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Reducing Personal Computer Energy Usage without Financial Incentives

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(1) Personal Computers

- There are Hundreds of Millions of Personal Computers(PCs) in the US alone
- Each of these computers consumes a moderate amount of power, between 20-50 watts for laptops and 75-200 watts for desktops
- On an individual level, the cost of this energy usage is minimal, constituting $100-400 a year per computer
- 40-60% of electricity used by office equipment is consumed by personal computers.
- Even minor efficiency gains can yield significant improvements overall

(2) Computer Energy Use

- Significant work has gone into making computers more energy efficient, but achieving optimal energy savings requires user actions
- Convince users to reduce PC energy use in offices
- Two Methods:

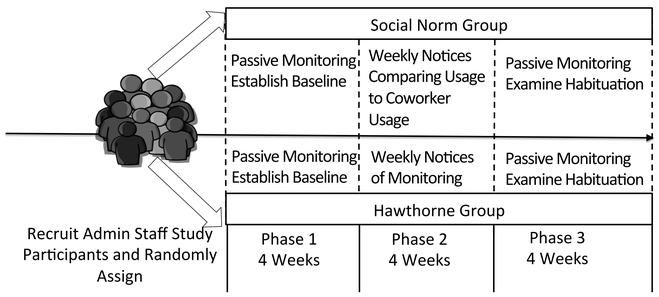
1. Hawthorne Effect, sending weekly email notifications informing participants their energy is being monitored, to increase awareness
2. Social Norms, send weekly email notifications informing participants of their previous week's energy consumption, and how it compares to their coworkers

- Also examine if this leads to habituation by continuing to monitor energy use after notifications cease

synergy
systems, networking and energy efficiency

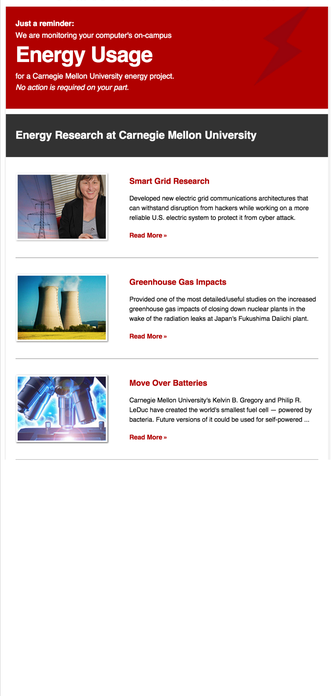
(3) Our Study

- Target Population: CMU Admin Staff
- 12 Weeks Study, 3 phases (4 weeks per phase)
- 4 Weeks of Passive Monitoring to establish Baseline
- Two Groups: Hawthorne and Social Norm, received weekly Notices in the second stage depending on their condition
- Third Stage passive monitoring to examine habituation
- Surveys and Interviews after Study Completion

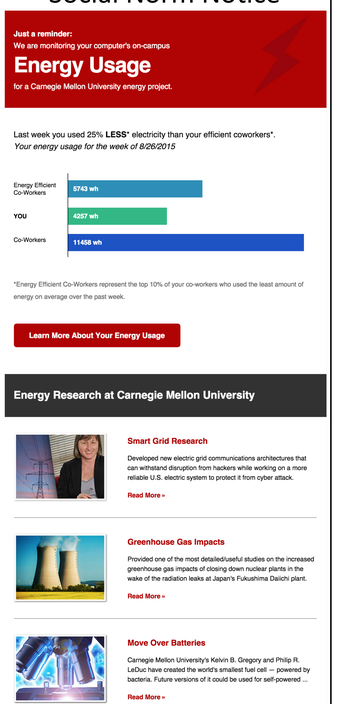


(4) Our Notices

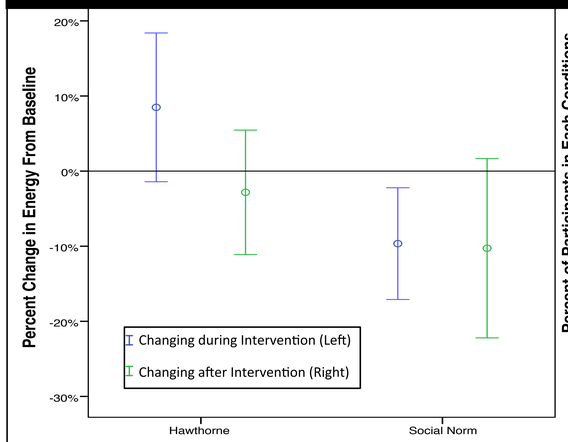
Hawthorne Notice



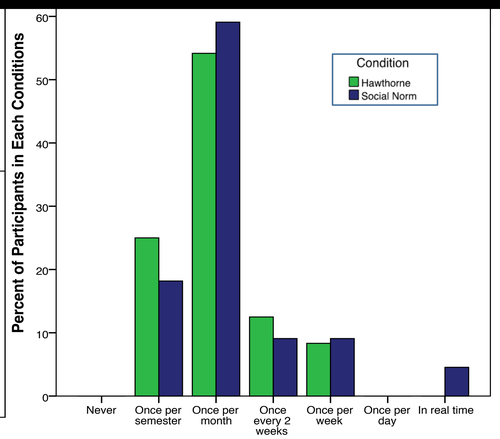
Social Norm Notice



(5) Results



Change in energy consumption from the baseline during phase 2 and 3. Bars denote 95% confidence intervals. Social norm has a statistically significant energy reduction in phase 2, with a similar energy reduction in phase 3 Hawthorne energy usage is generally higher than social norm, with an sizeable but not significant increase in phase 2, and a small decrease in phase 3



Desired Rate of Feedback by Conditon

Average desired rate of feedback was lower than what we used during our study, and was equal across conditions. None of the subjects indicated that they would not want to see any email notifications. Most common response was once a month, with more than half of subjects in each condition desiring this rate of feedback

(6) Discussion and Conclusions

- Participants generally reported making no conscious changes to behavior
- Participants reported wanting more information on their energy use, particularly those in the Hawthorne Condition
- Participants reported wanting some form of incentive to change their behavior (competition to see who can save the most, getting part of the savings, etc.), suggesting that studying this effect without such incentives has merit
- Hawthorne Effect did not have a significant effect on energy usage
- Sending weekly notices of computer energy consumption led to a 9.7% drop in energy usage, without any form of financial incentive
- Habit formation also occurred for social norm notices, as reductions were maintained into phase 3
- Our results suggest that using social norms to reduce energy usage should be widely applied in all office settings, as there are significant conservation gains to be had

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