The Role of Student Leadership in Climate Change Mitigation

Scott Thach, VP of Education

Alliance to Save Energy

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Alliance to Save Energy

Mission:

- Promoting energy efficiency for a healthier economy, a cleaner environment, and greater security.

Organization:

- Staff of 35+ professionals
- 38 years of experience
- $7 million annual budget
- Recognized as the premier energy efficiency organization

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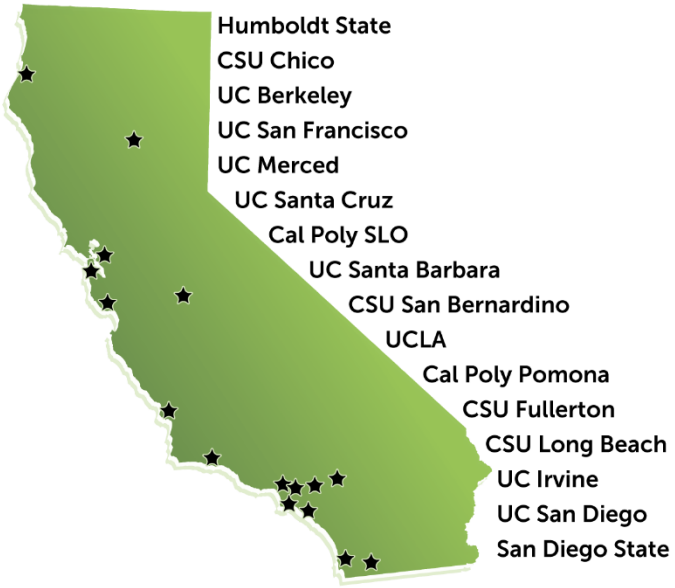
PowerSave Campus Overview

- 16 campuses
- Student driven workforce education and training program
- Paid student internships
- Generates actual savings, KPIs tracked by students



ALLIANCE TO SAVE ENERGY
Using less. Doing more.

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

PG&E
Pacific Gas and Electric Company

Southern California Gas Company
A Sempra Energy utility

SDGE
A Sempra Energy utility

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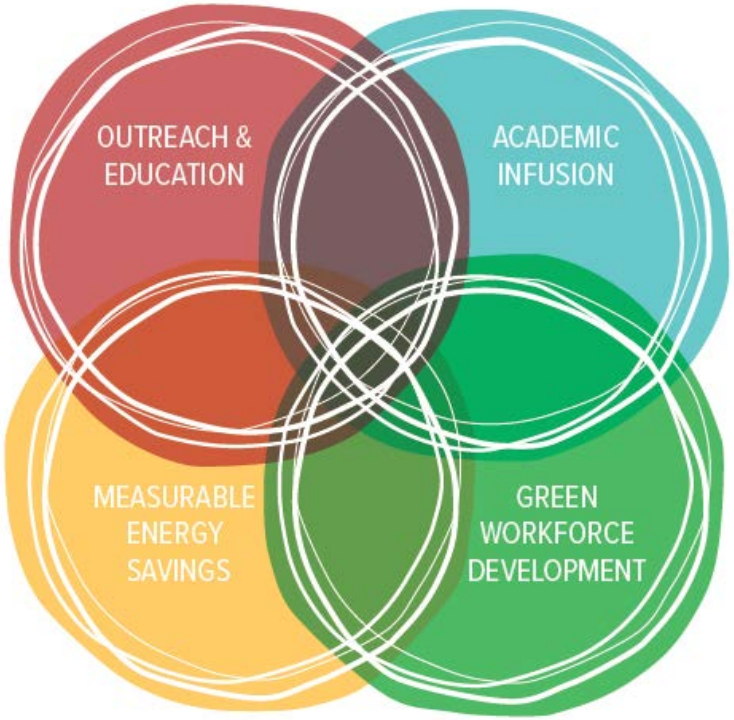
PowerSave Campus Overview

- Measurable energy and water savings
- Integrating efficiency into curricula
- Fostering ongoing campus awareness
- Green workforce development



