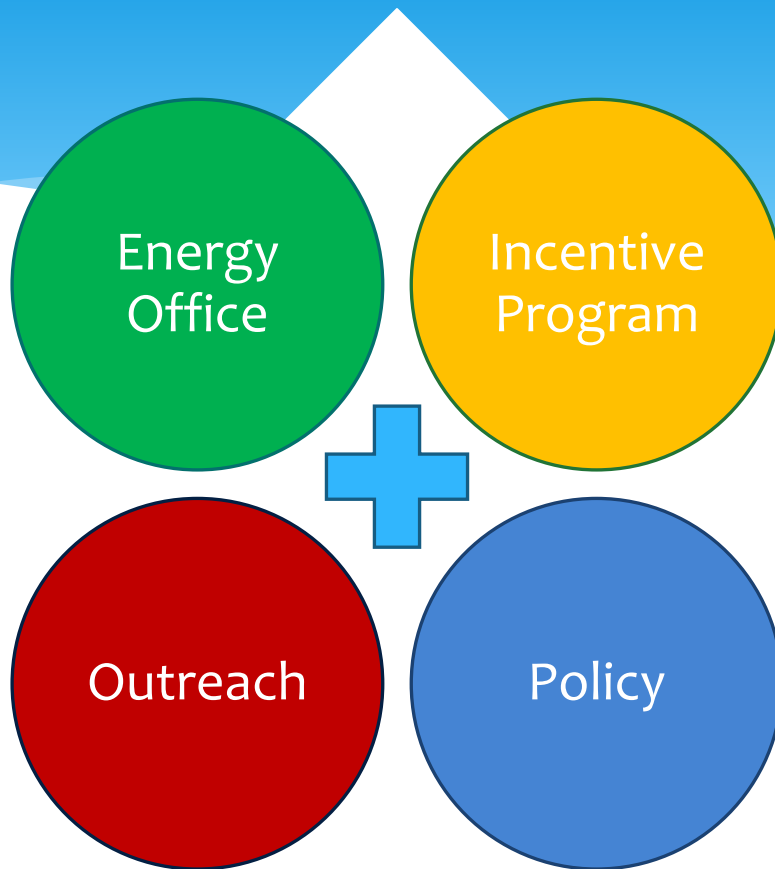


Defining the Skills of Technicians in High Performance Buildings: An Energy Manager's Perspective

Chuck Frost, UC Berkeley, Energy Manager
Laney College, Faculty

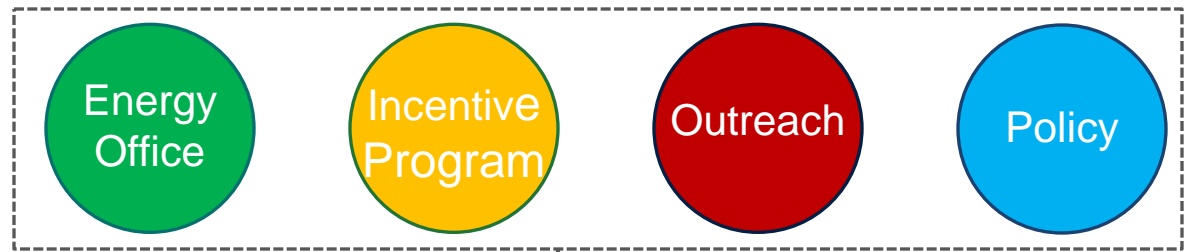




Strategic Energy Partnership



Operational Excellence & Behavior Change



*We will **permanently reduce** the amount of energy the campus uses while empowering faculty, staff, and students to take energy savings steps that reduce our environmental footprint and save money.*



ENERGY
MANAGEMENT
PROGRAM

Policy

Administrative support to **help building occupants make energy-wise decisions**

Guidelines and standards relating to campus energy use for both **new construction and building renovations**

Guidelines for **equipment procurement, building temperature and operating hours, and renewable power**





