Campus Goals Can Be Puzzling-- Be Part of the Solution

Institute For Facilities Management
Elective 634 – University of California Carbon Neutral Goals
February 2, 2020

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UC Office of the President

UNIVERSITY OF CALIFORNIA Carbon Neutrality Initiative

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Course Description

This session will introduce participants to the University of California system policies and technical strategies to achieve carbon neutrality by 2025. The class will provide lessons learned and include change management experiences, with a special emphasis on facilities organizations.

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Learning Objectives

At the conclusion of this session participants will be able to:

- List key technical strategies to reduce energy-related greenhouse gas emissions and achieve carbon neutrality.
- Summarize how well-designed policies can be an effective tool to achieve complex goals in decentralized organizations.
- Recognize the potential operational benefits of taking an active role in supporting broad campus/system goals.

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The University of California

The University of California improves the lives of people in California and around the world through world-class educational opportunities, groundbreaking research, top-rated health care and agricultural expertise.

EDUCATION	
Total enrollment	280,380
Undergraduate students	222,493
Graduate students	57,887
Alumni	2.0 M
More than 160 academic disciplines	
More than 800 degree programs	

MEDICAL CENTERS AND CLINICS	
Outpatient visits	4.7 M
Emergency room visits	375,104
Inpatient days by payer	174,839
Medicare patients Medi-Cal patients	31% 36%

FACULTY AND STAFF	
Faculty	23,300
Other academic (postdocs, etc)	47,000
Staff	157,400

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UC Research

Charles David Keeling

Sherwood Rowland and Mario Molina

Mission

*University of California's buildings and fleets will become **net carbon neutral by 2025**.*

Vision

*The University of California is developing **scalable solutions** to build the low-carbon future our research has proven to be imperative.*

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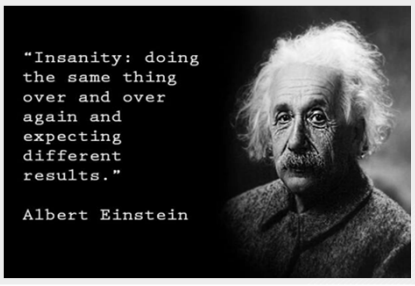
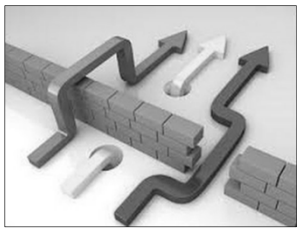
Why Organizational Changes Fail

- Insufficient Communications
- Lack of Leadership



Carbon Neutrality Finance and Management Task Force



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Change Management Process for Transformative Change Ideas

- Top-down Mandate + Bottom-up Ideas
- 6 months to develop report + 6 months to vet report
- Sprints: project management strategy
  - Product owners
  - Sprint team
  - Surveys and interviews

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Two Key Task Force Conclusions

- *The successful transition to carbon neutrality hinges on securing broad support for the initiative among senior administrators, faculty, and our students.*
- *The way in which carbon neutrality measures are implemented must respect campus autonomy in charting their own progress toward carbon neutrality while providing campuses with the leadership, tools, and authority to accomplish the goal.*

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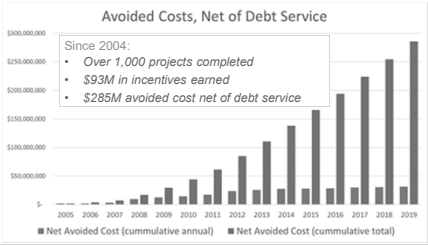
UC's historical energy efficiency efforts have produced significant results



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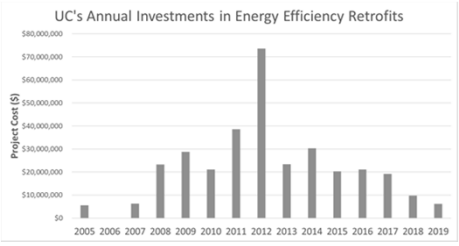
But progress has slowed in recent years



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Task Force Energy Efficiency Sprint Executive Summary

- UC's leadership is committed to the carbon neutrality 2025 goal
- Reducing energy consumption in existing facilities is a key strategy to reduce greenhouse gas emissions
- Energy efficiency projects reduce operating costs, lessen exposure to future utility rate increases, and decrease deferred maintenance backlogs, all of which improve the financial strength of the University
- Removing the financial, staffing and operational barriers to accelerate energy efficiency projects is foundational to the 2025 goal