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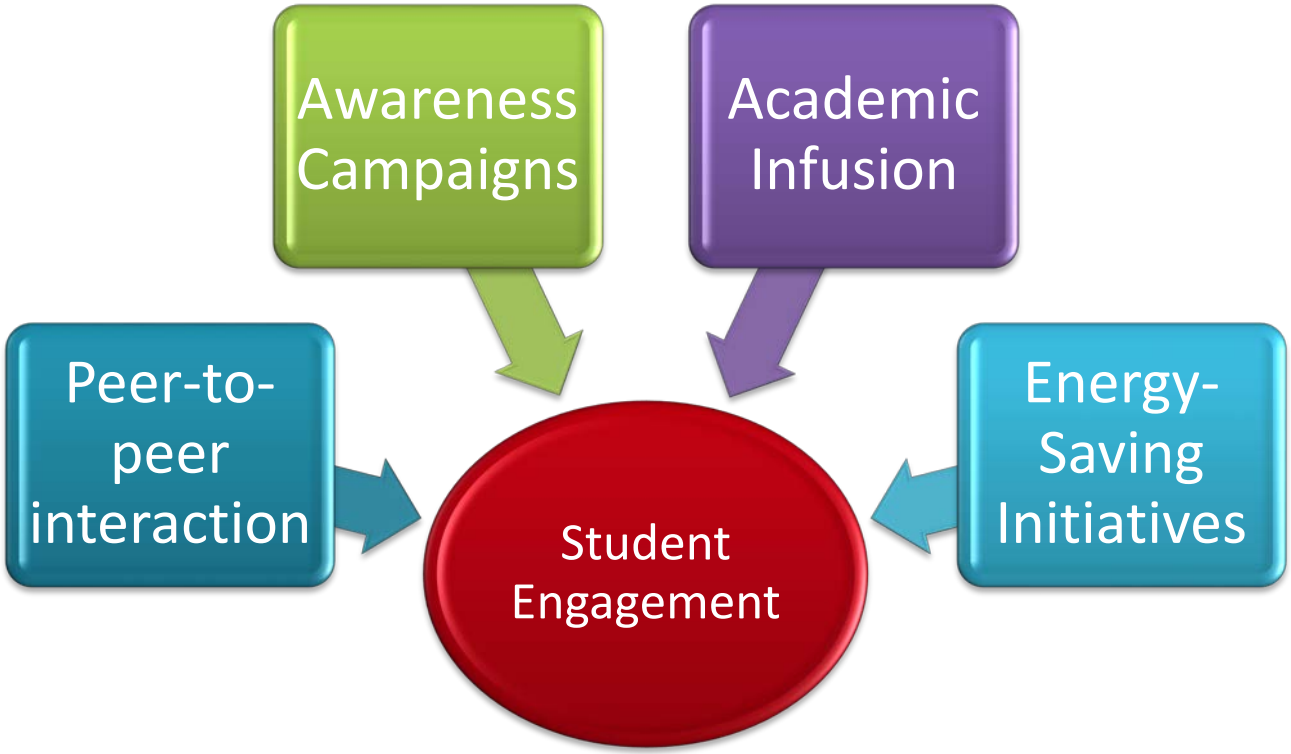
Tomorrow's Sustainability Leaders Taking the Lead Today

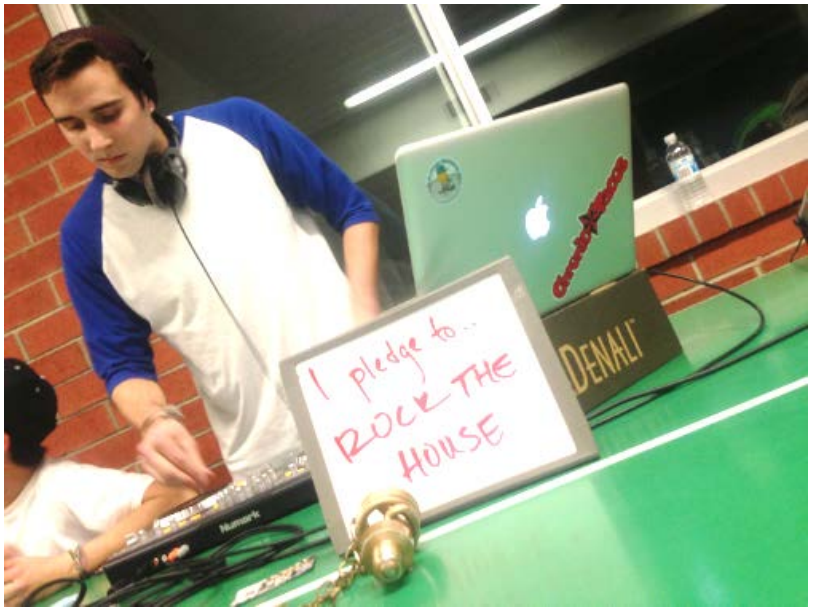


Peer-to-Peer Interaction

- Effective way to educate student body about energy efficiency, water conservation, and campus climate change goals

Energy Awareness Campaigns

- Tabling events
- Community outreach
- Videos
- Pledge drives




I pledge to... to use more blankets... instead of heating
I pledge to... DO IT IN THE DARK!
I pledge to...
I pledge to use less electricity!
I pledge to... SHOWER LESS
I pledge to... pull the PLUG
I pledge to... Compost more!!
I pledge to... SHOWER... W/ A BUDDY!

