In-depth Interviews with IT Managers.....	4
Focus Groups with Employees .....	5
Web Survey of Employees.....	6
Step 3: Strategy Development.....	16
Step 4: Pilot Testing.....	20
Method .....	20
Outcome Measures.....	21
Baseline Conditions .....	21
Pilot Results .....	23
Step 4: Recommendations for Ongoing Evaluation.....	25
Lessons Learned.....	25
Implementation Challenges .....	25
Implementation Successes .....	25
Turnkey Conclusions .....	26
Appendix A.....	27
References.....	32



## Table of Tables

Table 1. Estimates of energy savings impacts. ....	v
Table 2: Characteristics of participating cities.....	1
Table 3. Mean frequency of current computer shutdown behavior (0-10). ....	8
Table 4. Mean scores for barriers to computer shutdown (0-10).....	11
Table 5. Mean scores for barriers to monitor shutdown (0-10). ....	12
Table 6. Mean scores for benefits of computer shutdown (0-10). ....	12
Table 7. Mean scores for benefits of monitor shutdown (0-10).....	13
Table 8. Mean scores for barriers to using power management settings (0-10). ....	14
Table 9. Mean scores for benefits of using power management settings (0-10).....	14
Table 10. Employee survey outcomes with associated marketing strategies.....	17
Table 11. Number of pre- and posttest observations by municipality. ....	21



## Table of Figures

Figure 1. Computer shutdown policy by sample group. ....	7
Figure 2. Computer shutdown behavior among those indicating a policy. ....	8
Figure 3. Does your monitor stay on all the time? ....	9
Figure 4. Current monitor shutdown settings. ....	9
Figure 5. Source of current power management settings. ....	10
Figure 6. Information sheet. ....	18
Figure 7. Prompt/commitment card. ....	19
Figure 8. Pilot implementation design. ....	20
Figure 9. Computer shutdown percentages at baseline. ....	21
Figure 10. Monitor shutdown percentages at baseline. ....	22
Figure 11. Computer and monitor shutdown percentages (baseline). ....	22
Figure 12. Pre and posttest computer shutdown percentages by treatment condition. ....	23
Figure 13. Pre and posttest monitor shutdown percentages by treatment condition. ....	23



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## Executive Summary

From March to September 2012 a municipal employee computer and monitor shutdown pilot project was conducted with four municipalities nationwide. The pilot project used a community-based social marketing approach and was aimed at developing a turnkey strategy that would be replicable and scalable to other cities across the nation. The four pilot cities were: Columbia, Missouri; Frederick County, Maryland; Santa Clara County, California; and, Baltimore, Maryland. The implementation process was evaluated across all of the four cities and evaluation data were received from three out of the four cities who successfully implemented the program. Overall, the process and results were positive. Additionally, the similarity of barriers and benefits across the diverse pilot municipalities provides evidence that the developed turnkey strategy may be successfully replicated in other regions to the extent that they face similar barriers to behavior change.

### Pilot Results

Results of the pilot project varied somewhat across the three municipalities. However, the overall findings suggested that the program was effective at increasing computer and monitor shutdown rates.

- In Columbia, computer and monitor shutdown rates increased significantly as a result of the strategy (computer shutdown went from 62% to 81% and monitor shutdown went from 35% to 58%).
- In Frederick County where computer shutdown rates were already very high (over 90%), there was no increase in computer shutdown behavior, but monitor shutdown rates increased significantly due to implementation of the strategy (from 38% to 63%).
- In Santa Clara County, computer shutdown increased significantly for all employees in the pilot program (control and treatment group), and monitor shutdown increased significantly due to the marketing strategies (from 3% to 38%).

### Potential Impacts

While the effect of shutting down one computer may be small, the combined effect of shutting down even half of a municipality's computers and monitors can contribute significantly to municipal energy-saving initiatives. For a small city the size of Columbia, Missouri (assuming 1,000 employees are shutting down) these savings translate to: 257 Metric tons CO<sub>2</sub>; the annual GHG from 54 passenger vehicles; or, the CO<sub>2</sub> emissions from electricity use of 38 homes for one year. The aggregate impacts are even more impressive. If 20 small cities were to successfully implement this program (assuming 20,000 employees are shutting down), this would translate to a savings of: 5,136 Metric tons CO<sub>2</sub>; the annual GHG from 1,070 passenger vehicles; or, the CO<sub>2</sub> emissions from electricity use of 769 homes for one year (see EPA GHG Equivalency Calculator at <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>).

**Table 1. Estimates of energy savings impacts.**

Workstation	Average Watts (Inactive)	Hours/Day (Inactive)	Hours/Year (Inactive)	kWh/Year (Inactive)	Per 1,000 Employees	Assume 50% Left On
Desktop Computer (CPU)	100	16	5,824	582.4 kWh/computer	582,400 kWh	291,200 kWh
19" LCD	25	16	5,824	145.6 kWh/monitor	145,600 kWh	72,800 kWh
<b>TOTAL</b>	125	16	5,824	728 kWh per workstation	728,000 kWh	364,000 kWh



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## Background and Purpose

As agencies work toward sustainability goals, program planners are faced with the difficult challenge of motivating individuals in their communities and organizations to adopt or modify a specific behavior. To this end, Sustainability Directors believe they are tackling huge behavior change challenges without the arsenal of tools they need. The Urban Sustainability Directors Network (USDN) is a peer-to-peer network of 115 North American local government sustainability leaders formed to enable members to support and learn from each other, so that they can more quickly find solutions to their urban sustainability challenges.

Following the USDN annual meeting in September 2010, a group of seventeen USDN members formed a workgroup to explore a collaborative project to foster sustainable behavior change. The result was the development of a multi-city collaborative community-based social marketing pilot aimed at energy use by municipal employees. The pilot program followed the traditional community-based social marketing model and focused on strategies for motivating municipal employees to shut down their computers and monitors at the end of each workday.

From March to October 2012, the “CBSM Municipal Employee Computer and Monitor Shutdown Pilot” was conducted in collaboration with four USDN member cities and counties. This paper highlights the process and results from the pilot project. The report begins with an overview of the target behavior selection process and concludes with recommendations for ongoing evaluation and thoughts about city- or county-wide implementation.

### Participating Municipalities

The project was piloted in each of four diverse USDN member cities and counties. The pilot sites were selected for participation based on their interest in the selected behavior, internal support (e.g., IT support), relevance of the selected behavior to the audience (i.e., technical solutions are not available), and a demonstrated commitment to provide the resources needed to manage the data collection, outreach and staffing needs of the project. See Table 2 for a comparison of the participating cities.

**Table 2: Characteristics of participating cities.**

City	Population (2010 U.S. Census)	Approximate # of Employees	Approximate # of Workstations
Baltimore, MD	620,961	13,000	5,300
Columbia, MO	108,500	2,000	1,000
Santa Clara County, CA	1,781,642	15,000	12,000
Frederick County, MD	233,385	2,901	2,600

Note: Due to difficulty in conducting foundational research activities Baltimore chose not to participate in the pilot. A summary of the challenges can be found in Appendix X.



## ***Community-Based Social Marketing Process***

The project used community-based social marketing (CBSM) as an overarching framework for developing a behavior change campaign aimed at municipal employee energy use. Community-based social marketing has recently emerged as an alternative to traditional education campaigns (McKenzie-Mohr, 2011; Schultz & Tabanico, 2007). CBSM packages basic principles of psychology with applied research methods in a way that provides a usable framework for practitioners working to promote behavior change across a variety of settings. The approach begins with the careful selection of a specific target behavior and then uses a four-step process to foster sustainable behavior change. These four steps are (1) identifying the barriers to a targeted behavior, (2) using behavior change tools to overcome the barriers, (3) piloting the selected tools using empirical research methodology and a control group, and (4) evaluating the project once it has been widely implemented. Because the programs developed under this approach are piloted on a small scale, the program can be refined as needed until there is documented evidence to show that the program works before it is broadly implemented.

## ***Project Goals***

The goals of the project were to use a research-driven process to promote meaningful energy-use reduction at the level of individual behavior. The approach was developed and tested across diverse cities and counties in order to provide an effective approach that would be replicable and scalable. Additionally, the collaborative nature of the project afforded several distinct opportunities:

- **Use of an innovative approach.** The pilot provided an opportunity to document the utility of community-based social marketing as a tool for Sustainability Directors. Through involvement in this project, USDN members learned the process and techniques associated with the CBSM model which they can later apply to other behavior change programs in their communities.
- **Finding out what works.** The project allowed multiple cities to compare and contrast outcomes, successes and challenges associated with the strategies and will inform large scale implementation decisions. The program was piloted on a small scale to demonstrate both efficacy and cost-efficiency before implementing on a broad scale.
- **Foundational research.** The project utilized a core set of foundational research tools to fill gaps in the existing knowledge base surrounding the target behaviors. This was not only a cost-savings mechanism, but the use of a consistent research methodology allowed for valid comparisons across various contexts.
- **Turnkey strategy.** The quality of programs delivered by governmental agencies is often contingent on the time and financial resources that they can bring to the task. In many cases, lack of knowledge, staff time and financial resources result in agencies delivering programs that are far from optimal. Through this project, we developed a turnkey outreach strategy that has demonstrated efficacy across a wide range of contexts. Through the USDN, the final program strategy is available to program planners across North America who may want to deploy the program in their communities.



