Introduction

UCSB Utility & Energy Services provides the UC Santa Barbara campus with support in several functional areas, including building automation, engineering review, energy conservation and renewable energy project development, utility operations and LEED project coordination. In addition to the daily operations of the campus, this group evaluates and implements strategic initiatives as they relate to campus growth, operational readiness, regulatory requirements and educational programs in support of UC Santa Barbara's academic mission.

Given the current state of California’s economy and subsequent reduced funding, it has become increasingly important to manage campus energy usage while maintaining the quality of programs and research for which the University is known. Regulatory requirements such as California’s Assembly Bill 32 Cap and Trade program and Renewable Portfolio Standard, as well as University sustainability initiatives and local air quality obligations have provided an unprecedented opportunity for the Utility & Energy Services group to develop new conservation and efficiency measures. These challenges have become the new norm for the University; achieving the growth projected by our Long Range Development Plan while minimizing the overall impact of the campus resulting from the consumption of electricity, natural gas and water.

Fundamental to meeting these challenges has been the partnership developed between the UC and California Investor Owned Utilities for the design and development of largescale energy conservation conservation measures, which has led UCSB to implement nearly $20 million in energy conservation projects over the last six years.

The current partnership program cycle (2013-2014) is nearing completion and additional projects are in development for 2015, which will be a stand-alone program cycle year. When evaluating energy efficiency measures, several criteria are considered: return on investment, greenhouse gas emissions reduction, regulatory implications, local air pollution limitations, and capital renewal of the campus plant (deferred maintenance), among others.

The overarching goal of the program is to conserve energy and reduce costs while providing a better working environment for the campus population and promoting the health and productivity of faculty, students and staff.

UCSB and Southern California Edison partnered to install a 200-kilowatt Bloom Energy fuel cell. To learn more and view real-time data for the fuel cell demonstration project, visit:

http://energy.ucsb.edu/projects/projects.html#
Utility Usage & Cost – 2013/2014

Electricity consumed: 87.2 gigawatt-hours
Peak electrical demand¹: 14.6 megawatts
Natural gas consumed: 2.9 million therms
Potable water used: 159 million gallons
Reclaimed water used: 69 million gallons
Total spent on utilities² FY13: $11.3 million

Total utility expenditures increased by 6.8% in fiscal year 2013/2014 as compared with fiscal year 2012/2013, but were 11.3% lower than the peak year 2010/2011.

Electricity, natural gas and total water consumption decreased as compared to the prior year, however electricity expenditures increased as compared to 2012/2013 as a result of increased demand charges.

¹Peak electrical demand recorded on May 14, 2014 at 3:00PM.
²The cost and consumption figures presented in this report represent total usage of and total dollar amount spent on electricity, natural gas, potable water and municipally-supplied reclaimed water received by main campus services and distributed through campus owned infrastructure. These figures do not include housing and auxiliary facilities that are not served by the main campus utility distribution systems.
Electricity Cost

The UCSB main campus electrical account was on a bundled service, time-of-use (TOU) rate for the entirety of 2013/2014. Southern California Edison’s TOU-8-B 50KV+ tariff has included relatively stable generation charges, however in 2014, seasonal and time dependant demand charges have risen substantially. In order to mitigate these costs, Utility & Energy Services has prioritized energy efficiency measures that reduce demand during on-peak demand pricing periods, including the campus chilled water loop optimization project. Additionally, the campus is evaluating a 3-4 megawatt distributed solar photovoltaic installation for development in 2015/2016.

Generation costs are expected to increase at a rate of 3-4% between 2014 and 2020 for grid-purchased electricity due in part to regulatory requirements enacted for California’s Investor Owned Utilities (IOUs). Costs associated with California’s enactment of Cap and Trade under AB32, in addition to the State Renewable Portfolio Standard (RPS) and will continue to be passed through to the ratepayers of California. The decommissioning of the San Onofre Nuclear Generation Station is expected to result in increased generation and demand costs.
Total campus electricity consumption during 2013/2014 decreased by 3.7 percent as compared with the year prior. Electricity use per square foot has reduced by 36 percent over the past 10-year timeframe, reflecting a $2.9 million in annual avoided cost based on 2014 electrical rates. This savings can be attributed primarily to implementation of the Strategic Energy Partnership, increased efficiency standards in new construction, and increasing the campus community’s awareness regarding energy conservation.
Electricity Usage (continued)

Through efficiency gains in campus cooling and ventilation systems, as well as building control systems optimization efforts, peak demand for the campus has been reduced in addition to annual consumption. Utility & Energy Services plans to move forward in partnership with Southern California Edison on implementation of Automated Demand Response capability in Fall of 2014, allowing the campus to reduce electrical demand by over one megawatt during times of peak load on the electrical grid, which typically occur between the months of June and September. As is evident from the data below, UCSB power demand and electrical energy consumption display relatively low seasonal variability.
Total natural gas expenditures have decreased over the past six consecutive years. The drop in natural gas usage and continued low historical rates contributed significantly to the campus’ utility cost savings in 2013/2014.