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Interaction Through Social Media

- Students are the most up-to-date with social media trends
- Student intern groups can gather more followers in less time

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Academic Infusion & Professional Development

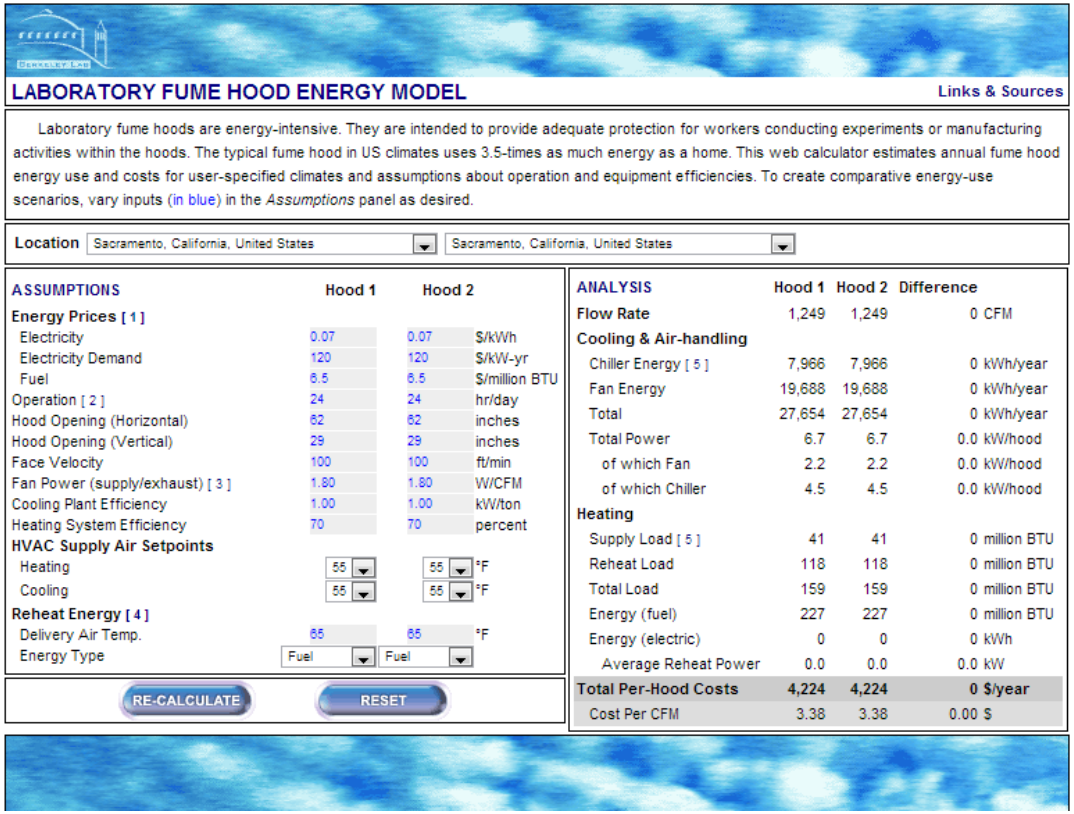
- Student-led seminars about energy efficiency, climate change, and careers in sustainability

- Career panels

Achieving Actual Energy Savings

- Fume Hood *Shut the Sash* campaigns
- Removing unnecessary lighting
- High-efficiency water fixture retrofits
- Energy Audits

So what about the savings?



LABORATORY FUME HOOD ENERGY MODEL — Links & Sources

Laboratory fume hoods are energy-intensive. They are intended to provide adequate protection for workers conducting experiments or manufacturing activities within the hoods. The typical fume hood in US climates uses 3.5-times as much energy as a home. This web calculator estimates annual fume hood energy use and costs for user-specified climates and assumptions about operation and equipment efficiencies. To create comparative energy-use scenarios, vary inputs (in blue) in the *Assumptions* panel as desired.