## Step 1: Identify a Clear Target Behavior

Organizations working to promote sustainability have a broad range of behaviors that could be addressed through a behavior change program. However, integral to the CBSM approach is a focus on specific activities. Even within a single domain (such as employee energy use), there are numerous and diverse activities that could be promoted. With limited budgets and resources available to carry out their programs, program planners must make informed choices regarding which behaviors are most worthwhile to target. To this end, the USDN Sustainable Behavior Pilot Projects Working Group participated in a structured behavior selection exercise in order to identify behaviors that were most appropriate for a collaborative behavior change project.

The Working Group conducted an in-depth, collaborative investigation of a wide range of behaviors that could potentially be targeted within a municipal setting. A long list of behaviors was prioritized based on an analysis of the available data on **penetration** (is there room for change?), **probability** (how much can we expect people to change?), and **potential impact** (how much will this behavior change impact our desired outcome?). The extent to which there was a shared interest in the behavior among Working Group members and the similarity of barriers and benefits across participating regions was also considered. Based on this behavioral analysis and a series of discussions, the Working Group selected two specific behaviors to serve as the focus of a behavior change program focused on energy savings associated with personal office computers.

### *Workstation Power Management and Shutdown*

The municipal employee pilot program focused on motivating municipal employees to enable automatic sleep and hibernate modes on their computers (i.e., power management) and to shut down computers *and* monitors at the end of the workday. Given the large number of desktop computers that exist within municipal offices, a program targeting these behaviors has the potential for large energy savings.

### *Potential Impacts*

Desktop computers are a necessity in today's office work environment. But many computers remain on, even when not in use. These inactive computers and monitors continue to draw power, albeit at a reduced rate. The typical computer (CPU) uses 100 watts/hour in "sleep" mode, and a 19" LCD monitor uses 25 watts/hour in sleep mode. While seemingly small, these loads add up, and assuming 16 hours of inactivity per day (i.e., an 8-hour workday), this results in a yearly total of 582 kWh for the CPU and 146 kWh for the monitor—that's for one computer, when not in use.

### *Target Audience*

The pilot program focused on municipal employees within each jurisdiction who had their own computer workstation. A representative from each of the participating cities and counties selected departments or buildings in their city that would be an appropriate fit for the pilot project.



## Step 2: Foundational Research to Identify Barriers and Benefits

Three stages of foundational research were conducted. First, participating sites scheduled meetings with IT Managers to learn about technical and policy barriers and to gain project support. Second, employees were invited to participate in focus group discussions on the topic of power management and shutdown procedures. Finally, employees completed a web-based survey designed to gather quantitative information about the extent of the identified barriers and benefits in the target population.

### *In-depth Interviews with IT Managers*

#### **Method**

In-depth interviews were given to eight IT managers across the three municipalities (Columbia, N=3; Frederick County, N=4; and Santa Clara County, N=1). Research partners in each of the participating municipalities located interviewees and conducted the interviews following a structured protocol.

#### **Measures**

In the interview, IT managers were asked to describe the standard power management settings for computers in their departments and to indicate whether they could be modified remotely and whether or not employees were allowed to modify their settings. They were also asked to indicate whether there was a policy about daily computer and monitor shutdown and, if so, whether they were aware of current compliance levels. Finally, they were asked what they considered to be the key issues (barriers and benefits) surrounding shutting down computers and monitors for the people in their departments

#### **Results**

IT managers from Columbia and Santa Clara County indicated that there was no official policy for shutting down computers at the end of the day. Those from Frederick County were split: Two managers indicated that there was currently a policy to shut down computers, while the other two said that there had been a policy at one time, but that it had not recently been reinforced by any communications.

The majority of IT managers supported a policy of shutting down computers and monitors, as long as it did not interfere with departmental operations or productivity. The major barriers anticipated were time needed for computers to boot up and problems for workers who shared computers or for departments who needed constant access, including overnight. Perceived benefits to daily shutdown included saving money, reducing wear on machines, and enabling users to get updates.

Most respondents said that they did not currently adjust power management setting on employee computers or that they used a default setting for new computers. Employees were free to change these settings themselves, but there was the possibility of adjusting power management settings remotely, although this was not currently being done.

#### **Conclusions**

The results from the in-depth interviews suggested that IT managers largely favored a policy to shut down computers and monitors daily, and would therefore be willing to communicate the policy and provide the necessary practical support. In addition, some of the pilot project associates stated that conducting the interviews generated IT support for the program.



## ***Focus Groups with Employees***

### ***Method***

Research partners in each municipality invited employees to participate in focus group discussions of current computer shutdown and power management behavior. The groups were conducted to provide initial information about how employees viewed each of the target behaviors under consideration: turning off computers and monitors at the end of the workday and using power management settings during the workday. Groups were conducted at office sites during lunch and group members received a meal as an incentive to participate.

Participants were qualified to be invited to the focus group if they had a desktop computer at work and used it for at least 50% of their workday. Each participating municipality conducted two groups and attendance ranged from 5 to 12 participants.

### ***Measures***

Participants were asked whether or not they currently turned off their computer and monitor at the end of the workday and about the reasons for their behavior. They were also asked to describe IT policies as they understood them and to describe the current power management settings on their computer and how they were set.

Groups also discussed the barriers and benefits they perceived to each of the target behaviors of using standby or hibernate modes on their computers during the day and turning off computers and monitors at the end of the workday.

### ***Results***

#### **Current behaviors**

A majority of focus group participants indicated that they were turning off computers at the end of the day or at least on weekends. However, many reported that they were not turning off the monitor regularly, and may not have known they needed to do so, if the screen was dark.

Reasons given for not turning off the computer included habit, forgetting or being in a hurry, not wanting to wait for the computer to boot up, and compliance with department policy.

Focus groups were mixed in terms of levels of knowledge about power management settings and how to adjust them. Many were not sure whether the current setting was a default or had been set by IT. Most stated that their computer went into some type of standby mode after a period of time, but not into hibernation mode requiring a log-in.

#### **Barriers to computer and monitor shutdown**

Time was the most frequently cited barrier to computer shutdown, especially for those with older computers that needed more time to boot up. Some people were also not sure whether or not the computer needed to be left on to receive updates. Finally, some participants mentioned programs that needed to run overnight or wanting to leave complex, multi-file projects open. The main barrier to monitor shutdown was making it a habit.



### **Benefits to computer and monitor shutdown**

Participants mentioned a number of potential benefits to the target behaviors including:

- Saving energy
- Saving money
- Reducing wear and tear on computers
- Security and privacy
- Improving computer function and receiving needed updates

### ***Web Survey of Employees***

#### ***Method***

Results from the focus groups with employees were used to construct the Employee Computer Use Survey which was distributed and completed via webmail. The total number of respondents for each of the three participating municipalities was: Columbia (N=245), Frederick County (N=160) and Santa Clara County (N=34). The web survey questions can be found in Appendix A.

Results from the focus groups and IT interviews suggested that the barriers and benefits to computer and monitor shutdown were different for employees with their own computer workspace versus those who utilize shared computers and workspace. Therefore, this survey focused on employees who had their own designated computers in their own workspace.

#### ***Measures***

The web survey instrument asked participants to estimate the degree to which they were currently turning off their computer and monitor. They were also asked to indicate what their departments' current policy was (if any), who set the policy, and how it had been communicated.

Next, participants were asked to rate their level of agreement with a set of statements describing potential barriers and benefits to computer and monitor shutdown. The items were drawn from the employee focus group discussions.

The webmail survey also asked employees to indicate how the current power management settings on their computer had been determined. Again, they rated their agreement with statements describing potential barriers and benefits to using power management settings on their computer.

Finally, employees were asked to rate their likelihood of participating in each of four actions:

- Turning off the computer at the end of the workday
- Turning off the computer at the end of the work week
- Attending an energy conservation education session at their office
- Leading an energy conservation session at their office.



