Energy Use at UCSB

Purpose
The goal of this project is to reduce energy use at the University of California, Santa Barbara (UCSB) by targeting heat behavior. There is a disconnect between building occupants on campus and electricity use because departments do not directly pay for their energy consumption and do not know how much energy they use. This program rewards departments with a financial incentive to reduce 5% of their annual energy savings.

Project Motivation
- UCSB is tasked with meeting the UCOP’s 2025 Carbon Neutrality Goal.
- The UCOP’s campus consumes around $600,000 in energy utilities every month.
- The UCSB Long Range Development Plan (LRDP) will expand campus for the expected 1% annual growth through 2025.

Research Questions
1. Which behavior can be changed to reduce energy use?
2. Which strategies can effectively influence behavior to reduce energy use?
3. How can strategies be scaled for a campus-wide rollout?

Changing Occupant Behavior

Pilot Program Approaches

Information

Strategic messaging

Competition

Occupant Approaches

Lighting settings

Temperature control

Building Approaches

Targeted behaviors

Novel interventions

Decision settings

Pilot Program Experiment Design

Energy Reductions

Examples of emailed and printed messages used in the pilot buildings.

- Educational messages educate occupants each month, individual names were placed in common spaces, such as classrooms and kitchens to maximize the number of occupants that would see the messages.
- Controlling messages ask individuals to commit to a specific behavior.
- Novel messages influence individuals to commit to behaviors of their choosing.

Educational building energy reduction

Strategic messaging effectiveness

Over the period where strategic initiatives were applied, there was an average reduction in electricity of 6.0%, 4.8%, and 2.6% in the education, social science, and lab buildings, respectively.

Campus Scale

A campus-wide program was found to be financially beneficial for the whole range of expected energy reductions.

Financial Feasibility

The group conducted a cost-benefit analysis to assess the program’s financial feasibility on a campus-wide scale. A 2.6% energy reduction would be necessary for a campus-wide program to be financially beneficial. Without financial incentives to departments, the reduction is only cost-effective for departments that are granted a financial incentive to reduce energy use. Under the pilot program, we expect energy reductions of 3.1% from a campus-wide roll-out program.

Acknowledgements

The group would like to thank the following individuals for their contributions to this project:
- Sarah Anderson, Dave Austin, Patrick Caffrey, Phil Bray, Chris Rayner, Anne Marie Berry, Allison Love, Dave McIntyre, Alex Meuett, Pam Pellegrini, Jordan Sager, LabRATS, PowerData UCB, and the Green Initiative Fund.