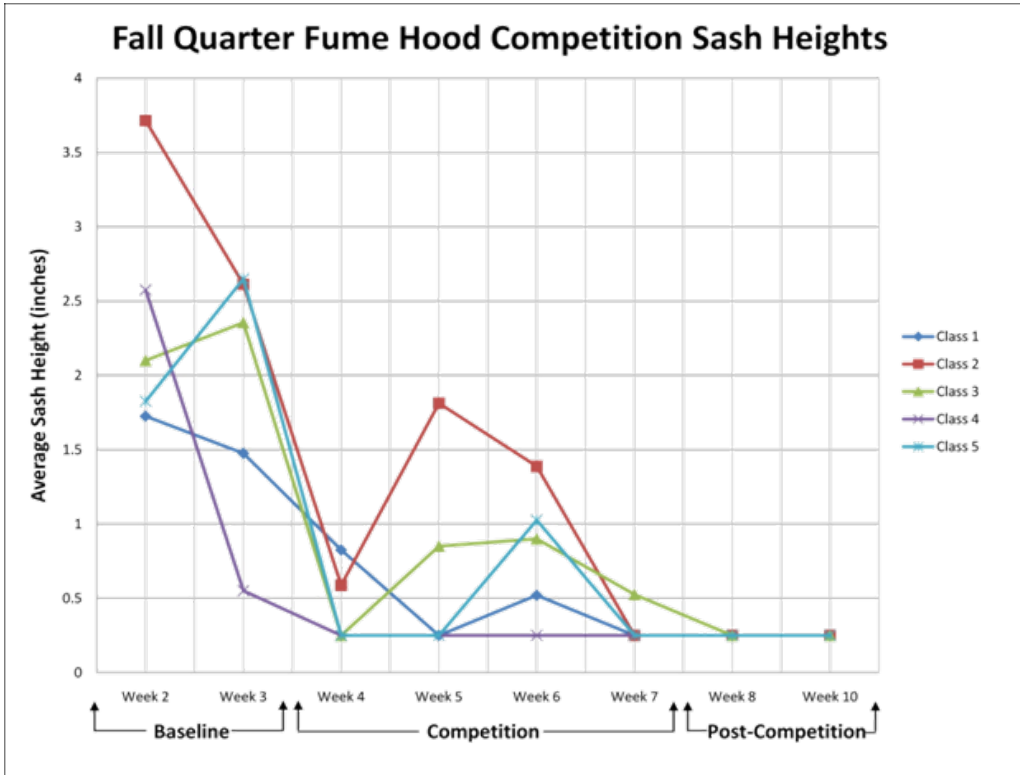
Location: Sacramento, California, United States | Sacramento, California, United States

ASSUMPTIONS	Hood 1	Hood 2	
Energy Prices [1]			
Electricity	0.07	0.07	$/kWh
Electricity Demand	120	120	$/kW-yr
Fuel	6.5	6.5	$/million BTU
Operation [2]	24	24	hr/day
Hood Opening (Horizontal)	62	62	inches
Hood Opening (Vertical)	29	29	inches
Face Velocity	100	100	ft/min
Fan Power (supply/exhaust) [3]	1.80	1.80	W/CFM
Cooling Plant Efficiency	1.00	1.00	kW/ton
Heating System Efficiency	70	70	percent
HVAC Supply Air Setpoints			
Heating	55	55	°F
Cooling	55	55	°F
Reheat Energy [4]			
Delivery Air Temp.	65	65	°F
Energy Type	Fuel	Fuel	

RE-CALCULATE RESET

ANALYSIS	Hood 1	Hood 2	Difference
Flow Rate	1,249	1,249	0 CFM
Cooling & Air-handling			
Chiller Energy [5]	7,966	7,966	0 kWh/year
Fan Energy	19,688	19,688	0 kWh/year
Total	27,654	27,654	0 kWh/year
Total Power	6.7	6.7	0.0 kW/hood
of which Fan	2.2	2.2	0.0 kW/hood
of which Chiller	4.5	4.5	0.0 kW/hood
Heating			
Supply Load [5]	41	41	0 million BTU
Reheat Load	118	118	0 million BTU
Total Load	159	159	0 million BTU
Energy (fuel)	227	227	0 million BTU
Energy (electric)	0	0	0 kWh
Average Reheat Power	0.0	0.0	0.0 kW
Total Per-Hood Costs	**4,224**	**4,224**	**0 $/year**
Cost Per CFM	3.38	3.38	0.00 $