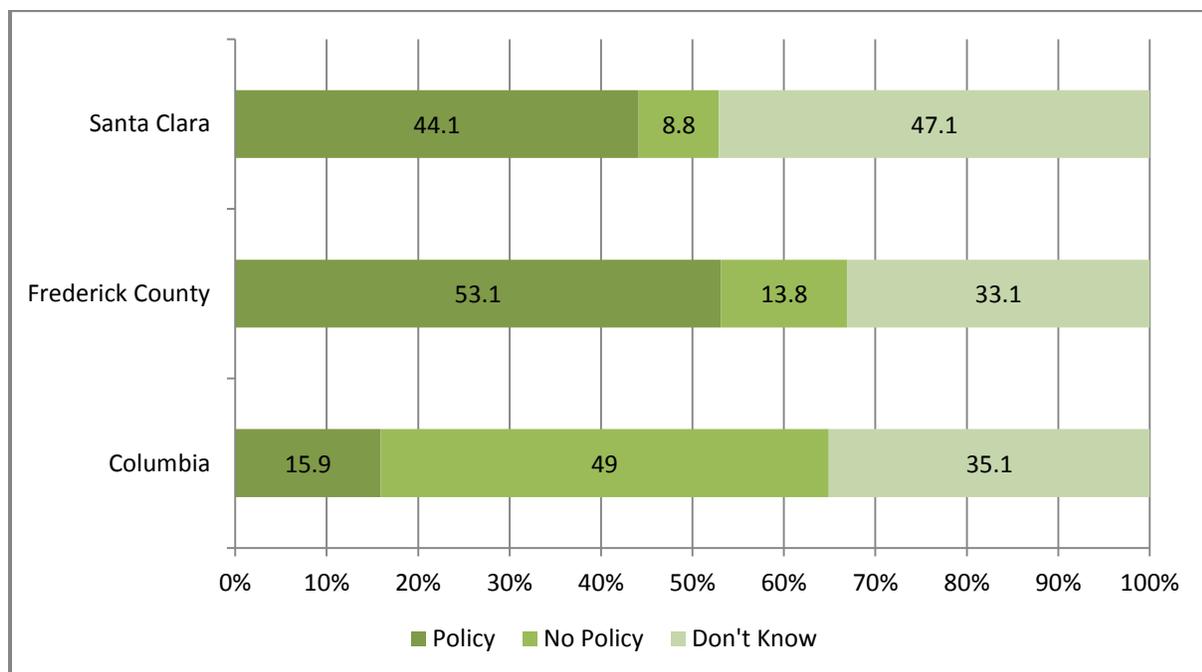
**Results**

**Current Policies**

Over 90% of all employees said that they used a desktop computer for the majority of their work. There was a significant difference across groups in the percentage of employees who had their own computers, with 94% of those in Frederick and Santa Clara Counties saying yes, but only 74% of those in Columbia ( $p < .001$ ).

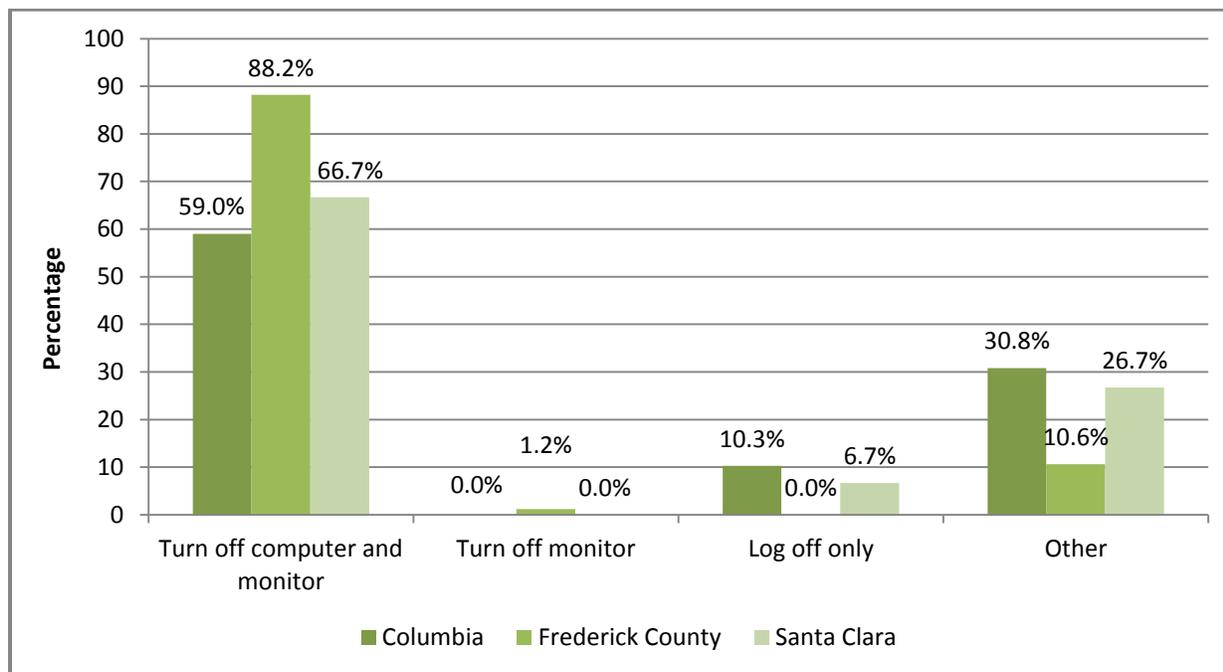
Respondents were asked whether their office had a policy about turning computers off at the end of the work day. Results showed that a third or more of respondents did not know whether there was such a policy or not. Of those who indicated that there was an office policy, Frederick County had the largest percentage and Columbia the smallest ( $p < .001$ ). See Figure 1.

**Figure 1. Computer shutdown policy by sample group.**



Of those who indicated that there was a policy, the most common choice was turning off both the computer and monitor. The “Other” category was the second most common choice, with most who wrote in a response saying that they turned off the computer only and assumed that the monitor went off at the same time. Figure 2 shows the distribution of different shutdown policy among those who said there was a policy in their workplace.

**Figure 2. Computer shutdown behavior among those indicating a policy.**



**Current behavior**

Respondents were asked to rate on an 11 point scale (0 to 10) where the low end was “Never” and the high end was “Always,” how often they performed specific actions at the end of a workday. Table 3 shows the mean responses for the three samples on each item. Frederick County employees said that they already turned off either their computer or monitor or both at a high rate. Santa Clara County employees were most likely among the participating groups to say that they kept their computer on but locked or logged off at the end of the day. Columbia also left computers on at a higher rate than Frederick County, possibly related to the larger number of employees in the Columbia sample who shared computers or worked in emergency services. See Table 3.

**Table 3. Mean frequency of current computer shutdown behavior (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
I turn off my computer	6.63	10.03	6.21
I turn off my monitor	5.54	8.64	5.00
I turn off both my computer and monitor	4.98	8.51	4.09
I leave my computer on, but locked or logged off.	5.22	2.41	6.68

