Green Pastures

Green Campus Interns present staff members of the Facilities Management and Planning Energy Services Unit with the first ever Green Space award.

Cal Poly Pomona

Green Campus Program

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NEWS FLASH!

Green Campus will be participating in these upcoming tabling events:

Bronco Fusion- Sept. 23
University Park 8:15-9:45am
Olive Lane
2-4pm
Welcome Week
September 22
Encinitas Lawn 11am-1pm
Come Out and See Us!

Greening Your Office

By Brandon Ro

Many faculty and staff are asking themselves, "How can I make my office greener?" We are pleased to announce that the Green Campus Program may have an answer! During the summer, Green Campus has been piloting a new office sustainability assessment called Green Space. Green Space consists of a sustainability consultation to assess your office's current sustainable practices and how they can be improved.

The first participant in this program has been the Energy Services Unit in Facilities Management and Planning. Some of the recommendations given were to prevent phantom loads by plugging appliances into power strips and turning off overhead lighting in offices adjacent to windows. We are happy to report that the recommendations from this first Green Space assessment can help create an annual estimated savings of 3,114 kWh, $436, and prevent as much as 4,930lbs of Green House Gas emissions (GHG)! Once the office has demonstrated improvement, the office participants may qualify for our Green Space Awards.

Interested? Contact the Green Campus Program ***TODAY!*** Please email us at ***greencampus.cpp@gmail.com*** to set up your office's very own Green Space Sustainability Assessment.

CAL POLY POMONA'S COOLING FACILITY

By Shannon Nowell

It's summertime in Pomona! That means 100+ degree heat and hot, gusty wind. Yet, if one steps into the offices and classrooms of Cal Poly Pomona, one will experience a reprieve from the intense temperatures characteristic of these summer months. Thank goodness for air conditioning! However, during these summer months when classrooms are empty and faculty offices are abandoned, these cooler temperatures are just wasting energy. Green Campus set out to investigate the matter and was pleasantly surprised to find that improvements to make campus air conditioning more energy efficient have already begun.

The source these cooler inside temperatures is the fully-automated cooling tower and the chillers tucked behind Parking Lot J. Green Campus toured this facility with the help of our informative guide, Jesse Ochoa. There are three main components to this facility: the storage tank, the chillers and the cooling tower. These are all connected through a series of pipes, valves and pumps that take the water from the tank, send it to water vaults on campus, and distribute it to various buildings to chill the air in the classrooms and offices. It then gets returned to this facility where the heat is extracted from the water and the process begins again.

THE BIG, GREEN GIANT

The tank that holds the chilled water is a 2.6 million gallon Thermal Energy Storage Tank (TEST) with stainless steel temperature boxes set incrementally up its dark green aluminum-clad, insulated paneling. At the bottom of the tank, the water is chilled to 39 degrees Fahrenheit and at the top it is about 20 degrees warmer. The water is chilled at night to make use of off-peak hours and cooler outside temperatures. Amazingly, the water at the bottom of the tank will remain a constant 39 degrees for up to three days without "charging the tank", or cooling the water.

3 BIG CHILLS

During the daytime, water is pumped to campus through a pipe line called the "main loop." This process is called discharge mode. When it returns to the chilling facility it is treated by negative pressure refrigerant machines, called "chillers", to absorb the heat from the water. There are three of these machines at the cooling facility each containing long copper pipes, and refrigerant. Each of these large, insulated barrels can extract 12,000 btu's an hour!

The Cooling Facility as seen from Satellite.

ONE BIG RADIATOR

The cooling tower is one of three processes the water runs through to become chilled. It works like a car radiator, just bigger. The water from the chillers is sent to big bath tubs at the top of the tower. From there, the warm water cascades down through louvers where it is cooled further by four large propellers acting as fans. These can be seen from Google Earth! The absorbed heat is released into the surrounding air and the chilled water is sent to the bottom of the cooling tank.

IMPROVEMENTS IN EFFICIENCY

The cooling facility opened in 2000 and typically, the pumps and valves that transport the water utilize pneumatics to be turned on and off; or, opened and closed. This is where a lot of the immediate improvements will be made. Instead of relying on compressed air, the mechanisms will be switched out for electronic switches. Additionally, the pumps that send the water to and from the major components will be changed to variable speed drive (VSD) pumps. This means the pump will match the needed flow rates of the water instead of being turned on 100 percent for every process. This will allow the Central Plant to exceed its original design parameters by varying the flow through the chillers. These improvements will be integrated into a computer interface that will show the temperatures for each of the rooms in a

Cooling Plant continued on page 5

Did you Know?

Buildings consume nearly a third of America's energy, much of it wasted by inefficient design... another reason to install Green Roofs and Greywater systems!

http://bet.rmi.org/

GREEN ROOF 101

By Shannon Nowell

When it comes to sustainable design or green building, usually the topic of green roofs will arise. With a name like Green Campus, we are certainly not an exception. Join us as we explore some of the benefits of green roof design!