Quantify Behavior



Fume Hood Competition

- Avg. fume hood costs $4,300/year to operate. Closing the sash could save $1,898 per year. (LBNL)

- Savings per Hood: 11%
  Cost Savings per hood: $914 / year
  Number of hoods in Tan Hall: 105

- Total Savings Potential for Tan Hall: **$95,970 / year**

UCSB Pool Cover Campaign

ICA Pool Cover

Project Description:
Students proposed a plan to cover the campus pool when they discovered that it must be heated to 79° F at all times, wasting University energy and money. The pool is used by Intercollegiate Athletics for all of the campus' aquatic teams and therefore requires sustained heating.

Objective: To reduce campus therm use thereby reducing UCSB's greenhouse gas emissions and pool heating costs.

Results:

Total Cost: $53,949.04 - $25,019 rebate from The Gas Company = $28,930.04

Therm Savings: 43,159 = $43,159/yr

Greenhouse Gas Emission Reduction: 290 metric tons CO_2

Special Thanks: After four years of planning, the ICA pool has been covered. This would not have been possible without the TGIF Fund, Facilities Management, UCSB Sustainability, UCSB Athletics, and the PowerSave Campus Program who collaborated to ensure the pool cover project's success!

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Heated Pool Cover Campaign – Cal Poly SLO

- PowerSave Campus interns calculated potential savings for using existing pool covers.
- Worked with Athletics to run a pool cover competition between the two swim teams.

- Cost: $0
- Savings: 128,501 therms
- **$100,231 (Jan-Dec 2013)**

Leveraging Student Project Grants for Energy Efficiency Upgrades on Campus

- Student intern groups can secure project funding through tuition-based grants for on-campus energy upgrades
- *The Green Initiative Fund* on University of California Campuses

The Green Initiative Fund

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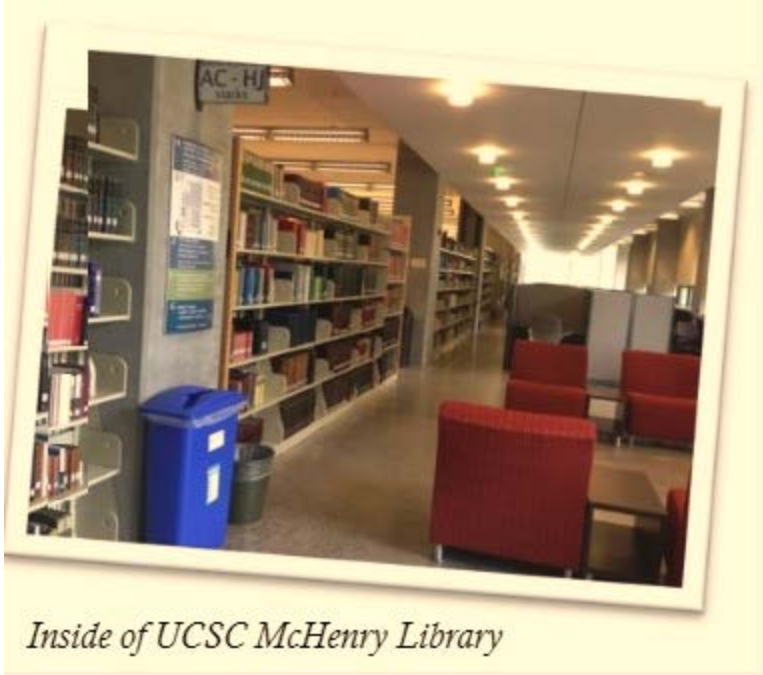
McHenry Library Lighting Retrofit – UC Santa Cruz

LED retrofit and reoriented fixture angles to be more efficient in the book stacks

- Spent: $256,279 ($353,363-$97,064 utility rebate)
- Annual energy savings: 404,515 KwH/$54,609
- Project life = 15 years

  Total Savings = **$819,305**



Inside of UCSC McHenry Library

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Housing and Student Affairs Support

- Student interns working with housing to promote energy efficiency in dorms
- Hold energy efficiency training sessions for Resident Advisors
- Create a culture of sustainability within residence halls
  - *Green Room Certifications*
  - Mock energy audits in dorm rooms

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Campus Conservation Nationals

- Residence Hall Energy Competitions
- PowerSave Campus teams have seen up to a 25% reduction in energy consumption in campus buildings

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Facilities Support

- Student interns can be the public relations arm of the facilities department
- Assisting facilities employees in campus projects
  - Retrocommissioning tasks
  - Energy Audits

Dennis Elliot, Dir. of Energy & Sustainability
Cal Poly San Luis Obispo

- "I consider our interns to be an extension of my position as campus energy manager, with a direct focus on energy conservation projects. Especially valuable to me is their ability to effectively reach out to students and faculty. Their youthful enthusiasm, genuine concern for the environment, and ability to educate and motivate others allows them to achieve participation and buy-in from a wide variety of campus stakeholders…."