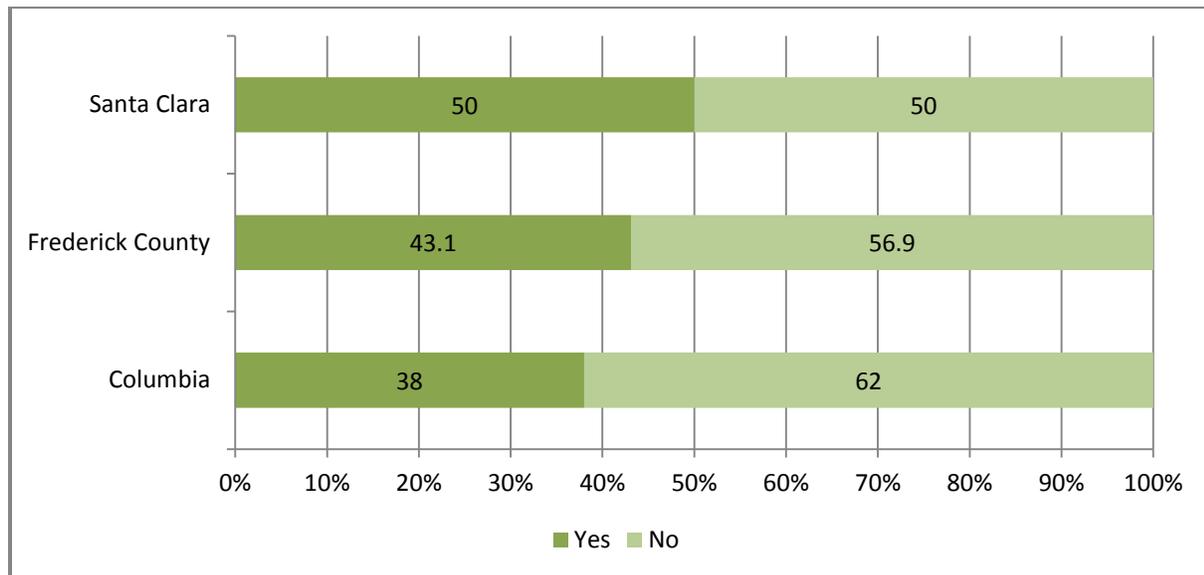


### Current Power Management Settings

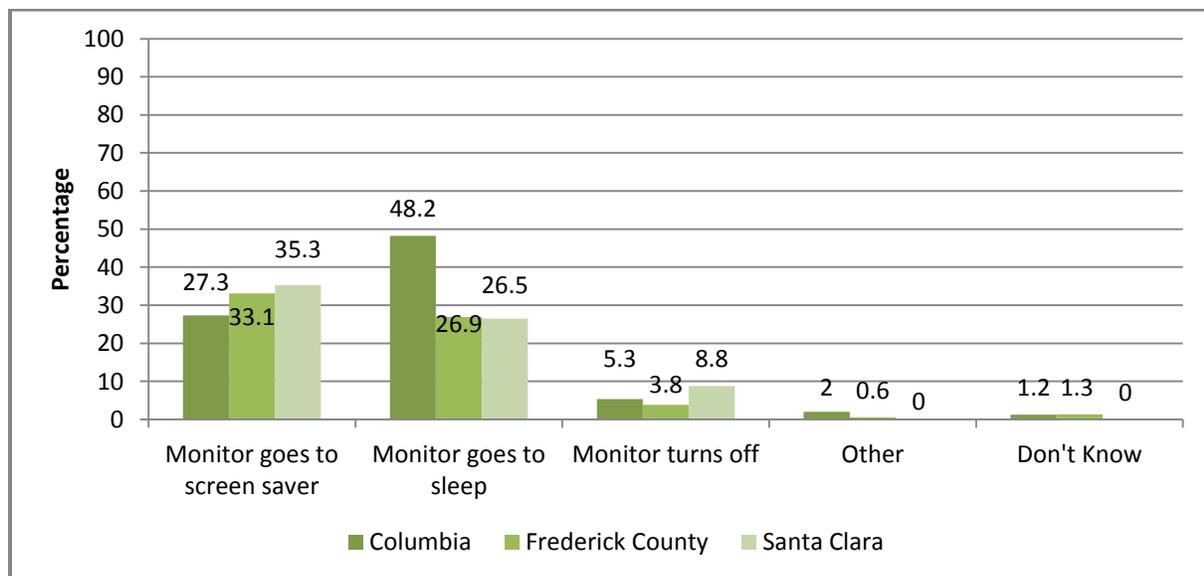
Over 90% of respondents in all municipalities said that their computer stays on all the time during the workday, as opposed to automatically shutting down when not in use for an extended idle period. When asked about returning to their computer after a certain amount of idle time, between 5% and 8% said that they had to wake up the computer by touching the mouse or keyboard.

Responses showed that there was currently a mix of power management settings for the monitor during the workday. For the largest percentage of respondents, monitors were set to go into sleep mode or to a screen saver after a certain amount of time. See Figures 3 and 4.

**Figure 3. Does your monitor stay on all the time?**

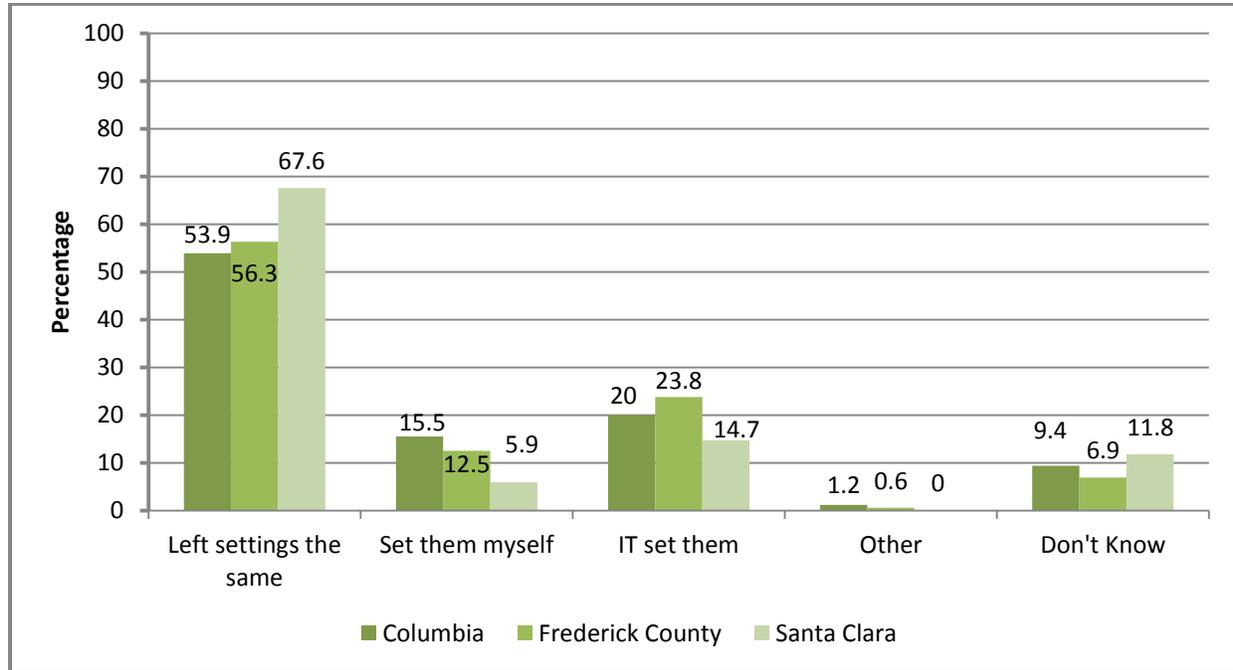


**Figure 4. Current monitor shutdown settings.**



When asked where they would go with questions about power management settings, over 86% of all respondents said that they would go to IT or the IT helpdesk. This percentage was over 97% for Santa Clara County. The other most commonly endorsed sources were co-workers or the internet. Power management setting seemed to be a source of confusion for some respondents; several open-ended responses in the Columbia sample stated that they weren't sure about their setting or had not heard about power management options. The largest percentage of respondents had not changed the power management settings on the computer they were currently using. See Figure 5.

**Figure 5. Source of current power management settings.**



### Barriers and Benefits to Shutting Down Computers and Monitors

To look at what factors were perceived as barriers to energy-saving behaviors, respondents were asked to indicate their level of agreement with a series of statements on an 11-point scale. Higher scores represent greater agreement.

**Barriers to computer shutdown.** On average, respondents tended to disagree moderately that the issues presented were barriers to shutting down their computers. The exception was the time it takes to reboot the computer, which respondents mildly agreed might prevent them from always shutting down. This seemed a greater issue for respondents who had older computers. Santa Clara County respondents were most concerned about this factor, as well as about having to reopen multiple files. Those in the Columbia sample were more likely to feel that the computer functions better if it is left on. This may have been related to the larger number of Columbia employees who shared computers or worked in departments with 24-hour operations. See Table 5.

**Table 4. Mean scores for barriers to computer shutdown (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
Rebooting takes too much time	5.95	4.64	6.35
I don't want to have to reopen multiple work files...	3.75	3.01	4.09
The computer I use needs to be left on for access by others who share it.	3.14	1.48	1.59
The computer I use needs to be accessible at all times.	3.82	2.32	3.32
The computer functions better if it is left on.	4.16	2.34	2.79
I was told not to turn the computer off.	2.44	1.62	1.50
I sometimes forget to turn the computer off.	2.92	2.64	4.26

Note: For all of the potential barriers except rebooting time, the median response was “1.” That is, at least half of the respondents in each group did not feel that the factor was a barrier at all to shutting down.



**Barriers to monitor shutdown.** Respondents also did not feel strongly about any of the potential barriers to monitor shutdown. However, the responses clustered at both ends of the scale for “The monitor goes off automatically” which suggests that there is variability across computer settings, or that people may not know for sure whether their monitor shuts off automatically or not. See Table 5.

**Table 5. Mean scores for barriers to monitor shutdown (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
The monitor needs to be left on for access by others who share it	3.00	1.28	1.79
The monitor needs to be accessible at all times	3.19	1.71	2.32
The monitor goes off automatically	6.92	5.12	7.50
I was told not to turn the monitor off	2.36	1.71	1.79
I sometimes forget to turn the monitor off.	3.24	3.03	4.44

**Benefits of computer shutdown.** Respondents in all of the sample groups were strongly positive about the energy and money saving benefits of computer shutdown, as well as the security benefits. Those in the Columbia sample had lower ratings than those in the other samples, however ( $p < .01$ ). See Table 6. An exploratory statistical test found that those who did not have their own computer at work also rated these benefits significantly lower, which might account for the differences across municipalities ( $p$ 's < .001).

**Table 6. Mean scores for benefits of computer shutdown (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
It saves energy	9.03	10.20	10.65
It saves money	8.77	10.07	10.56
It is better for security	8.35	10.03	8.79
It is better for privacy/confidentiality	8.23	9.99	8.88
It saves wear and tear on the computer	7.21	8.58	8.88
It allows me to receive regular updates	7.09	8.68	8.68
The computer functions better if rebooted	7.41	8.06	8.82



**Benefits of monitor shutdown.** Ratings of the benefits of monitor shutdown followed the same pattern and those for computer shutdown, although they were generally somewhat lower. In focus groups, some individuals expressed doubt that monitor shutdown would provide significant energy savings.

**Table 7. Mean scores for benefits of monitor shutdown (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
It saves energy	9.19	9.93	10.32
It saves money	8.90	9.81	10.03
It is better for security	6.90	7.73	6.97
It is better for privacy/confidentiality	6.97	7.66	6.71
It saves wear and tear on the monitor	7.34	8.44	9.38

Across all groups, the ratings for privacy, security and wear were lower than for energy/money savings. This was a potential benefit that was suggested across focus groups, so it is not clear why the ratings were lower in the survey data, and there were no comments in open-ended items addressing the issue. Possibly respondents did not see shutting down as having advantages over simply locking their computers. Also, shutting down the monitor by itself is not a very effective security measure.