Outreach

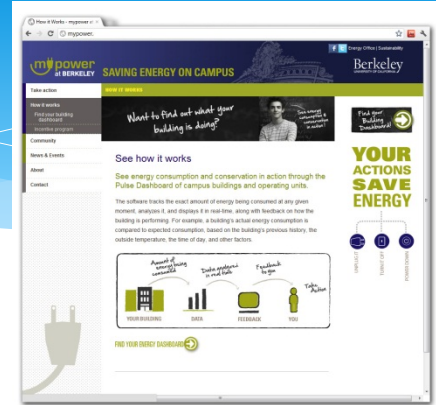
ENERGY
MANAGEMENT
PROGRAM

Outreach

Campus-wide energy reduction campaign that focuses on individual behavior change

Includes competitions, energy audits, and resources on how to reduce energy usage and **Power Agent** volunteer program

Resources to **help you take actions** towards reducing energy consumption in offices, labs, residence halls, and other campus areas



Energy Information System

Pulse Energy Dashboard

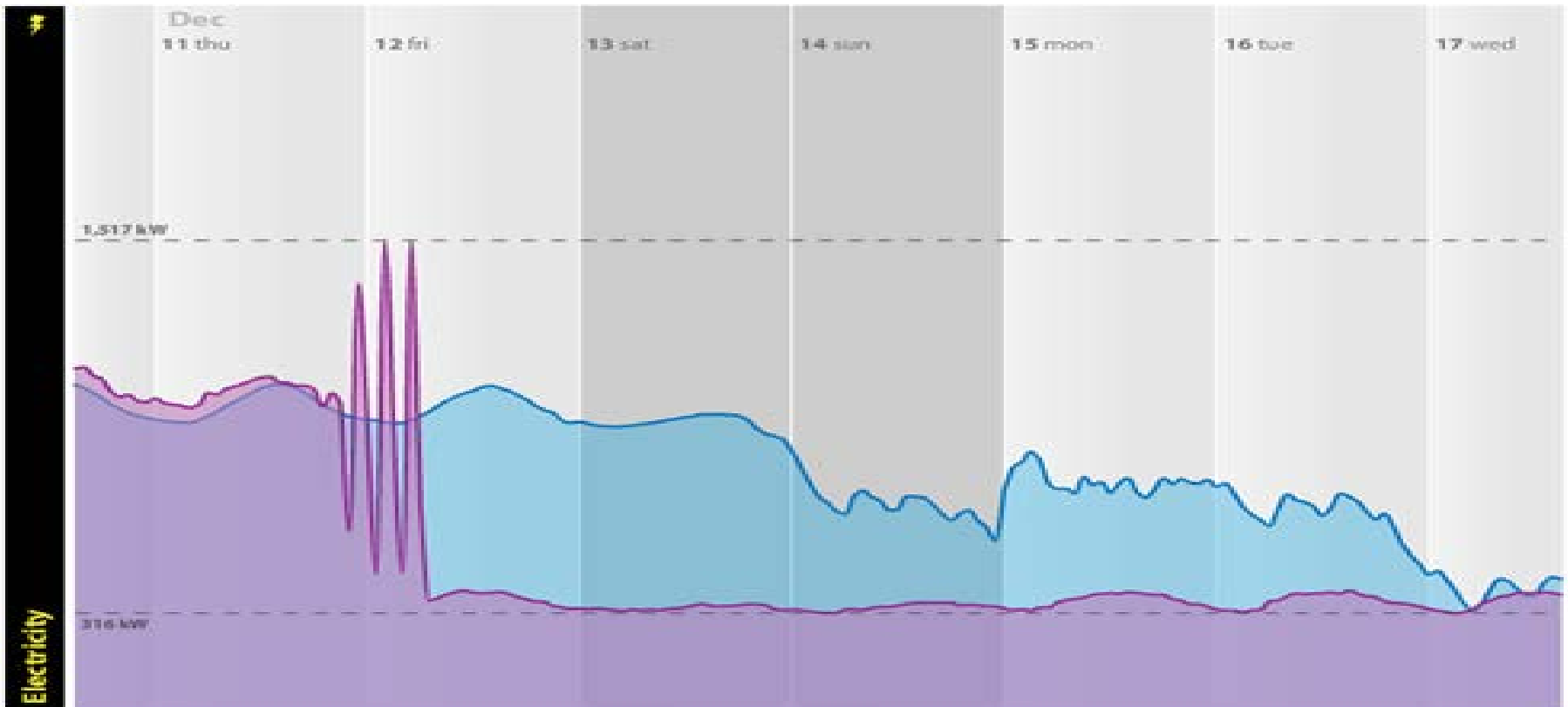
- * Web Based (thin client)
- * Monitor building energy consumption
- * Real Time Data (15 min)
- * Can predict (model) future building energy use
- * Enhances the Retro-Commissioning process
- * Helps keep buildings tuned



What happened here?