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Dennis Elliot, cont.

- "In addition to accomplishing more energy conservation projects, we are finally able to begin working on behavioral change by energy end users - a critical component to any effective energy conservation plan, and something that Facilities has had difficulty dedicating time and resources to in the past…"
- "They are laying the groundwork to expand on these pilot projects and make them long term campus programs that will deliver significant energy savings in perpetuity."

The Future

Behavior change as a critical means for an energy efficient campus

- Energy efficient buildings are becoming more common
- Low-hanging fruit has been picked
- Behavior is often the limiting factor in high performance buildings

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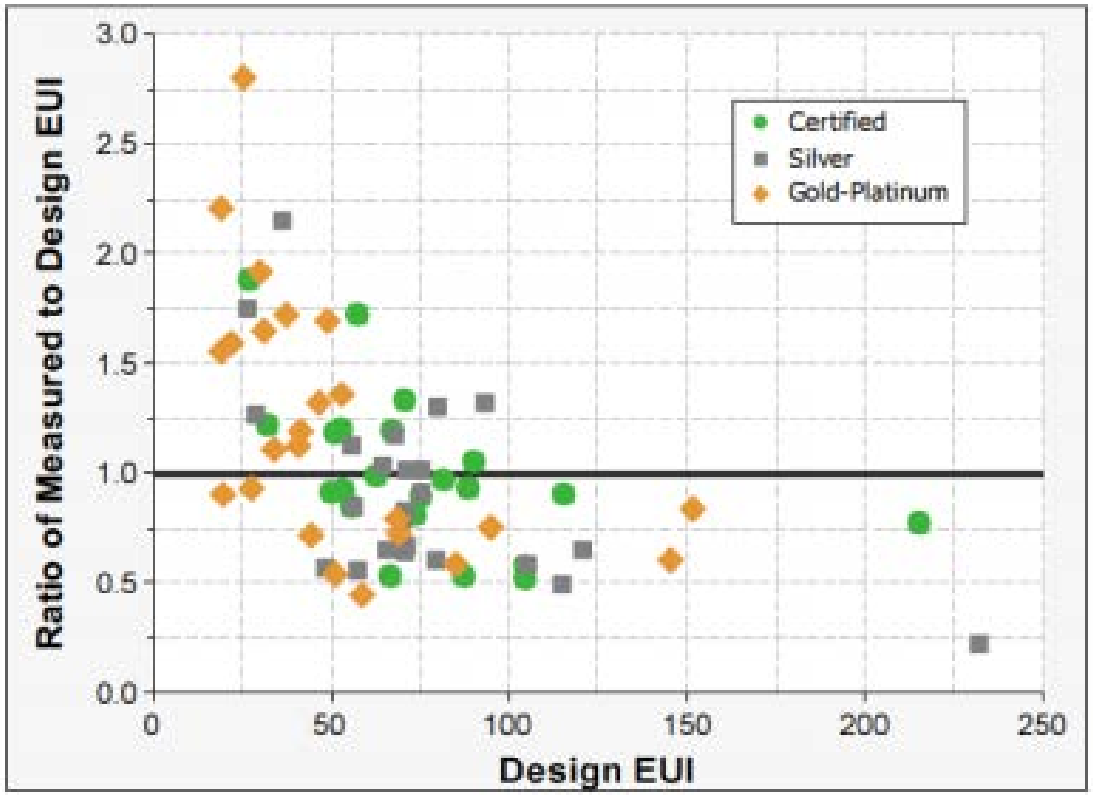
High-Performance Buildings Can Under-Perform



Measuring Impact

- Energy management hardware and software becoming simpler, more cost-effective and versatile
- Sub-metering and smart data allow more granular view of opportunities
- Occupant behavior is easier to quantify

lucid™ GREEN BUILDING STUDIO

ENERNOC

EnergyCAP.