**Barriers and Benefits to Using Power Management Settings**

**Barriers to using power management settings.** Ratings for the potential barriers to using power management setting tended to be higher than the barriers to computer and monitor shutdown, with the exception of rebooting time. A closer examination of the frequencies for these survey items showed that, again, responses were clustered at the ends of the scale for some items. Specifically, a substantial group of respondents were very concerned about the computer going into power management mode during a presentation or other work or about the computer being inaccessible. Several respondents noted that they were not familiar with power management settings, which may also have influenced their ratings of the potential barriers.

**Table 8. Mean scores for barriers to using power management settings (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
Takes too long to log back in	5.76	4.93	5.44
Some programs do not come back up properly	4.69	3.99	3.97
Don't want it to go into PM during work	6.13	5.62	7.35
Computer needs to be accessible at all times	5.90	5.28	6.26

**Benefits to using power management settings.** Patterns for perceived benefits to using power management settings were similar to those for shutting down the computer and monitor. Again, the median scores were “10” or “11” for energy and money savings. The median was “9” for the security and privacy/confidentiality items.

**Table 9. Mean scores for benefits of using power management settings (0-10).**

Survey Item	Columbia	Frederick County	Santa Clara County
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
It saves energy	9.13	9.74	9.53
It saves money	8.73	9.64	9.38
It saves wear and tear on the computer and monitor	7.88	8.69	8.74
It is better for security	7.83	8.84	7.85
It is better for privacy/confidentiality	7.92	8.96	7.71



### ***Likelihood of Participating in Energy Saving Actions***

At the end of the survey, we asked participants to rate their likelihood of participating in energy saving actions relating to computer use, where higher scores reflect a greater likelihood. Participants were generally very favorable toward turning off the computer when it is not in use. They were also favorable toward using power management setting to conserve energy: Half of respondents rated their likelihood at “9” or above. They showed moderate willingness to attend an informational session, although participants in Santa Clara were significantly less favorable in their response to that item than were the other groups ( $p < .01$ ). However, respondents were not at all favorable to the idea of leading such a session. The median on this item was “2” for Columbia and Frederick County and “1” for Santa Clara County.

### ***Conclusions***

Results from the web survey led to a number of conclusions about employees’ baseline behaviors. First, it was noted that, with the exception of Frederick County employees, who were already turning off their computers regularly, there was room for change. Many employees were not aware of whether or not their monitor went off when the computer was shut down and so were not making a separate effort to turn it off. Finally, most employees had not changed their power management setting and were not clear about how or if they should do so.

Overall, employees indicated that they were interested in the energy and money-saving potential of the target behaviors and were willing to change their habits. Results also suggested that employees would look to their IT department to set policies and answer any questions they might have about energy-saving behaviors.



### Step 3: Strategy Development

It was determined from the foundational research that power management settings were not well understood by employees, differed across operating systems, and could also be managed by IT personnel, either when computers were first set up, or remotely. Therefore, the strategy for the pilot program was to focus on the behaviors of turning off both computers and monitors at the end of the workday. Given the large number of desktop computers that exist within municipal office buildings, a program targeting these behaviors has the potential for significant energy savings.

The pilot program was tailored to the specific barriers and benefits of the target behaviors revealed by the foundational research. The program also leveraged tools of behavior change from the social sciences which have demonstrated effectiveness across a wide range of contexts. The behavior change tools incorporated into this strategy are defined below:

- **Credibility.** Information is more effective if the source is perceived as trustworthy or expert (see for example, Eagly, Wood, & Chaiken, 1978). The strategy included communication from IT representatives or the appropriate administrative authority.
- **Prompts.** Reminders of the specific desired behavior can increase compliance significantly (see for example de Kort et al., 2008). The strategy included a reminder designed for placement on the employees' monitor to remind them to shut down the computer and monitor.
- **Public Commitment.** Publicly pledging to perform an action reinforces the actor's intention to do so (Burn & Oskamp, 1986; Boyce & Gellar, 2000). The strategy included a signed commitment, made in-person, and then displayed publicly on the employees' monitor.
- **In-Person Communication.** Face –to-face communication increases the effectiveness of persuasive information (Cialdini, 2009). The strategy was designed for in-person delivery by staff, interns, or other representatives.

Table 10 on the following page shows each barrier and benefit, and details the marketing strategy used to address it.



**Table 10. Employee survey outcomes with associated marketing strategies.**

Address Barriers	
Research Outcomes	Marketing Strategy
Employees were not clear about whether or not there was a shutdown policy.	<ul style="list-style-type: none"> <li>➤ <b>Employees were sent an email communication from IT</b> that clearly stated the policy and asked employees to participate in the behavior.</li> </ul>
Employees were concerned about long start up times at the beginning of their workday.	<ul style="list-style-type: none"> <li>➤ Startup times from a small random sample of employee computers were collected in order to demonstrate that startup time is shorter than one might perceive. The <b>information</b> was displayed on a half-page flyer.</li> </ul>
Employees across all municipalities were unsure if their monitors shut down when their computers were shut down.	<ul style="list-style-type: none"> <li>➤ Employees were given clear instructions on shutdown that specifically addressed both computers and monitors.</li> <li>➤ Communication included a computer and monitor shutdown <b>prompt/commitment card</b>. The prompt/commitment card was business-size and strategically placed on their computer monitor near the shutdown menu in order to <i>remind</i> employees of their commitment to shutdown the computer <i>and</i> monitor at the end of every workday.</li> <li>➤ The prompt/commitment card included an employee <b>commitment</b>. Employees in the treatment group were asked to sign the card and place it on their monitor. Asking for a commitment to save resources alters or enhances one’s self-perception. People behave in ways that are consistent with their self-perceptions.</li> </ul>
Saving money and energy were seen as clear benefits to shutting down computers and monitors at the end of the workday.	<ul style="list-style-type: none"> <li>➤ <b>In-person visits</b> to employees reiterated the IT shutdown policy and identified employees as conscientious and interested in saving resources.</li> <li>➤ Employees received a half-page flyer that briefly stated the perceived <b>money and energy savings benefits</b>.</li> </ul>

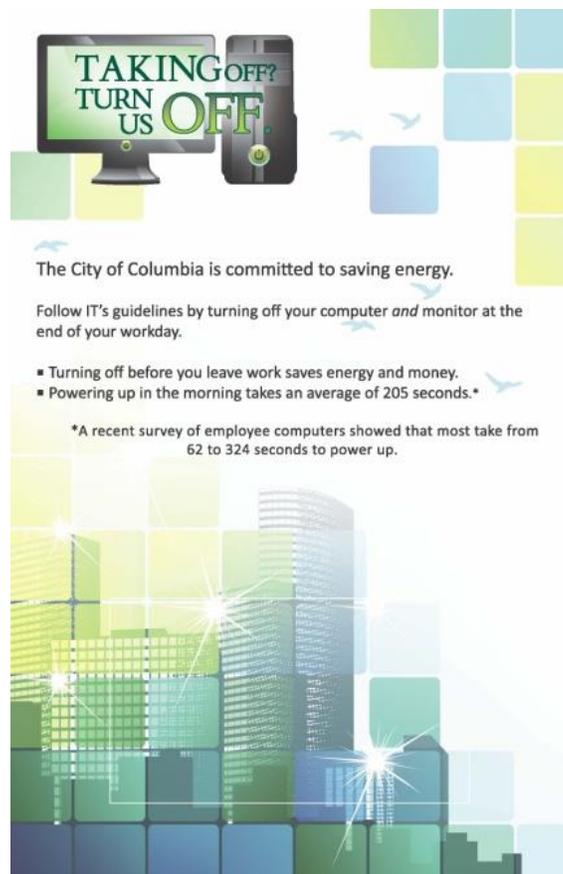


Community Based Social Marketing draws from research in the psychology and the social sciences to provide specific strategies to address different types of barriers to behavior changes. The overall structure of the pilot program included the following behavior change strategies:

**Credible Source.** Results from the focus groups and survey indicated that employees would look to IT as the most reliable source for information related to computer use and would turn to their IT department or Help desk if they had questions. For this reason IT was chosen to serve as the source for the information to be communicated by email as part of the pilot program strategy.

**In-Person Approach.** The background research revealed that computer start-up time was a concern for employees. Research partners at each location sampled computers to obtain a range and average startup time for their employees' computers, but this information could be easily overlooked if embedded in an email or flyer. For this reason, employees in the treatment group received in-person visits during which key information was presented to each person individually. Figure 6 shows an example of the customized information sheet.

**Figure 6. Information sheet.**



**Public Commitment.** Research has shown that making a public commitment to a behavior increases the likelihood of actually performing that behavior and continuing to do so. In the present project, turning off computers and monitors, because it is observable, can itself be a public commitment, but the pilot program included the additional step of asking employees to sign and display a commitment card pledging to turn off their computer and monitor at the end of each workday.

**Prompt.** The commitment card served not only as a public display of each employee's pledge to turn off their computer and, especially, their monitor; it also served as a reminder to do so. Figure 7 shows the card that participants in the treatment group were asked to place on their computer monitor.