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Action Plan to Address Energy Efficiency Barriers

Financial	Staffing	Systems	Information
• **Debt capacity constraints** • **Energy savings directed to other uses** • Utility budgets not fully funded • Incentives unavailable or decreasing • Cash constraints • Cap and trade funding uncertain • Seed funding not available • Campus financial health doesn't allow for spending	• **Lack of leadership** • **Lack of qualified internal staff** • Internal organizational issues • Campus "culture" • Lack of UCOP support • Customer impacts • Campus is overly risk averse	• **SEP process** • OSHPD rules • EE priorities unclear • Technology choices • When to act unclear • Can't use ESCOs • System expertise not widely shared • Incentives uncertain • Cogen issues • Project delivery • Savings unproven	• **The value/purpose of EE not well communicated** • Poor metering • Baseline energy data • Credible audits • EE potential uncertain • Space planning issues • Metrics for success not available

Legend
- **Develop solutions now**
- Outline potential solutions
- Define the issues; solutions later
- For separate study/action

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Leadership - Solutions: Management Strategies

1. Set aggressive goals
2. Establish accountability for achieving goals: public tracking and reporting at campus and system level
3. Create a streamlined project approval process

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UC's Sustainable Practices Policy Introduction

*The University of California is committed to **responsible stewardship of resources** and to **demonstrating leadership** in sustainable business practices. The University's locations should be **living laboratories** for sustainability, **contributing to the research and educational mission** of the University, **consistent with available funding** and safe operational practices*

Why Did UC Create a New Energy Efficiency Goal?

- Feedback from some campus stakeholders that reducing greenhouse gas emissions was not cost effective
- Requests from energy managers that more administrative attention and support was needed for them to be effective in implementing their work.
- A general consensus that UC could improve its operational efficiency with metrics and goals in place for energy use.

Policy Goal Considerations

1. The overarching objective is to apply a healthy amount of pressure and support to have all campuses continue reducing energy use
2. The new policy must be one that all key stakeholders can support
3. Some campuses are growing a lot
4. Campuses vary in their climate zones, size and operational complexity
5. Some campuses have already greatly reduced their historical energy use, others are relatively early in their implementation
6. Some campuses are planning large projects that are 3-5 years out
7. Policies with simple language are best
8. The methodology for measuring performance must be easily implemented and understood

Group Exercise (10 minutes)

1. Create a short written policy statement to encourage and support reductions in energy use on your campus.
2. Provide a general outline of the procedures that would be needed to enacted the policy goal.

UC's Energy Efficiency Policy Goal

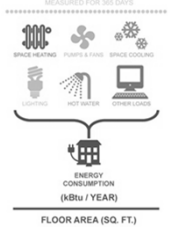
Each location will implement energy efficiency actions in buildings and infrastructure systems to reduce the location's energy use intensity by an average of least 2 percent annually.

UC's Energy Efficiency Policy Procedures

- *Each location's percent reduction in energy use intensity (EUI) will be reported annually based on the sum of weather-adjusted energy use divided by the sum of the maintained gross square footage.*
- *UCOP will use energy usage data from the systemwide purchased utility database for reporting campus energy use intensity, based on the campus-specified set of utility accounts and associated maintained gross square footage.*
- *Electric and gas site energy will be converted to kBTU and normalized for weather.*
- *Policy goals will be evaluated and adjusted as appropriate following the 2025 reporting year.*

UC's Energy Efficiency Policy Calculations

The Calculation



Example for UCOP

Electricity:
(7,112,381 kWh from utilities
+ 691, 345 kWh from on-site solar) * 3.412 kBtu/kWh +

Natural Gas:
(115,088 therms) * 100 kBtu/therm

=38,135,084 kBtu (measured)

Which, when adjusted for weather (because 2017's weather was less energy intensive than normal), becomes:

39,061,030 kBtu

Divided by 1,027,065 sq. ft.
(UCOP's current space total)

= *an **EUI of 38** kBtu/sq. ft./year*

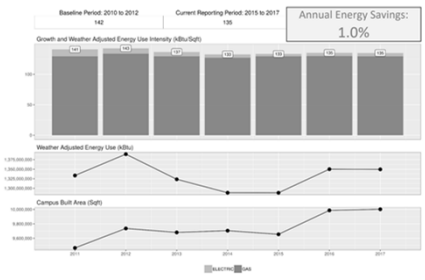
UC's New Annual Report Elements for Carbon Neutrality