Yes, green roofs are aesthetically pleasing, but what does that have to do with energy savings? A whole lot…
Green roofs increase the thermal resistance of buildings and help mitigate the Urban Heat Island (UHI) effect. The rooftop surface temperatures of buildings can impact the energy necessary to heat or cool a building to desired temperatures. Through the natural evapotranspiration (EVo) process in plants, green roofs have been documented to reduce energy demand by more than 50 percent annually in certain types of structures. The act of transforming heat and soil moisture by plants into humidity helps mitigate the temperature fluctuations within the building envelope, reducing them by as much as 90 percent. During warm or hot weather this means reducing indoor temperatures by six to eight degrees; thus, reducing the need for air conditioning. However, the thermal qualities within green roofs lay primarily within the foliage of the planting material and the insulating layer of green roof construction. If the vegetation is dead, or the soil is dry or frozen, then the insulating qualities of the green roof can be greatly reduced.

This same evapotranspiration process naturally cools and humidifies higher temperatures within metropolitan cities known commonly as the Urban Heat Island (UHI) effect. These higher temperatures, sometimes an additional 10 degrees compared to more vegetated

areas in the same geographic location, come from the absorption of heat from asphalt and concrete surfaces, and waste heat from automobiles, industrial processes and air conditioning.

Increased Life Expectancy of the Roof

Green roofs increase the longevity of the roof membrane by protecting it against UV radiation, extreme temperature fluctuations, and physical damage. This means fewer materials, and in turn energy, is used during the lifecycle of the building.

Storm Water Retention

In Southern California, water is a scarce resource. Great amounts of energy are used to transport water from the Colorado River and Owen's Valley to the city of Los Angeles and San Bernardino. Therefore, it is important to conserve water and utilize every drop that comes out of the sky. Typical construction of buildings, parking lots, and roadways utilize materials impervious to water, thus increasing the flow of storm water and urban run-off (from irrigation of landscapes) into the existing drainage and sewer systems. This rapid flow of water to these systems does not allow the water to recharge back into its own watershed. We are spending all this energy and money to transport the water and literally flushing it down the drain! Green roofs will absorb storm water during rainfall and reduce the flow of water across these impervious surfaces. This means water will have the chance to seep back into the ground and recharge the watershed.

Green Roofs continued on page 5

Water Conservation: Grey Water Systems

By Andrew Coyne

When we talk of energy conservation, typically, we are referring to savings in electricity, but there is another side of energy conservation that should not be overlooked, water conservation. According to UNESCO, the United Nations Educational, Scientific, and Cultural Organization, water shortages will be a serious global issue by 2020. Already in places like Southern California we are seeing more and more municipalities place stringent water-use caps on residents, charging extra fees for any usage that goes over these thresholds. With this in view, now is a great time to consider designing a grey water system for your home.

What is Greywater?

Grey water is wastewater from showers, tubs, washing machines, bathroom sinks, and dishwashers. This is not to be confused with "blackwater", the contaminated wastewater from toilets, which cannot be recycled without extensive purification. Grey water, on the other hand, can be used for irrigation in home gardens as well as for flushing toilets, without any additional purification. In total, grey water accounts for more than half of the water-use in the typical house. A helpful formula to calculate the quantity of greywater that your house yields can be found in the California Greywater Standards Guide.

Components of a Greywater System

The most basic grey water system includes a plumbing system that funnels the grey water from the shower, tub, washing machine, and bathroom sink to a surge tank, the main holding area for the water, which contains a filter to remove particles from the water. A pump moves the water out to the irrigation field and irrigation system, which usually delivers the water to plants sub-surface. It should be noted that there are a number of different possible designs, but this is the most conventional. The construction of the house (i.e. the type of foundation) will be the primary determinant of how the system is designed.

Grey Water Systems Continued on Page 5

Other Easy Means to Save Water

From http://www.bracsystems.com/tips.html

In your house

check for leaks from faucets and pipes; the smallest drip can waste as much as 75 liters a day.

In the bathroom

Flush less — remember the toilet is not an ashtray or wastebasket.
While brushing teeth, shaving, etc., turn off the water.
When cold water will do, avoid using hot water.

In the shower

Take shorter showers — 5 minutes or less.
wet yourself down, turn the water off, lather up, then turn the water on to rinse off soap.

In the kitchen

Operate the dishwasher only when you have a full load.
• Scrape, don't rinse, your dishes before loading in the dishwasher.
• When purchasing a dishwasher, consider a water-efficient model.
• Thaw frozen food in the refrigerator or microwave, not under running water.
• Store drinking water in the refrigerator instead of letting the tap run while you wait for cool water to flow.
• When washing dishes by hand, fill one sink or basin with soapy water and fill the rinsing sink to one-third or one-half full — avoid letting the water run continuously in the rinsing sink.

In the laundry

For washers with variable settings for water volume, select the minimum amount required per load.
• If load size cannot be set, operate the washer with full loads only.
• Use the shortest wash cycle for lightly soiled loads; normal and permanent press wash cycles use more water.