**Figure 7. Prompt/commitment card.**



## Step 4: Pilot Testing

### Method

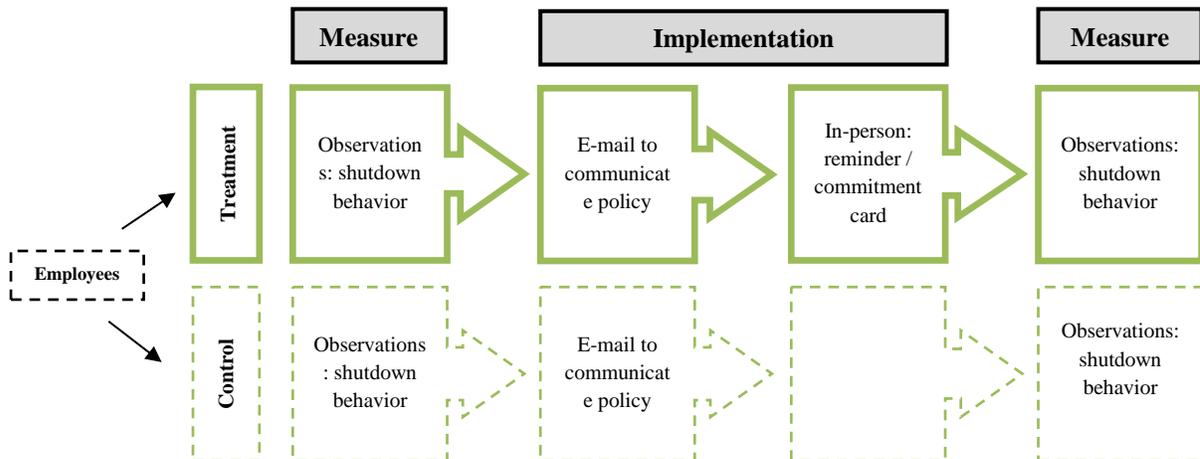
Prior to implementation of the behavior change strategy (treatment), all employees received an email informing them of the policy of shutting down both computers and monitors at the end of the workday.

Each municipality selected groups of computers to be assigned into control and treatment groups. The treatment condition involved an in-person visit by individuals selected as communicators by each municipality (municipal green teams, IT, or sustainability department staff members). Each person in the treatment group was approached, asked if they recalled the email message, and given a flyer containing information about the policy. They were also asked to sign a commitment sticker and place it on their computer. The control groups did not receive any further information about the shutdown policy after the initial email.

Ideally, groups were chosen so that there was as little chance as possible that the treatment would be observed by individuals who were in the control group, but achievement of this goal may have varied across municipalities.

To assess the effectiveness of the treatment, observations were taken at the end of the workday, after the employee had left his or her office or workspace. Observers took separate note of whether the employee had shut down his or her computer and monitor. Figure 8 shows an overview of the full pilot implementation process.

**Figure 8. Pilot implementation design.**



**Outcome Measures**

Municipalities were asked to complete two observations of each computer and monitor before the treatment implementation and two observations after implementation. Three cities completed some observations of computer and monitor shutdown. Table 11 shows the number of computer/monitor pairs observed in each location.

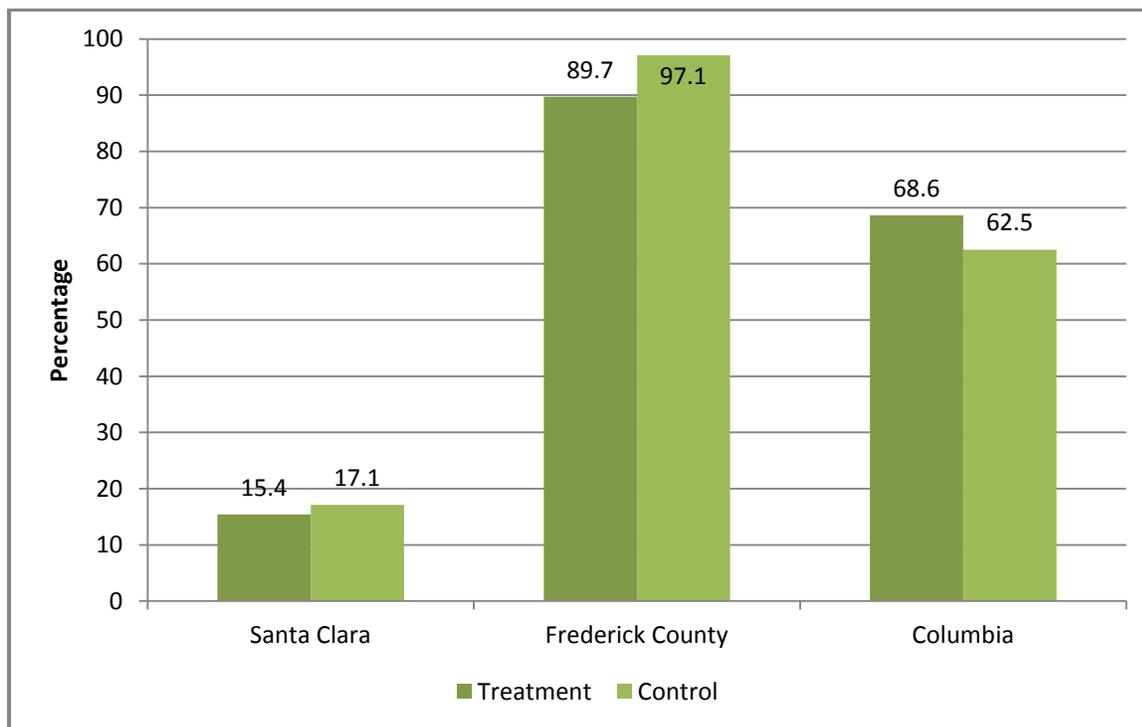
**Table 11. Number of pre- and posttest observations by municipality.**

Municipality	Pretest Observations		Posttest Observations	
	Treatment	Control	Treatment	Control
Columbia	35	48	43	44
Frederick County	39	35	36	35
Santa Clara County	39	41	38	39

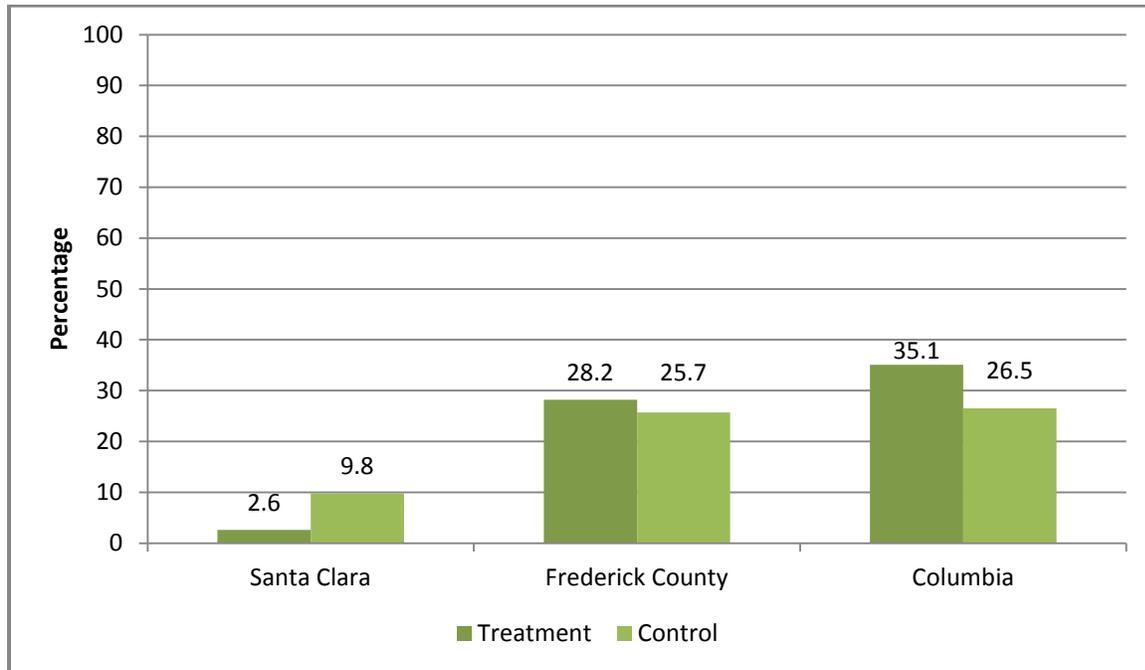
**Baseline Conditions**

**Baseline rates of computer and monitor shutdown.** Three municipalities provided baseline observation data on computer shutdown for their offices. Analyses showed that, although there were significant differences across municipalities in terms of the percentage of people observed who were shutting down their computers and monitors, there were no differences between the groups chosen as treatment and control in the percentage of people who shut down their computers and monitors at baseline (all  $p$ 's <.05). See Figures 9 and 10.

