



FACT SHEET: GREEN BUILDINGS - OPERATIONS & MAINTENANCE



SUSTAINABILITY OPPORTUNITY

A typical building incurs 80% of its lifetime cost through operations and maintenance. Stanford University operates and maintains over 900 buildings of various sizes, 20 million square feet of building space, and about 1,500 landscaped acres. Comprehensive energy efficiency programs, verification of mechanical systems, targeted behavioral programs, and careful attention to indoor air quality ensure Stanford's existing buildings operate efficiently and safely.

TOP INITIATIVES & RESULTS

Energy Demand Management

The following programs have allowed Stanford to reduce energy intensity on campus by 8% since 2000, despite continued campus growth:

- Through the Whole Building Energy Retrofits Program, Stanford will spend \$30 million on major capital improvements to the 27 biggest energy users on campus. The retrofits completed thus far have received Pacific Gas and Electric rebates of \$2.4 million and have saved more than \$4.5 million each year in energy costs. An additional \$4 million in energy savings are anticipated for projects in the pipeline. On average, buildings that have participated in the WBERP program are seeing 24% reductions in their energy usage, with some buildings achieving savings of up to 50%.
- Since 1993, Stanford's Energy Retrofit Program has provided more than \$15 million for projects to improve energy efficiency, reduce building costs, reduce utility demand, and decrease maintenance costs. In those years, these energy retrofits have resulted in an estimated savings of 39 million kilowatt-hours of electricity, 360,000 ton-hrs of chilled water, and 11 million MBtu of hot water/steam, or cumulatively over \$ 4 million.
- The Energy Conservation Incentive Program rewards schools and departments with "cash for kilowatt hours." If the organization uses less than its budget (based on past usage), it keeps the money saved. Since 2004, the program has inspired participants to use three percent less electricity than budgeted—more than \$800,000.
- Stanford's Facilities Energy Systems Operations (FESO) team is comprised of controls engineers and technicians tasked with the operation and maintenance of the various building level control systems on campus. The team ensures that building systems are operated as efficiently as possible by developing appropriate control algorithms and monitoring the performance of the systems.

- Since 2001, the annual Winter Closure Program has targeted the two-week campus shutdown over the winter holidays as an opportunity to conserve energy by turning off heating and ventilation systems in most buildings across campus. As of 2015, the program has resulted in a net energy cost savings of \$3.3 million since its inception.
- •Stanford has ongoing program for recommissioning the major Heating, Ventilation, and Air Conditioning (HVAC) systems of over 80 buildings to ensure they function as designed. Technicians conduct reviews of each building on a four-year cycle and provide recommendations to further improve energy performance through needed repairs.

Building HVAC Recommissioning

Stanford is recommissioning the Heating, Ventilation, and Air Conditioning (HVAC) systems of its largest buildings to ensure they function as designed. Technicians and engineering consultants who conduct the reviews also provide recommendations to further improve energy performance through retrofit projects.

Acknowledging the complex schedules of an academic environment, Stanford actively manages operational hours for building systems. Each week Stanford adjusts the HVAC operating schedule in up to 60 buildings to align with the specific hours of use.

Occupant Behavior

In 2009 Stanford launched the Cardinal Green Office Program, a platform for Stanford's Schools and Departments to educate occupants and implement sustainability practices at a building level. The program harnesses individual, action-based resource conservation to achieve consumption reductions that complement the effects of infrastructure improvements. Office building pilot projects sustained up to a 20%



FACT SHEET: GREEN BUILDINGS - OPERATIONS & MAINTENANCE

reduction in electricity use, corresponding to a payback period of less than one year for modest investments in Smart Strips and timers. Waste reduction and water conservation efforts achieved comparable savings. The program features a customizable toolkit to tailor targeted actions to a specific building population.

Cardinal Green Labs Program was launched in 2015, offering resources designed to help laboratories operate as sustainably as possible. Following an online assessment, laboratory occupants receive a customized action plan for implementing sustainable practices in their research space.

Green Cleaning

Stanford's custodial services provider, DTZ, promotes indoor environmental quality through its GreenClean program. The holistic GreenClean approach balances health, safety, and environmental risks of products and services, specific facility functions and occupant activities, and cleaning, maintenance, and sanitation needs. From ergonomically designed HEPA-filter vacuums and microfiber rags to the zero emissions vehicles used by custodial crews, DTZ ensures low-impact cleaning practices.

Chemical and Pollutant Source Control

Stanford strives to provide the best air quality to building occupants and the campus at large. Accordingly, smoking is prohibited in all indoor spaces, covered walkways, university vehicles, and at university sponsored outdoor events, including athletic competitions. The School of Medicine and all of its associated grounds are entirely smoke-free. The university is installing entryway systems with special outdoor and indoor mats at each doorway to trap dirt and other particulates that occupants track into buildings. The award-winning Department of Environmental Health and Safety has a surplus chemical program to reduce waste, and an extensive universal waste program to properly dispose and/or recycle e-waste. Custodial and lighting contractors are required to recycle the glass and safely dispose of mercury from fluorescent lamps across campus.

Integrated Pest Management

Stanford uses non-chemical pest control whenever possible, both inside buildings and in the surrounding landscape. The emphasis is on excluding pests from the buildings, not controlling them once they are thriving inside. Power washing, natural predators, and other alternative techniques are used to control plant pests as well, with pesticides and herbicides used only as a last resort.

AWARDS

- Digie Award for Most Intelligent College Campus, IBcon (2015)
- Honorable Mention, ASHRAE Technology Award, for the Stauffer Building I laboratory VAV conversion project in the existing institutional building category (2010)
- Award of Honor—Complete Environmental Health & Safety Award, Campus Safety Health and Environmental Management Association (2009)
- Honorable Mention, Flex Your Power Awards (2005)
- Environmental Achievement Award for Lab Mercury Reduction Efforts, US Environmental Protection Agency (2002)
- Clean Bay Business Award, Palo Alto Regional Water Quality Control Plant, annual recipient since 2001 (Stanford Fleet Garage)

RETROFIT PROJECT REBATES

- RAF I and II HVAC Upgrades, \$123,500 rebate from PG&E (2015)
- Frances C. Arrillaga Alumni Center DDC Upgrade, \$28,000 rebate from PG&E (2014)
- D. Packard Electrical Engineering DDC Upgrade, \$43,500 rebate from PG&E (2013)
- Beckman Center HVAC Upgrade, \$630,000 rebate from PG&E (2011)
- Bing Wing HVAC Upgrade, \$181,000 rebate from PG&E (2011)
- Cantor Art Center Retrofit, \$122,000 rebate from PG&E (2011)
- Alumni Center Window Film Installation, \$11,000 rebate from PG&E (2011)
- Gilbert HVAC Upgrade, \$709,000 rebate from PG&E (2010)
- Parking Structures 2 and 6 Lighting Retrofit, \$13,000 rebate from PG&E (2010)
- Y2E2 Photovoltaic Installation, \$38,000 rebate from PG&E (2009)
- Avery Aquatic Center Pump Retrofit, \$110,000 rebate from PG&E (2009)
- Business Continuity Data Center, \$48,000 rebate from PG&E (2009)
- School of Medicine Server Virtualization, \$8,988 rebate from PG&E (2009)
- Stauffer Building II Laboratory VAV Conversion, \$110,000 rebate from PG&E (2008)
- Desktop Power Management, \$55,000 rebate from PG&E (2008)

MORE INFORMATION

CONTACTS

Facilities Energy Management: Gerry Hamilton, Director, gerryh@stanford.edu
Sustainability Programs: Fahmida Ahmed, Director, fahmida@stanford.edu