

Brown University Pembroke and Wriston Quads

Getting those windows closed



CHALLENGES

In the spring of 2011, Brown University partnered with GreenerU to address energy waste from open windows in dorms. This issue stemmed from a variety of pain points. In the Pembroke and Wriston Quads, students did not have much control over the heat in their rooms. Opening the window was used as a form a temperature control. In some cases, the open windows exacerbated the overheating problem by tricking building or zone thermostats to call for more heat, thus further overheating other parts of the building.

GreenerDorms addressed these issues by improving building systems while engaging students to keep those windows closed all winter.

APPROACH

GreenerU maximized the impact of dorm improvements in both the Wriston and Pembroke quads by delivering its innovative solution, which integrates building system upgrades with behavioral programs to improve comfort in residence halls, addresses deferred maintenance, and maximizes financial returns.

These projects started with a detailed engineering investigation of the buildings' mechanical, electrical and temperature control systems. As part of the investigation phase, GreenerU worked in close collaboration with Facilities Management and Residential Life to confirm goals and identify concerns. Energy efficiency and temperature control upgrades were planned as summer work. In the fall, student engagement campaigns were designed to leverage the building upgrades as part of the campaign to enlist students in energy reduction efforts.

WORK PERFORMED

In this early phase of GreenerU's work at Brown, we took an experimental approach to better understand the impact of the integrated GreenerDorms approach.

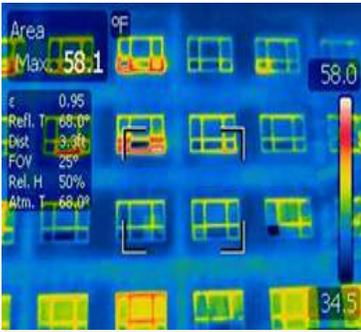
In 2011, two comparable buildings were selected for this pilot program experiment. One building received both building upgrades and behavioral and outreach programs while the other, a similar residence hall serving as the control, received no upgrades and no behavior and outreach programs. Building system

Project Highlights:

- » Behavioral and outreach programs reduced open windows by 50%
- » Thermal energy was reduced by 58% in dorms that received the full GreenerDorms package
- » Total electrical energy use was reduced by 16%



Signage cues were placed next to every heater in the dorm



GreenerU used a thermal image to test for heat leaks from windows open and poorly sealed windows.

Behavioral and Outreach Programs:

- » Include building users in the solution generating process
- » Create a sense of shared ownership in sustainability efforts
- » Enhance the savings gained by implementing infrastructure upgrades



A fully open window can cost up to \$2000 in lost heat annually

improvements focused on both energy efficiency and comfort improvements. These included:

- » New submeters (on the campus high temperature hot water system)
- » Pipe and valve insulation
- » Building weatherization
- » Installation of high efficiency domestic hot water heaters
- » Water efficient plumbing upgrades
- » LED lighting improvements - designed to enhance the visual environment as well as reduce energy use
- » BAS upgrades
- » Room level temperature controls (typically via thermostatic radiator valves)

Behavioral outreach programs were conducted to educate students on how the infrastructure changes affect them, and how to best interact with their living space. This included encouraging residents to report heating issues rather than opening their windows as a self-fix. The outreach campaign was designed to leverage the University’s investment in improving the students’ living environment to help gain more effective outcomes.

RESULTS

- » In the pilot building that received the full GreenerDorms package, **thermal energy use was reduced by 58%** as compared to an identical control building that was untouched
- » In the broader project, **electrical energy use was reduced by 16%** in a single quad
- » **Window opening was reduced by 75%** in the pilot building, compared to the control building

Since the pilot program, Brown continued to partner with GreenerU to expand the GreenerDorms program with the goal of understanding the impact of targeted behavior and outreach programs. Results from the second year showed that students in GreenerDorms programs are 50% less likely than students in the control population (conventional energy upgrades) to report that they open the window when the heat is on. Another finding was that a shift in culture has occurred over the past three years, with a 40% decrease in the average number of windows open compared to the first GreenerDorms program.