Energy Management: Engaging and Financially Connecting Occupants with Electricity Use

Better Buildings Summit
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The Big Picture

Annual electricity usage growth rate of +2.5%

In 10 years, compounds to +28%
Status quo

- Management of energy usage and costs reside centrally

- The need for culture change:
  - Increased utilization of existing spaces
  - Addition of new buildings
  - Persistence of retrofit and rcx savings
  - Preservation of building systems
Energy Management Initiative

• Established in 2010 through Operational Excellence

• Complements existing campus operations and goals

• Consists of four components:
  - Energy Incentive Program
  - Energy Office
  - Energy Use Policy
  - Outreach
Why Occupants?

• Do your occupants of your academic buildings know how much it costs to operate their building each month?

• By the numbers:
  81% students, 14% staff, 5% faculty of which 0.1% are technical staff

• Growing evidence on occupant energy savings
Incentive Program

- Only focuses on electricity use:
  - Controllability
  - Metering system reliability

- Program rules:
  - Square footage apportionment
  - Roll up by Operating Units
  - Availability of energy data
  - Steering Committee
Outreach - marketing

• myPower outreach and marketing campaign to influence individual behavior change
  ➢ Voluntary Power Agents

• Energy competitions in academic buildings and dorms

• Energy presence in main campus
  ➢ Storefront for walk-ins
  ➢ Energy tools and tips to spur individual action
Outreach - technical

- Energy dashboards
- Building surveys

UC Police Department Office
1 Spruce Hall
October, 2012

Background

The UC Police Department office is located in the basement of Spruce Hall. The building, built in 1944, houses many important campus administrative offices: Financial Aid, Admissions, and Visitor Services. The UCPOD office received Green Department Certification from the UC Berkeley Office of Sustainability in 2009.

The office houses approximately 180 employees. However, due to the responsibilities of the UCPOD, much of the office's operations and technology are active at 34 hours of the day.

Michael Enns has been very active in promoting sustainable behavior in the UCPOD office. As a volunteer Power Agent, Graup helped to organize an energy power load survey with the myPower team in Fall of 2012. Additionally, he has been vocal in encouraging other employees to be more cognizant of their energy use. Graup contacted the myPower team to analyze the energy consumption arising from the basement location of the office.

Lighting

The basement location of the UCPOD office raises issues with lighting. Windows are located in the office, and when there are overground windows, they are often impacted by boxes or the blinds are closed for privacy reasons. This severely limits the amount of natural light entering the office, creating a large need for artificial lighting.

Many of the rooms and offices possess task lights, however there are still rooms that have overhead lighting when task lighting would suffice. Additionally, some rooms are lit at all times, even when unoccupied. Many of the task lights still use incandescent lightbulbs, but Mr. Enns indicated that the office is slowly transitioning to more efficient CFL and LED lighting.

The 24 hour demands of the UCPOD require that some lights remain on at all times, but lighting in the office after hours is reduced. Outside of the office, many of the lights in Spruce Hall are left on after business hours.

Recommendations

- Open blinds to utilize natural light when not dealing with sensitive information
- Identify the locations of light switches in different rooms
- Look into methods to change to LED lighting without changing fixtures
- Encourage employees to replace incandescent globes with more efficient CFLs
- Contact building manager to look into:
  - Installing more efficient hallway lights
  - Utilizing “night mode” lighting after hours

Thermal Comfort

The basement location of the office also creates many issues with the temperature inside the office. Due to the unseparated ventilation systems, the temperature inside the office is generally very warm and uncomfortable.

Additionally, UCPOD employees are required to wear thick uniforms which add to the discomfort. The windows are rarely open in place of air conditioning due to the obstructions blocking the windows outside. For
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<tr>
<th>Organization</th>
<th>Research Interest</th>
<th>Application</th>
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| Center for the Built Environment                       | • Occupant thermal comfort  
• HVAC controls sequences                                                               | • Personal comfort systems at Doe Library and Stanley Hall  
• HVAC setpoint and deadband reset in Stanley Hall                                           |
| LoCAL                                                 | • Occupant-controlled heating and cooling  
• Energy dashboards                                                                   | • Application deployed in Sutardja Dai Hall  
• sMAP viewer in over 50 buildings                                                          |
| College of Engineering / Architecture / PG&E          | • Building systems energy use and rcx  
• Automated fault detection for HVAC                                                  | • Energy audit and analysis of HVAC, lighting and window shades in Energy Biosciences Building  
• Pilot application in pneumatic control system                                              |
| CITRIS                                                | • Best in class HVAC control sequences                                              | • Pilot project in Sutardja Dai Hall airside systems                                            |
| TGIF                                                  | • Implement projects to help meet teaching and sustainability goals                 | • Smart plugs installation at Carleton and South Hall  
• LED retrofit for microscopes in Valley Life Addition                                       |
| Lawrence Berkeley National Labs                       | • Rapid efficiency feedback for building managers  
• Whole building measurement and verification (various)  
• Backpack-mounted building energy modeling                                              | • Deployed in over 60 campus buildings  
• Evaluate accuracy of forecast by whole building energy algorithm  
• Pilot data collection and verification in Mulford Hall                                    |
| Pacific Northwest National Labs                       | • Re-tuning of building systems for efficiency using simple tool                    | • Re-tuning training and assessment of Soda Hall and Hertz Hall                                 |
Results

- EMI saved $4.4M in two years
- Incentive program monies returned to campus:
  - Year 1 = $874,000 (8,740,207 kWh) $20,000 overage
  - Year 2 = $995,000 (9,956,443 kWh) +13%
- Active, ongoing, relationships for continuous improvements
Thank you!
Discussion?
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