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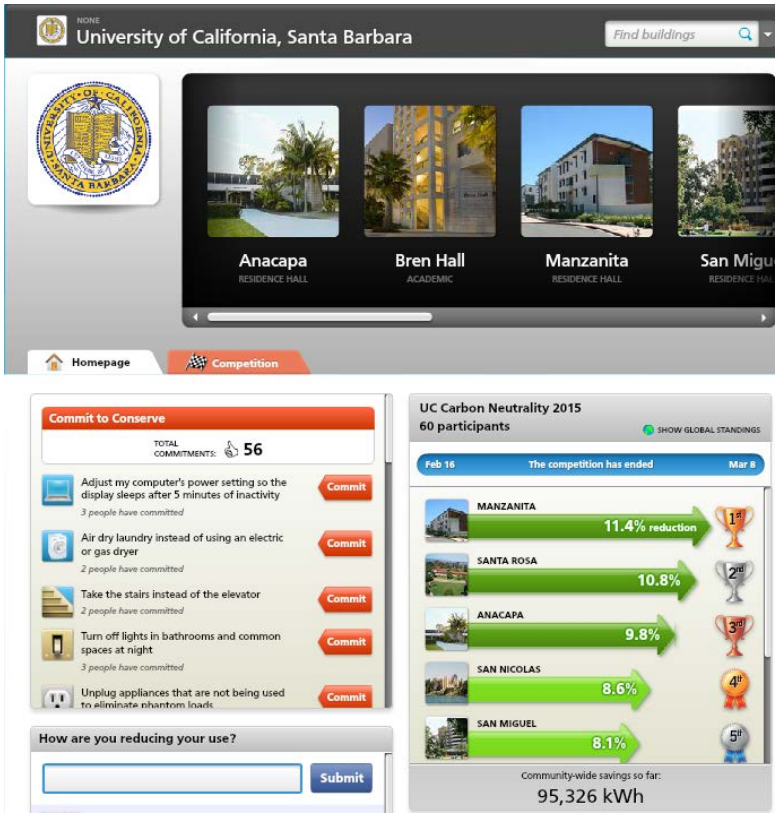
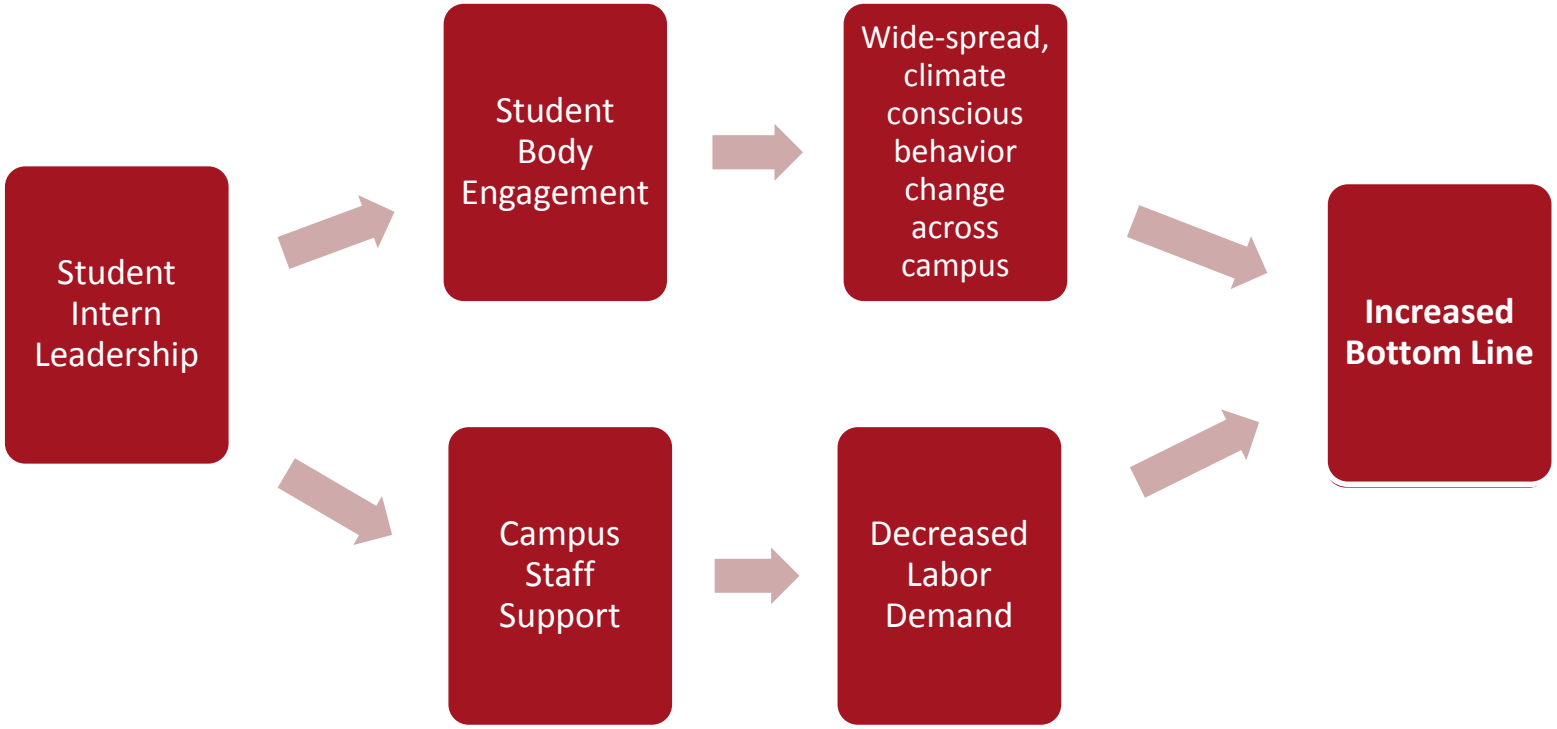
Dashboards Provide a Window on Performance