Green Roofs continued from page 3

Other Benefits from Green Roofs

- ***Reduction of Pollution Levels***: Green roofs absorb nitrates, aerosols contaminants, dust and smog particulates, and carbon (plants love it!)
- ***Provides a habitat for native plants and animals***.
- ***Reduction of Noise Levels***: For each 3"-4" of growing medium, a green roof can reduce reflective sound levels up to 3dB and improve sound insulation up to 8dB.
- ***Additional Usable Space:*** Some restaurants grow their own herbs and vegetables on the rooftop of their building. Also, adding useable square footage can increase the real estate value of the property.
- ***Photovoltaic solar modules work more efficiently with green roofs***: The hotter a PV cell gets, the less productive it becomes.
- ***Creates a Therapeutic Environment***: Hospitals utilize rooftops for therapeutic or healing gardens for patients. Even viewing a garden from an upper story can help revitalize the spirit.
- ***Building Incentives***: LEED points can be achieved on new construction projects that utilize green roofs. Additionally, some municipalities offer incentives for offsetting the costs of green roofs.
- ***Corporate Responsibility and Environmental Leadership***: Participating in green building Participating in green building techniques can be good PR for a company looking to promote themselves through corporate responsibility and environmental leadership.

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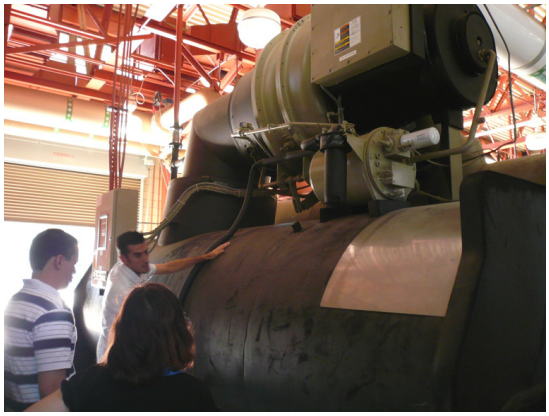
building and allow for more efficiency in how the cool air is distributed.

Improvements in water usage are also planned for the cooling facility. Currently, the cooling tower can run through three or four cycles with the same water. Unfortunately, due to suspended solids that collect in the water throughout the distribution and cooling process, the water must periodically be discharged and replenished. Maintenance of the Central Plant includes efforts to reduce this effect by treating the water with sulfuric acid and sodium hypo chloride. However, when the total suspended solids in the water reach a certain level, then the water needs to be flushed to the storm drain and can no longer be cycled through the system. Facilities Management is looking for ways to recycle that water for irrigation or other possible uses on campus. All of these improvements will be integrated into a graphical user interface (GUI) and able to be adjusted, remotely, through the internet by maintenance personnel.

This tour was a great educational opportunity for Green Campus. Hopefully, we can provide feedback for Facilities and Management as they fine-tune the central plant cooling facility to make Cal Poly Pomona a more energy-efficient campus.



Green Campus Interns are shown the Chiller inside the Cooling Facilities by Jesse Ochoa of Facilites Management and Planning.

Grey Water Systems Continued from page 4

It must be noted that homeowners cannot simply install a grey water system on their own. Most municipalities regulate grey water use, and so a permit will need to be procured. Check with your local government for specific regulations. Other important factors in the successful function of a grey water system are the types of soap and detergent one uses in their washing machines and showers. Bleach, dye, salts, and boron, are all harmful to the soil and plants. For this reason, one should always use biodegradable, phosphate-free soap and detergent. Even with the costs of changing household detergents and acquiring a permit, the numerous environmental and economic benefits of a grey water system make it a wise investment for the energy conscious homeowner.

For more information check these sites out:

www.greywaterguerrillas.com

http://www.owue.water.ca.gov/docs/Revised_Graywater_Standards.pdf

http://www.greywater.com/

http://www.bracsystems.com/

"China Is Now Reaching For The Green, Not Gold!"

Travel Log of Brandon Ro

Since the Olympics there is no doubt about it, China is going green! During the month of July, Green Campus intern, Brandon Ro, studied abroad in China. There he learned about the steps the country has been taking to reduce its carbon footprint. Many critics of China's development trends say that their direction is everywhere but green, however, after living in the country for a month and visiting major metropolises as well as small country villages, Ro begs to differ. From his observations, China in many ways is more "green" than the United States. "Some of the technologies they are implementing daily in China are more advanced than what some of our local bureaucracies are promoting," says Ro. China's attitude towards sustainability is very optimistic.

The Ancient Chinese city of Pingyao uses solar water heaters.

While visiting the Shanghai Urban Planning Museum, Ro learned about the eco-friendly, energy saving, green designs of some of Shanghai's upcoming new projects. This includes some of the buildings for the Shanghai World Expo 2010 pictured to the right in the large-scale model. One such building, the Expo Center, was designed to use the river's geo-thermal energy, harvest rainwater, use solar hot water heating, reap energy from photovoltaic's, and conserve waste water. On the other side of the spectrum, China is also busy retrofitting some of its ancient facilities. In the Ancient City of Pingyao, Ro notes that several solar hot water heating units have been installed. Green measures are being implemented on both the small and large scale. All in all, China is making great strides towards a more sustainable future.

A Large-scale model of the Shanghai World Expo 2010.

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