Introduction

UCSB Utility & Energy Services provides the UC Santa Barbara campus with support in several functional areas, including building automation, engineering services, LEED project coordination and utility operations. 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 energy and utility conservation 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 attaining and 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, CSU and IOUs for the design and development of largescale energy conservation measures, which has led UCSB to implement nearly $17 million in energy conservation projects over the last three years. A new program cycle (2013-2014) is being submitted to the California Public Utilities Commission as well as to the Regents of the University of California for approval. When evaluating initiatives, numerous criteria are considered: return on investment, voluntary GHG emissions reduction targets, impending Cap and Trade regulation, local air pollution limitations, and capital renewal of the campus plant (deferred maintenance), among others. The overarching goal is to conserve resources while providing a better working environment for the campus population and promoting the health and productivity of faculty, students and staff.

UCSB initiatives, such as a building-level metering and accurate real-time monitoring of utility usage will play a vital role in providing the necessary information to focus strategic energy conservation initiatives and deliver savings at the lowest possible cost. The metering program will also provide an abundance of valuable information to undergraduate and graduate students interested in working in energy management, engineering, and sustainability.
### Utility Usage & Cost - 2011/2012

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity consumed:</td>
<td>88.5 million kilowatt-hours</td>
</tr>
<tr>
<td>Natural gas consumed:</td>
<td>3.7 million therms</td>
</tr>
<tr>
<td>Potable water used:</td>
<td>548 acre-feet</td>
</tr>
<tr>
<td>Reclaimed water used:</td>
<td>165 acre-feet</td>
</tr>
<tr>
<td>Total spent on utilities* FY12:</td>
<td>$11.5 million</td>
</tr>
</tbody>
</table>

Total utility expenditures decreased by $1.26 million in fiscal year 2011/2012 as compared with fiscal year 2010/2011, representing a total reduction of approximately ten percent.

Electricity and natural gas consumption and expenditures decreased as compared to the prior year, however potable and reclaimed water consumption and expenditures both increased as compared to the prior year.

![Utility Usage & Cost Chart](chart.png)

*The 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

Enactment of a UC-level Direct Access contract for electricity procurement in September 2009 has contributed to an overall electricity rate increase for UCSB. The campus remained on Direct Access for the duration of the 2011/2012 fiscal year during which time a reduced rate structure was negotiated for the current contract duration (May 2011 – December 2012). UCSB Utility & Energy Services has evaluated Direct Access contracts versus bundled service for the main campus account, and will return to bundled service with Southern California Edison, effective December 2012, as a strategy for mitigating rising electricity costs and reducing the GHG intensity of its purchased electricity.

Commodity costs have increased for grid-purchased electricity due in part to regulatory requirements enacted for California’s Investor Owned Utilities (IOUs). Marginal cost increases associated with the requirement for IOUs to meet a statewide Renewable Portfolio Standard target have and will continue to be passed through to the ratepayers of California. The California RPS requires IOUs to provide 33 percent of their generation from renewable sources by 2020.
Electricity Usage

Total campus electricity consumption during 2011/2012 decreased by 1.1 percent as compared with the year prior. Electricity use per SF has been reduced by 35 percent since 2001/2002, reflecting a $4.43 million in annual avoided cost in 2012 dollars. This savings can be attributed in large part to the Strategic Energy Partnership, increased efficiency standards in new construction at UCSB, and increasing the campus community’s awareness regarding energy conservation.
Through efficiency gains in campus cooling and ventilation systems, as well as individual building control systems optimization efforts, peak demand for the campus has been reduced in addition to annual consumption. UCSB participates in a manual demand response program under which Utility & Energy Services will shed campus electrical load during high regional demand events. This summer, the campus has achieved load shed of up to a megawatt during such events.
Natural Gas prices have dropped consistently over the past three years, and are anticipated to remain relatively consistent for the next two years, at which point the AB32 Cap & Trade compliance costs are anticipated to result in an increase in commodity rates for natural gas.

The reduction in natural gas prices contributed significantly to the campus’ utility cost savings in 2011/2012.
Total natural gas usage decreased by 4.1 percent in 2011/2012 as compared to the prior year, and total expenditure for the campus has dropped for the fourth year straight. Natural gas usage per square foot has been reduced by 26 percent, reflecting a $686,000 annual avoided cost in 2012 dollars, since 2001/2002.

In addition to energy cost savings and GHG reduction targets, compliance with local air pollution regulation has become a driver for decommissioning of large boilers. The design and installation of distributed heating (in the form of one or several hot water loops) will address these issues 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 began in Summer 2012.
Potable water rates increased by approximately 15 percent during 2011/2012. In order to meet requirements for system capacity and operations, the Goleta Water District this year enacted a new rate structure which will increase water commodity and metering rates by 45 percent over the next five years. Water use reduction is and will continue to be a high priority for the campus.
Potable water use at UCSB during Academic Year 2011/2012 increased for the first time in three years, however potable water use per square foot has been reduced by nearly 30 percent over the past ten years. This efficiency trend can be attributed to a number of conservation measures, including the extension of municipally-supplied reclaimed water infrastructure.

Additional water conservation measures implemented this year include installation of high-efficiency water fixtures in residence halls, dining commons and academic buildings. Initiatives in development include further reclaimed irrigation infrastructure extension, sprinkler head conversion, replacement of water fixtures in state-funded academic/administrative building restrooms, and a baseball stadium water fixture retrofit. UC Santa Barbara is in the process of developing the University of California’s first Water Action Plan, expected to be complete in Summer 2013.
Reclaimed Water Cost and Usage

Reclaimed water now accounts for approximately 89 percent of irrigation water applied on the main campus and 23 percent of total annual water use. There continue to be challenges with irrigation for many species of plantlife at UCSB due to dissolved solids. 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.
A reliable and robust utility infrastructure is critical to meeting the varied requirements of campus end users, and UCSB Utility & Energy Services remains steadfast in our commitment to maintaining the highest quality service and ensuring the success of UCSB’s advanced research and quality academic programs.

UCSB will continue to implement energy conservation projects under the Strategic Energy Partnership; the campus has developed a large number of retrofit, replacement and monitoring-based commissioning projects for implementation in the anticipated 2013-2014 utility funding cycle. An increasing emphasis will be placed on reduction of onsite natural gas combustion in order to mitigate Cap and Trade and local air quality compliance risk by maintaining emissions levels lower than the established thresholds.

UCSB’s culture of environmental performance 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 power and water monitoring to facilitate the next generation of conservation campaigns at UCSB.

The Utility & Energy Services webpage will launch in early 2013 and will present a wealth of information and tools to users on campus and beyond.

Water rates are projected to increase by 45 percent over the next five years, and the first step increase of 15 percent was experienced by the campus during fiscal year 2011/2012. The campus will continue to explore the possibility of using 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 and off 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.
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