Sutardja Dai Hall
141,000 ft²

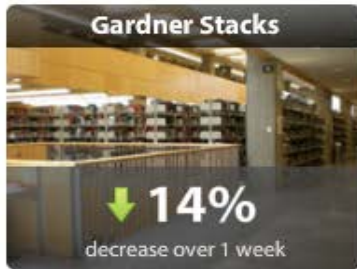
● Target ● Actual





SAVING ENERGY ON CAMPUS

Portfolio Performance Summary



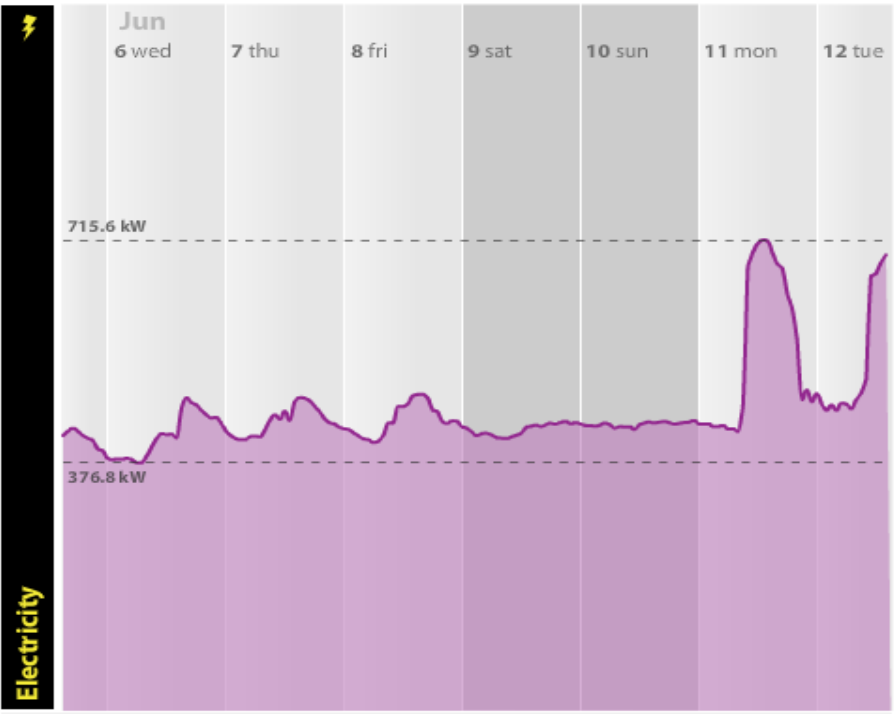
Welcome to the energy dashboard at UC Berkeley! This dashboard is part of UC Berkeley's Energy Management program, a comprehensive program aimed at permanently reducing the amount of energy the campus uses. It empowers faculty, staff, and students to take smart, simple energy savings measures that will improve our environmental footprint and save the campus money returning those funds to teaching and research. Learn more at myPower.berkeley.edu

How is it used?

The dashboard lets you see the real-time effects of your energy savings measures such as turning off the lights at night, lowering the heat by a degree, or other similar actions. You will be able to see the cumulative impact of your behavior and of others in your building, proving that small actions can add up to a large impact. Everyone has a role in the campus energy conservation effort.

How does it work?

Tan Hall 118,376 ft² Actual



76,573 kWh of energy consumed in the past week is equivalent to... Lighting the Golden Gate Bridge for **13.98** days

Light up the Golden Gate Bridge

Tan Hall is an 118,000 square foot research facility for the College of Chemistry. The building contains research and teaching laboratories, a lecture hall, staff offices, and a seminar room for students and faculty. It is named in honor of Tan Kah Kee, a pioneering industrialist and philanthropist in China and Singapore.

