Energy Management Education Using Living Lab Pedagogy

March 2014
Introductions & Agenda

Speakers

Todd Cohen, director, AACC’s SEED Center
Roger Ebbage, director, Northwest Energy Education Institute; faculty, Lane Community College

Agenda

• Introduction to the campus living lab model
• Energy management program overview and best practices
• Energy management and living lab activities
• Q&A
SEED: 472 Colleges
SEED’s NEW GUIDE: Examining student learning opportunities that incorporate the college campus built environment
Campus Living Labs

• Typically performed in conjunction with traditional classroom learning to make instruction more relevant to students pursuing “clean” careers

• Learning includes simple cognitive/affective learning exercises (e.g., students capturing and analyzing a campus building’s energy performance data)...

• ...as well as more hands-on applied learning (e.g., students installing rooftop solar panels)

• Serve a dual purpose:
  • reduce the college’s carbon footprint
  • provide students with critical real-world hands-on learning
Requirements for Living Lab Model to Work

• Working relationships between instructors and campus facilities directors
• Buy-in from leadership
• Deep integration into and across curriculum
SUCCESS STORY:
Engaging Facilities Staff in the Classroom

BY TOM DONOVAN, PHYSICAL PLANT DIRECTOR, ST. CLAIR COUNTY COMMUNITY COLLEGE

I regularly lecture in our college’s alternative energy classes and take the students to our warehouse to see the front-end building automation system we use to control the building in real time. It is very exciting to see the reaction on the students’ faces when they see how their studies apply to real-world situations. Many cannot believe that such a system exists and that you can control an entire building from one computer. As the system continually adjusts temperature settings in a remote room, for example, the students start to see how the concepts they learned in class play out.

For me personally, it is a wonderful added part of my job to teach. Sometimes I get questions from students that I’ve never thought about before. The key to all of this is the relationship I have with the faculty. We’ve moved beyond regularly scheduled living lab planning meetings and now we email another to discuss different classroom exercises or articles about emerging clean technologies. And the speed bumps we encountered early on are long gone, and it’s just become part of our culture.

SUCCESS STORY:
Cross-Disciplinary Living Lab Initiative

GEORGIA PIEDMONT TECHNICAL COLLEGE

When GPTC’s living lab initiative became interdisciplinary, students’ retention of core concepts improved (as measured by course assessments), and companies involved in the effort (including large building automation companies and smaller technology contracting firms) hired many of the graduating students.

Living lab projects at GPTC began to spill over into new buildings across the campus. The pilot program was relatively accurate at first, but we realized there were no central controls for the HVAC, but no central controls for the HVAC, but...
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Northwest Water and Energy Education Institute at Lane Community College

Mission Statement:
“To be the Preferred Source of Cost-effective, Innovative, High-quality Energy Education Designed to Quickly Respond to Industry and Societal Trends”

1997 NEEI Business Plan
Northwest Water and Energy Education Institute at Lane Community College

Programs Include:

Two-year Degrees:
5. Building Controls Technician (F2013)

Professional Development: Program Sustainability
4. Custom Training and Consultation
5. Solar Installer Apprenticeship Program
LCC as a Living Learning Lab

Energy Management – uses building infrastructure to train energy analysts

• Building Shell – windows, insulation, outside
• Lighting systems – system types, input wattage, on/off measurements
• Heating, Ventilation, Air Conditioning (HVAC) Systems
  • Central Plant – Boilers/Chillers
  • Penthouse Air Handlers - water / air / motor/ temperature measurement
  • Rooftop Air Handlers - water / air / motor / temperature measurement
  • Space Temperature measurement
• Plug Load – computers and peripherals, task lamps, radios, personal comfort appliance
• Occupant behavior – your call!
LCC as a Living Learning Lab

Water Conservation Technician Program:
Restroom water consumption
Landscape water consumption
Two Ac. Student learning garden consumption
Mechanical systems flow measurement / consumption
Storm Water Solution
Rainwater Harvesting

Renewable Energy Technician Program:
Solar Electric and Water heating System Installation
LCC as a Living Learning Lab

Bottom line??

All projects lead to efficient/effective use of energy and water consuming systems:

- Improved Campus Sustainability Profile.
- Lower utility costs – electricity and natural gas
- Lower carbon production and green house gas emissions
- Higher Recycling rate – lower garbage fees

Work orders producing systems that operate at design conditions
So what's new at the Northwest Water and Energy Education Institute?

New name – new Logo


2. New Degree Option Controls Technician coming online Fall 2013

3. Moving to a Newly Created Division – Institute for Sustainable Practices (ISP)
New LEED Platinum Academic and Residential buildings in the Eugene downtown core.

**Ground-source thermal wells.**
This is a ground source heating system.
Pipe loops conduct building heat into and out of 55 wells under the building.
Each well is 350 feet deep.

**Passive ventilation**
The building is designed to take advantage of natural airflow and the natural property of concrete mass to warm up or cool down.

**Rainwater Harvesting**
Two 10,000 gallon holding tanks (cisterns) are buried under the west courtyard.

**Automated building control system**
Low voltage electronic valves, pumps and sensors control the air temperature, ventilation and lighting in rooms. The system allows the temperature, ventilation and lights in each room to be controlled by preset program.

**Solar Water Heating and Electricity**
Solar water heating will produce 80% of the demand for Academic and Residential Buildings.
14 kW of roof top Solar Electricity – three different sources – output measured by students!
INSTITUTE FOR SUSTAINABLE PRACTICES

Degree Programs
- Building Controls Technician
- Energy Management Technician
- Renewable Energy Technology
- Sustainability Coordinator
- Water Conservation Technician

At a glance calendar

Upcoming Events from Institute for Sustainable Practices
A S L C C: Blackberries And BBQ
Thu, Oct 3, 2013, 11 a.m.
Plaza - Student Learning Garden
See all >

SUSTAINABILITY HIGHLIGHT OF THE WEEK:

CONGRATULATIONS TO THE MATHEMATICS DIVISION FOR ACHIEVING A GREEN OFFICE CERTIFICATION
October 1, 2013

Mathematics recently became the second division to receive the Green Office Certification with 19 out of 25 points. Employees in this Division are really doing their part to reduce Lane's greenhouse gas emissions! To save energy, the Math/Engineering Computer Lab's equipment shuts down after 30 minutes of no activity and the Division trains students to shut down the computer and turn off the monitor after each use. To reduce emissions from commuting, over 30% of Math employees carpool, walk, bus, bike, or telecommute at least two days per week. Click here for more information on the Math Division's sustainable practices.

News

PROFESSIONAL AND ORGANIZATIONAL DEVELOPMENT & DIVERSITY OFFICE RECEIVE GREEN OFFICE CERTIFICATION