The commodity cost for natural gas is anticipated to remain consistent through 2014. In 2015, AB32 Cap and Trade compliance costs will result in increases in natural gas commodity rates for non-covered entities.

This compliance cost was one factor in UCSB’s decision to opt in to Cap and Trade beginning in January, 2015. The trend in UCSB’s greenhouse gas emissions from natural gas combustion between 2015 and 2020 in combination with the market price for carbon allowances in the State will dictate AB32 compliance costs. Current energy efficiency and renewable energy projects at UCSB have targeted natural gas savings in spite of low commodity prices in order to mitigate this added cost to the extent possible. UCSB will receive an allowance allocation beginning in 2015, based on historical emissions. The campus will be responsible for the purchase of allowances for any difference between the allocation and actual emissions.
Natural Gas Usage

Total natural gas usage decreased by 15% in 2013/2014 as compared to the prior year, and total expenditure for the campus has dropped for the sixth consecutive year. Natural gas usage per square foot has been reduced by over 45% over the past 10-year timeframe through energy and water efficiency projects and initiatives.

In addition to energy cost savings and greenhouse gas reduction targets, compliance with local air pollution regulation has become a driver for decommissioning and replacement of large boilers. The design and installation of distributed heating (in the form of one or several hot water loops) will help to address this issue by minimizing natural gas heating emissions and equipment redundancy at multiple large research facilities on campus. Construction of Phase I of the UCSB hot water loop was completed in 2013.
UCSB’s potable water rates have increased by approximately 36 percent during over the past three years. In order to meet requirements for system capacity and operations, the Goleta Water District next will year introduce additional rate changes which will increase potable water commodity and metering rates over the next two years. Water use reduction is and will continue to be a high priority for the campus.
Potable water use at UCSB during 2013/2014 decreased significantly and was at its lowest point during the past ten year timeframe. Potable water use per square foot has been reduced by nearly 49 percent overall during the same ten year timeframe. This efficiency trend can be attributed to a number of conservation measures, including the extension of municipally-supplied reclaimed water infrastructure, campuswide installation of low-flow end use water fixtures, and the campus chilled water loop optimization project, which has significantly reduced the amount of evaporative heat rejection per unit of cooling produced.

UC Santa Barbara completed the University of California’s first Water Action Plan in Summer 2013.

California is experiencing record breaking drought conditions, especially on the Central Coast. Through the aforementioned water conservation efforts and an increase in education and outreach programs, UCSB has made an effort to meet the request for potable water reduction and has reduced potable water consumption 21% since 2012-13.
Reclaimed Water Cost and Usage

Reclaimed water use increased by 19 percent compared to the prior year, and now accounts for approximately 90 percent of irrigation water applied on the main campus and 25 percent of total annual water use. There continue to be challenges with irrigation for many species of plantlife at UCSB due to water quality parameters. Blending, treatment and/or filtration are all possible mitigation measures to facilitate the expansion of reclaimed water for irrigation to 100 percent of irrigated areas. Replacement of major turf athletic fields with synthetic materials will further reduce the demand for irrigation water.

The campus will continue to investigate opportunities for substitution of reclaimed water for potable water in irrigation, flushing and process applications. A major opportunity for savings may be the use of municipally-supplied reclaimed water for evaporative cooling, however, some degree of treatment and/or filtration will be necessary to pursue the use of reclaimed water for this application.
Summary

A reliable and robust utility infrastructure is critical to meeting the varied requirements of the campus population, and UCSB Utility & Energy Services remains committed to maintaining the highest quality service and ensuring the success of UCSB’s advanced research academic programs.

UCSB will continue to implement energy conservation projects under the Strategic Energy Partnership through the 2015 program cycle; an increasing emphasis will be placed on reduction of onsite natural gas combustion in order to mitigate Cap and Trade compliance costs and local air quality compliance risk.

By December 2014, the campus’ Automated Demand Response project will be launched in order to provide our Electric Utility the ability to dispatch over one megawatt of load reduction on campus. This is a collaborative effort between Southern California Edison and the campus to mitigate supply constraints on our regional electrical grid.

UCSB’s culture of environmental sustainability remains a driving force for continuous improvement, and Utility & Energy Services seeks to build on the efforts of the campus population by providing accurate, real-time building energy and water monitoring to facilitate the next generation of conservation campaigns at UCSB.

Water rates will continue to increase significantly. The campus will continue to expand the use of reclaimed water as a substitute for potable water in new buildings and existing process water applications.

In addition to demand management and efficiency measures, Utility & Energy Services will continue to increase renewable energy capacity on campus where feasible, and will continue to work with Southern California Edison, the Southern California Gas Company, Goleta Water District, Goleta Sanitary District and the UC Office of the President to secure the most favorable utility rates possible.

The Utility & Energy Services website includes an abundance of information and tools to users on campus and beyond, including the Gaucho Power Monitor, a real-time interface that provides power demand and energy consumption data for all major buildings on campus. Visit the website for additional information:

http://energy.ucsb.edu
Contacts

This Annual Utility & Energy Report is published each fall for informational purposes only. Please visit http://energy.ucsb.edu for additional information or contact staff below with questions or comments.

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