**Figure 9. Computer shutdown percentages at baseline.**

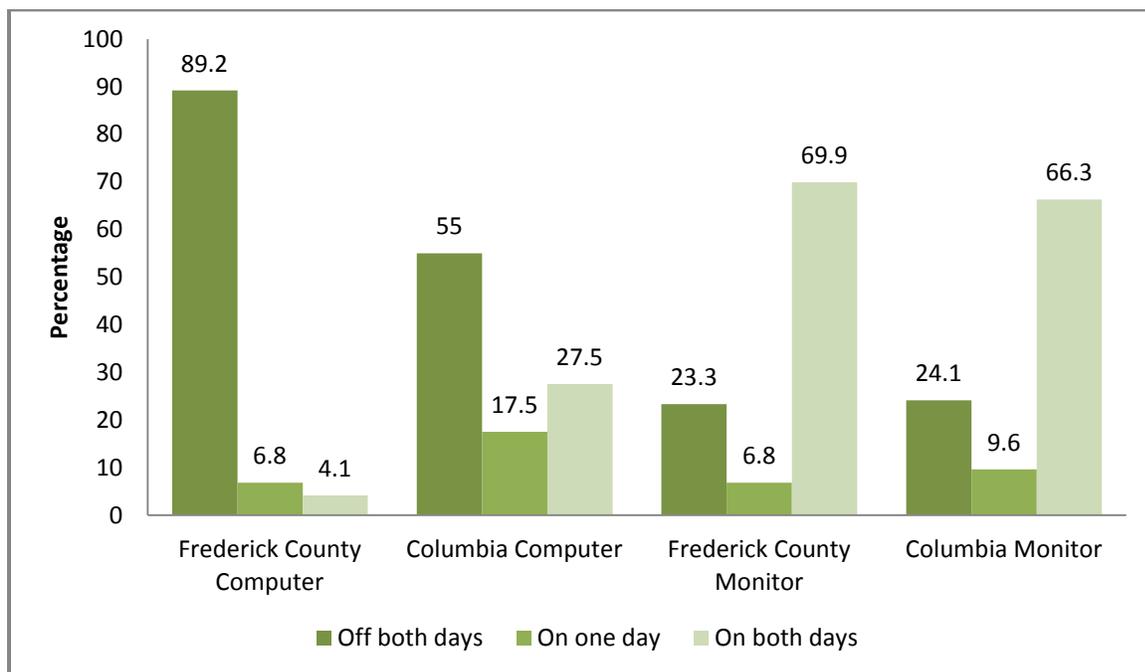


**Figure 10. Monitor shutdown percentages at baseline.**



Frederick County and Columbia each completed two baseline observations. Results showed that people in Frederick County were consistently shutting down computers at the beginning of the study, while those in Columbia were more variable. Most people in both municipalities did not shut down monitors consistently. See Figure 11.

**Figure 11. Computer and monitor shutdown percentages (baseline).**

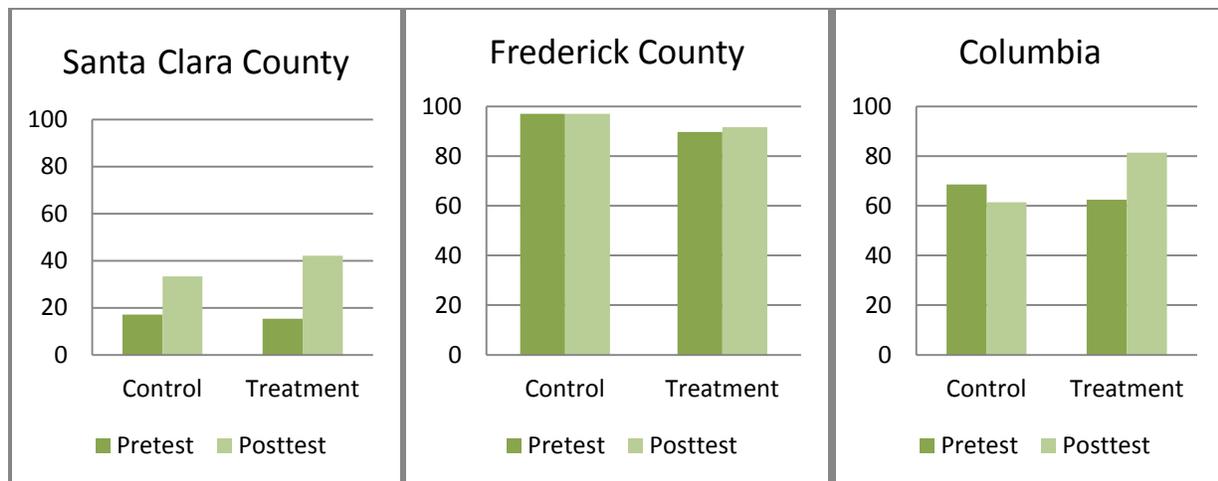


### Pilot Results

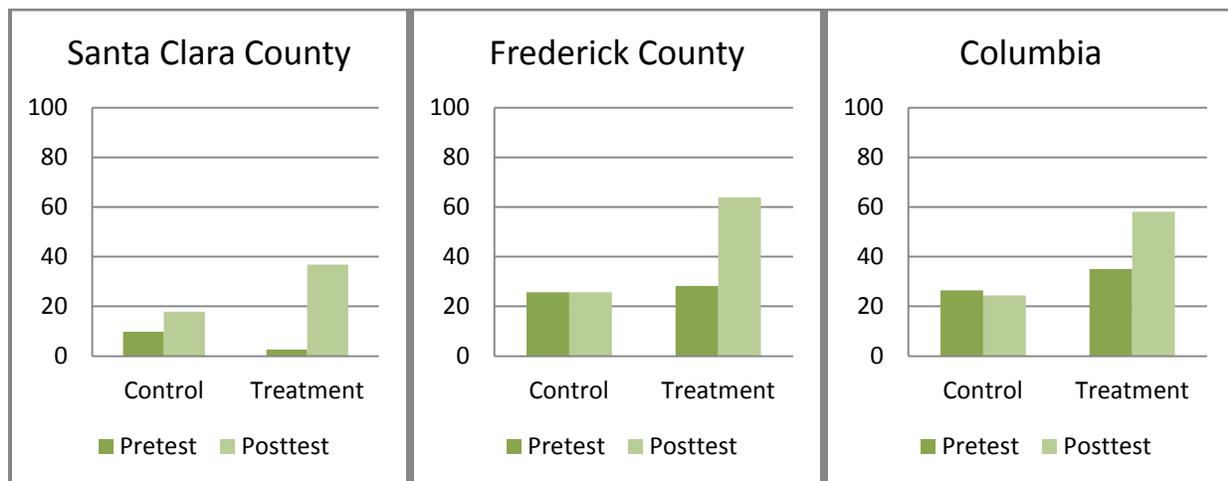
In order to evaluate the effects of the pilot, we examined the percentages of individuals who were shutting down computers and monitors before versus after the intervention period for both the treatment and control groups. All three municipalities provided at least one set of pre and post-intervention observations. Because only one municipality completed all four observations the analyses below are based on one pretest and one posttest observation only.

Results indicate that the in-person visit and commitment did not make a difference in the rates at which people shut down their computers in the Frederick County and Santa Clara County samples ( $p$ 's > .05). However, there was a significant difference across pre- and post-test computer shutdown rates for the Columbia sample ( $p$  < .05). See Figure 12. The treatment had a significant effect on monitor shutdown in all three municipalities ( $p$ 's < .05). See Figure 13.

**Figure 12. Pre and posttest computer shutdown percentages by treatment condition.**



**Figure 13. Pre and posttest monitor shutdown percentages by treatment condition.**



One added value of the in-person visit was to increase the likelihood that people would know how to shut down their monitors and would remember to do so. On many computers, monitor shutdown is not as obvious as computer shutdown: A monitor that is in the sleep mode may appear to be off, with the only visible indicator being a small light. This could explain why the intervention had a significant effect on monitor shutdown over and above the policy notification email.

### **Columbia**

Columbia was the only sample where the in-person visit increased the level of computer shutdown significantly over and above the policy email alone. One difference between this group and the other samples was that there was a longer interval between the in-person visit and the posttest observation than in the other two municipalities. This suggests that the in-person visit may have longer lasting effects than the policy email alone, although further testing would be necessary to confirm this hypothesis.

### **Frederick County**

Rates for computer shutdown were already very high in Frederick County, which left less room for change. However, Frederick County did demonstrate significant change in monitor shutdown behavior – an area where there was sufficient room to move.

### **Santa Clara County**

The results also showed that for Santa Clara County computer shutdown increased from the pre-test to the post-test for both the control and treatment groups ( $p < .05$ ). See Figure 12. It is not clear why there was an increase in computer shutdown for all groups in Santa Clara County. It is possible that there was a heightened awareness of computer shutdown policy, based on the pre-intervention email alone, and that this caused an increased percentage of people to shut down their computers during the post-test observation period, regardless of whether they received an in-person visit or not.



## Step 4: Recommendations for Ongoing Evaluation

Evaluating your program allows you to make any necessary program adjustments, and assuming success, move forward with municipal-wide implementation. Ongoing evaluation of employee computer and monitor shutdown behaviors could entail actual computer-usage reports from IT. For example, at least one municipality will utilize IT remote tracking of computer on and off modes for continuing evaluation of the program.

