



RPI lights the way for office energy savings

Case Study

Company Name:
Rensselaer
Polytechnic Institute,
Lighting Research Center

Business Type:
Higher Education

Location:
Troy, NY

Research Objective

Rensselaer Polytechnic Institute's (RPI) Lighting Research Center (LRC) teamed up with the New York State Energy Research Development Authority (NYSERDA) to investigate strategies to encourage office workers at a State University of New York office building to turn off their fluorescent office lights when sufficient daylight was present, whenever leaving their offices during the day, and at the end of the workday.

The research hypotheses included the following:

1. Lighting use during the intervention period would be less relative to the pre-intervention period.
2. Lighting use during the intervention period would be less in the dynamic (changing) message offices than in the static message offices.
3. Lighting use would be greater during the post-intervention period relative to the intervention period.

Background

Previous studies show that static message stickers affixed to light switch plates can reduce lighting energy use by approximately 15%. Dynamic interventions, where various interventions and/or rewards for requested actions are randomly provided may be effective in motivating action because they generally respond to the human need for surprise and reward.

Manually switching off lights reduces unnecessary lighting and avoids lights being automatically turned off by vacancy sensors while rooms are occupied; there is a 10- to 20-minute delay time built into vacancy sensors (to avoid turning off lights when occupants are still present and annoying occupants due to false-negative readings). This research explored using messaging to increase energy savings by encouraging occupants to use their manual light switches more frequently to turn off lights when leaving their offices and when adequate daylight is present.



Pilot Description

The pilot investigated the effectiveness of using dynamic message displays to encourage lighting energy savings. Dynamic messages were presented on small LCD screens adjacent to light switches in 20 offices in the SUNY administration building in Albany, NY. When lights were on and workers approached the door to leave their offices, dynamic message displays provided prompts about saving energy and directed workers to turn off lights before leaving. Some of the messages included humorous or whimsical prompts. Other messages directed workers to make use of daylight by turning off ambient lighting and using task lighting if necessary.

Microcomputers sensed when lights were turned off and positive feedback messages were displayed some of the time to reward individuals for turning off their lights.

The effectiveness of the dynamic message displays was tested in 20 private offices over a three-month period. Concurrently, 20 other private offices had static messages installed as a control. A pre-intervention period of one month served as a baseline for both groups, and a post-intervention period of one month tested for persistency of savings.

Findings

The evaluation results showed that only hypothesis 1 was supported by the data. For all offices in the study, the average wasted light per occupied hour in offices was reduced from 0.297 hour per hour in the pre-intervention period to 0.253 hour per hour during the post-intervention period, a statistically significant reduction of almost three minutes per hour.

Contrary to hypothesis 2, there was a greater decrease in wasted light per hour in occupied offices with static messages during the intervention period (from 0.244 hour per hour to 0.186), a significant 23.8% reduction, than in the dynamic message offices (from 0.339 hour per hour to 0.307 hour per hour), a nonsignificant 9.2% reduction.

The data also did not support hypothesis 3. The post-intervention period showed a decrease in wasted light during the post-intervention period in both the dynamic message offices and the static message offices, although the decrease was not significant.

A post-treatment survey completed by office workers in the study indicated that cultural reasons may have undermined the potential effectiveness of the dynamic messages in reducing wasted light. Nine workers in the dynamic message offices reported they left their lights on to signal they were “at work” for the day, while only four workers in static message offices reported the same. Additionally, six workers in dynamic message offices and three in static message offices thought it was better for economic or energy efficiency reasons not to switch off fluorescent lights for short periods of time (which is incorrect). These results show the need for communication from office managers about reducing all unnecessary light usage.

To view the full report

Visit: www.lrc.rpi.edu/programs/energy/pdf/dynamic_message_Final_report_12-22-16.pdf