Making Sustainability Sustainable

- Behavior programs can pay for themselves through energy savings
- Begin with analysis of savings opportunities
- Different PowerSave Campus program models tailored for different clients
- Taper program costs as savings increase

Financial benefits to intern leadership



Dennis Elliot, Dir. of Energy & Sustainability
Cal Poly San Luis Obispo (finale)

- "The fact that the program is administered by the Alliance to Save Energy is valuable to Cal Poly as well, as it reduces the burden on our operating budgets and administrative staff. We sincerely believe that the funds being invested in the PowerSave Campus Program deliver a tremendous return on investment for Cal Poly, the CSU, the Investor Owned Utilities, and the rate payers of the state of California."

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Hidden Benefits of Student-Led Behavior Programs

- Increased facilities performance for minimal cost
- Improved reputation
- Professional development for students
- Increased finances for capital improvements

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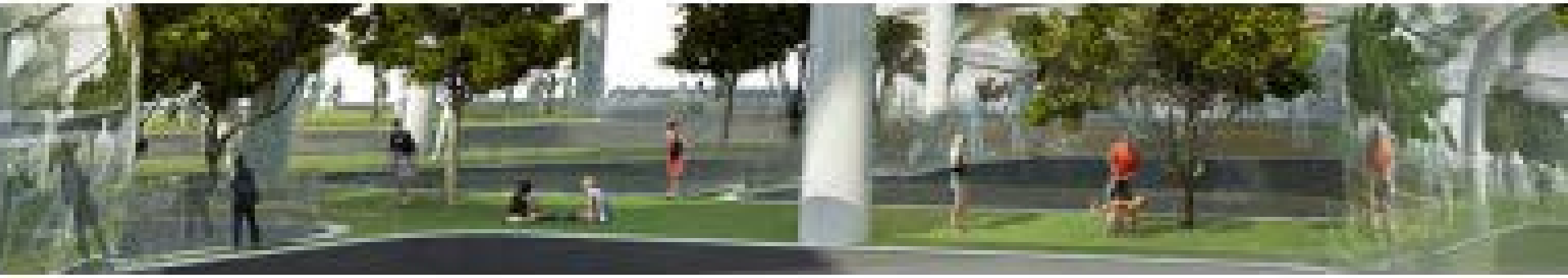

Conclusions

- Occupant engagement **helps maintain performance and save energy**
- Students are the best behavior **change agents** on campuses
- Carefully **targeted behavior programs** can save campuses money
- **Sustainable sustainability** campaigns save more than they cost

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Key Questions

1. Where are the operational savings opportunities on your campus?

2. What efficiency projects have you found with the best returns on investment?

3. Do you incorporate occupancy engagement currently? How?

4. Do you have existing work study programs that could fund student interns in an efficiency program?

5. How do you currently track your savings? Do you use smart meters? Are your buildings sub-metered?

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Thank you!

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