### Lessons Learned

#### *Implementation Challenges*

Because the target audience for the program consists of employees with their own computer, often in private offices, some of the participating groups experienced challenges in performing observations to determine baseline and post-treatment percentages of computer and monitor shutdown among their treatment and control groups. Here are some specific challenges:

- Limited resources to implement the in-person visits.
- Limited resources to conduct the pre- and post-treatment observations.
- There was time spent obtaining security clearance to enter buildings and offices after-hours.
- Building access and security were added stresses and especially problematic for one municipality where an employee (intern) who was collecting observation data was escorted out of the building after hours.
- One municipality had employee work style and culture challenges that became apparent during the in-person visits: the employees were mostly attorneys whose office hours varied from day to day and whose demeanor was characterized as *rushed*.

#### *Implementation Successes*

Throughout the pilot project process, participating municipalities shared their successes and some unexpected findings.

- All municipalities were very pleased about the plethora of information they learned by conducting the foundational research (focus groups with employees and the in-depth interviews with IT).
- The municipalities were pleasantly surprised to learn that IT was supportive of computer and monitor shutdown efforts, and that employees were keen to save money and energy resources.
- The municipalities reported that their IT departments were pleased that with regard to computers, employees wanted the IT department to tell them what to do.
- Collecting data for measuring program outcomes (walking through their departments) heightened the program associates' awareness about other energy-use issues that they have within their municipalities (e.g., an abundance of personal refrigerators and microwave ovens).
- Walking through the departments also highlighted aging computers and the need for new ones.
- A couple of the municipalities learned about the capabilities of their IT departments to monitor employee energy use.



### *Turnkey Conclusions*

Overall, the participating municipalities reported that the turnkey strategy developed and piloted as part of this project was a worthwhile effort. All of the pilot municipalities reported learning a lot by going through the process and were pleased with the outcomes. For most, the greatest value of the project came through conducting the foundational research. Engaging IT representatives, administrators, and employees in the research process yielded a number of direct benefits including opening lines of communication between Sustainability Directors and IT Departments, generating support for the program, and identifying additional opportunities for energy savings at employee work stations.

At the time of this writing, it remains uncertain whether the pilot municipalities will implement the strategy on a broad scale. At least one of the pilot municipalities could not get IT support for implementation of the pilot. Another (Frederick County) discovered through the research process that most employees were doing the right thing with regard to computers. It remains unclear whether Frederick County will invest staff time on an effort that will only impact monitor use.

Despite differences in the various municipalities, the success of the project across the regions suggests that the strategy could be successfully scaled up or replicated in other areas that face similar barriers and benefits to those identified in the pilot. More specifically, the pilot municipalities that successfully implemented the program shared several common characteristics. As such, the turnkey program is intended for municipalities with employee groups (a) that have desktop computers in their own workspace; (b) whose primary perceived barriers are long startup time at the beginning of the workday, and lack of knowledge about whether or not their monitors shutdown when computers are shutdown; and, (c) whose perceived benefits are energy and money savings. In those cases, the turnkey strategy offers a feasible and scalable method for achieving behavior change without the need to design a program from scratch. For example:

- The marketing materials are simple and can be easily produced in house with minimal customization. Customization can be handled with common software programs (Word & Adobe Acrobat) thus eliminating the need for graphic designers or creative departments.
- The in-person nature of the communication in the strategy requires an investment of staff time. However, the pre-scripted interaction could be easily provided to a student, intern, Green Team leader, or other volunteer.
- While the pilot municipalities spend considerable time developing research tools, the research tools are replicable across virtually any municipal audience.
- In many cases, there is technology that will automatically record the status of computers. This technology would eliminate the bulk of staff time needed for evaluation through direct observation.



## Appendix A

### **USDN Municipal Employee Web Survey**

The [City/County of \_\_\_\_] is interested in learning about employees' computer-use habits and existing efforts to manage computer power usage. Your responses will be used to develop new energy-saving programs that fit with the computer access needs of employees. Please answer as honestly and completely as possible. Your responses will remain confidential and will not identify you as an individual.

### **Employee Computer use Characteristics**

1. What kind of computer do you use for the majority of your workday? (Check all that apply)

- Desktop
- Laptop
- Tablet
- Other \_\_\_\_\_

2. Which best describes your work situation?

- I have my own computer
- I share my computer with another user or users
- Other \_\_\_\_\_

### **Current Behaviors**

3. Which best describes your actions at the end of a workday, where 0 equals "Never" and 10 equal "Always."

I turn off my computer.

0    1    2    3    4    5    6    7    8    9    10

I turn off my monitor.

0    1    2    3    4    5    6    7    8    9    10

I turn off both my computer and monitor.

0    1    2    3    4    5    6    7    8    9    10

I leave my computer on, but locked or logged off.

0    1    2    3    4    5    6    7    8    9    10



**Policy Knowledge**

4. To the best of your knowledge, does your office have any policy about turning off computers at the end of the workday?

Yes

No

Don't know

[If Yes]

5. What is the policy?

Turn off both computer and monitor

Turn off monitor only

Log off but leave computer on

Other \_\_\_\_\_

6. Who set the policy?

IT department or representative

City/County manager

Office manager

My supervisor

Other \_\_\_\_\_

Don't know

7. How did you learn about this policy?

In-person communication

Email

Employee handbook or training materials

Employee newsletter

Poster or other publicly posted document

Other \_\_\_\_\_

Don't know



**Barriers**

8. Next we'd like you to consider some things that might prevent you from always turning off your computer at the end of the workday. *Please tell me how much each statement applies to you on a scale of 0 to 10 where 0 is "Strongly Disagree" and 10 is "Strongly Agree."*

Rebooting takes too much time.

0    1    2    3    4    5    6    7    8    9    10

I don't want to have to reopen multiple work files the next day.

0    1    2    3    4    5    6    7    8    9    10

The computer I use needs to be left on for access by others who share it.

0    1    2    3    4    5    6    7    8    9    10

I sometimes have work that needs several hours or overnight to process.

0    1    2    3    4    5    6    7    8    9    10

The computer I use needs to be accessible at all times.

0    1    2    3    4    5    6    7    8    9    10

The computer functions better if it is left on.

0    1    2    3    4    5    6    7    8    9    10

I was told not to turn it off.

0    1    2    3    4    5    6    7    8    9    10

I sometimes forget.

0    1    2    3    4    5    6    7    8    9    10

Other \_\_\_\_\_



9. Next we'd like you to consider some things that might prevent you from always turning off your monitor at the end of the workday. *Please tell me how much each statement applies to you on a scale of 0 to 10 where 0 is "Strongly Disagree" and 10 is "Strongly Agree."*

The monitor I use needs to be left on for access by others who share it.

0    1    2    3    4    5    6    7    8    9    10

The monitor I use needs to be accessible at all times.

0    1    2    3    4    5    6    7    8    9    10

The monitor goes off automatically when the computer is shut down.

0    1    2    3    4    5    6    7    8    9    10

I was told not to turn it off.

0    1    2    3    4    5    6    7    8    9    10

I sometimes forget.

0    1    2    3    4    5    6    7    8    9    10

Other \_\_\_\_\_

**Benefits**

10. The following items ask you to consider some potential benefits that might come from turning off your computer at the end of the workday. On a scale of 0 to where 0 is "Strongly Disagree" and 10 is "Strongly Agree," please rate your agreement with the following potential benefits:

It saves energy.

0    1    2    3    4    5    6    7    8    9    10

It saves the organization money.

0    1    2    3    4    5    6    7    8    9    10

It is better for security.

0    1    2    3    4    5    6    7    8    9    10

It is better for privacy or confidentiality.

0    1    2    3    4    5    6    7    8    9    10

It saves wear and tear on the computer.

0    1    2    3    4    5    6    7    8    9    10

It allows me to be sure that I receive regular software updates.

0    1    2    3    4    5    6    7    8    9    10

The computer functions better if it is rebooted.

0    1    2    3    4    5    6    7    8    9    10

Other \_\_\_\_\_



11. The following items ask you to consider some potential benefits that might come from turning off your monitor at the end of the workday. *On a scale of 0 to where 0 is “Strongly Disagree” and 10 is “Strongly Agree,” please rate your agreement with the following potential benefits:*

It saves energy.

0    1    2    3    4    5    6    7    8    9    10

It saves the organization money.

0    1    2    3    4    5    6    7    8    9    10

It is better for security.

0    1    2    3    4    5    6    7    8    9    10

It is better for privacy or confidentiality.

0    1    2    3    4    5    6    7    8    9    10

It saves wear and tear on the monitor.

0    1    2    3    4    5    6    7    8    9    10

Other \_\_\_\_\_

### Intended Behavior

12. On a scale of 0 to 10 is “Not at all likely” and 10 is “Extremely likely,” please rate your likelihood to participate in each of the following actions:

Turning off my computer at the end of each work day

0    1    2    3    4    5    6    7    8    9    10

Turning off my computer at the end of each work week

0    1    2    3    4    5    6    7    8    9    10

Attending an information session about energy conservations in the office

0    1    2    3    4    5    6    7    8    9    10

Leading an information session for a group of my peers on energy conservation in the office

0    1    2    3    4    5    6    7    8    9    10

### Employee Characteristics

Last, we have a few questions for categorization purposes:

13. Gender     Male     Female

14. Which best describes your job function:

Administrative/Clerical

Legal

Facilities

Other



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