Find out how you can take action to reduce energy use in this building at mypower.berkeley.edu.

Green Features

Cal Climate Action Partnership



UC Berkeley's climate action goal is to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2014. The Cal Climate Action Partnership (CalCAP) is a collaboration of faculty, administration, staff, and students working to achieve this goal. CalCAP's work includes conducting an annual ten-source



ENERGY
MANAGEMENT
PROGRAM

Incentive Program: Overview

Provide **financial incentives** to Operating Units (OUs) to reduce user-controlled electrical consumption.

Create electricity consumption baselines based on historical data

OUs that **reduce electricity use receive an incentive payment**; later, OUs that exceed baseline pay overage charge

Share monthly data on electricity use by Unit

Install software & building kiosks, providing access to performance information



ENERGY
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Energy Office

Oversee many of the new initiatives and services

Support **ongoing commissioning (or “tune-ups”)** of buildings

Work with Facility Managers and building occupants to speed energy-related repairs, **identify conservation measures and reduction projects**, reinforce Unit initiatives

Provide **dedicated support** for energy-related maintenance

Analyze building energy use data, and share monthly data with Units

Energy Office Team

- * Energy Manager
- * Energy Engineer
- * Energy Analyst
- * Stationary Engineers
 - * (includes hybrids)
- * Electrician
- * HVAC/ Steam Fitter



Every building has a story



With a few typical exceptions, it is seldom obvious why a building is wasting energy



Energy savings and persistence for new and retro-commissioned buildings

- Equipment Scheduling
- Simultaneous heating and cooling
- Outside air usage
- Sensor error
- Equipment put in hand
- Set point adjusted
- Reset schedules modified
- Control sequence modified
- Calibration of pneumatic
- Occupant comfort & productivity



Definition of High Performance Building

A building that consistently delivers a highly productive environment without wasting resources. Such buildings may have specialized systems that require specific knowledge and awareness on part of the operators in order to maintain the intended operation and performance ASHRAE Guideline 32-2012



Increased complexity in High Performance Buildings



High Performance Buildings create operational challenges



- Increased operational cost for maintenance budgets
- More complex control strategies and sophisticated equipment
- Integration of building systems
- new technologies such as wireless, variable refrigerant flow
- Shortages in highly skilled building operators

Skills needed for High Performance Building Professionals

- Strong analytical skills, e.g. trend data analysis
- Ability to utilize a systems or holistic approach to equipment checks and troubleshooting
- Ability to evaluate facility conditions
- Strong understanding of control systems as well as advanced sequences of operation and system integration
- Interpersonal communications skills and teamwork
- Computer skills
- Be able to measure and verify savings



- * The U.S. Department of Energy (DOE) and the National Institute of Building Sciences (NIBS) are working with industry stakeholders to develop voluntary national guidelines that will improve the quality and consistency of commercial building workforce credentials for five key energy-related jobs





Building Energy Auditor Assesses building systems and site conditions; analyzes and evaluates equipment and energy usage; and recommends strategies to optimize building resource utilization.

Building Commissioning Professional Leads, plans, coordinates and manages a commissioning team to implement commissioning processes in new and existing buildings.

Energy Manager Manages energy consumption in buildings or across facilities; performs continuous site evaluations and analyses; identifies opportunities to increase building efficiency, promote renewable resources, reduce costs and increase building or facility performance.

Building Operations Professional Manages the maintenance and operation of building systems and installed equipment, and performs general building maintenance to optimize performance, maintain the building's operability and ensure the comfort and safety of building occupants.

Facility Manager (Government and FBPTA focus) A federal, state, or local government official who manages, monitors and coordinates facility operations and supervises and communicates with staff to ensure efficient, sustainable operations and the satisfaction of the facility occupants.



Building Operations Professional

Manages the maintenance and operation of building systems and installed equipment, and performs general building maintenance to optimize performance, maintain the building's operability and ensure the comfort and safety of building occupants.