Emissions History

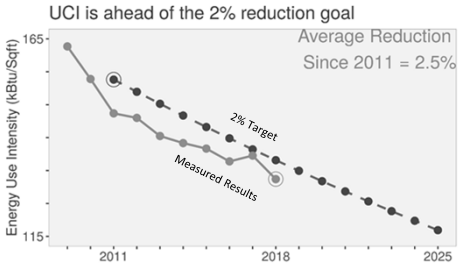
Energy Efficiency

Emissions Solutions & Forecasts

Energy Reporting Metrics for 2018

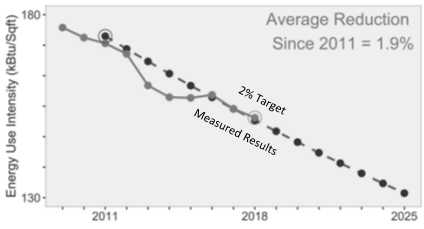


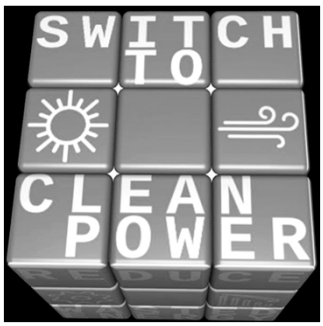
Updated Energy Reporting Metrics for 2019



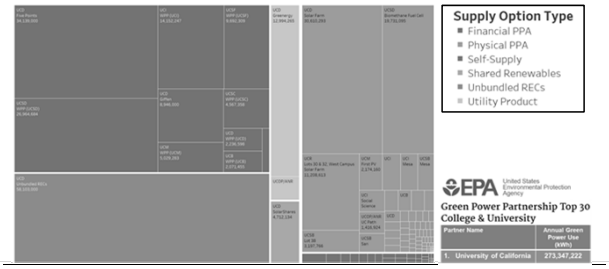
Systemwide Results

- Chancellors/Provosts/ CFOs/COOs better informed and more engaged
- Successfully signaled that carbon neutrality is a priority





UC now has over 100 renewable energy supplies on-line



Supply Option Type
- Financial PPA
- Physical PPA
- Self-Supply
- Shared Renewables
- Unbundled RECs
- Utility Product

EPA United States Environmental Protection Agency

Green Power Partnership Top 30 College & University

Partner Name	Annual Green Power Use (kWh)
1. University of California	273,347,222

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UC San Diego "Solar Chill" (1.5kW)

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UC Riverside Parking Lots (4.2MW)

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UC Irvine Rooftop Systems (4.3MW)

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UC Davis Solar Farm (16MW)

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Utility-scale – Giffen (20 MW)

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Utility-scale - Five Points (60 MW)

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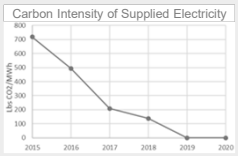
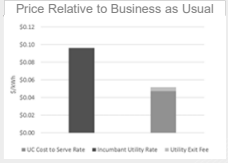
UC's Wholesale Power Program Results

Carbon Intensity of Supplied Electricity



UC's electricity supplies will be carbon neutral in 2019…

Price Relative to Business as Usual



…and costs will be less-expensive than traditional utility services

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Why electrifying new buildings makes sense for UC

- UC's own electricity company is already supplying 100% clean electricity.
- Other affordable mechanisms exist to procure clean electricity for those campuses not directly served by UC.
- Electrification of building systems is often technically feasible and cost effective.

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UC's New Green Building Policy

"No new building or major renovation that is approved after June 30, 2019 shall use onsite fossil fuel combustion…"

…(except those projects connected to an existing campus central thermal infrastructure).

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UC is developing Biomethane projects…

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…and signing offtake agreements for Biomethane

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Our latest project is under construction in Rialto, CA

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UC Offset Projects Evaluation Criteria

Our goal is to develop a diverse portfolio to achieve these priorities:

1. **Cost** and **quantity**
2. **Environmental** quality (additional, permanent, real)
3. Expands or applies **UC research**
4. Offers educational experiences to **students**
5. Improves or demonstrates **scalable climate solutions**
6. Improves **human health**
7. Has **social justice** benefits
8. Directly supports the local **UC community**
9. Has **low risk** of causing harm
10. Has other **co-benefits**

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UC Offset Projects Recommended for Seed Funding

PROJECT NAME	SUBMITTED BY	PROJECT TYPE
Catalyzing Negative Carbon Emissions	Ben Houlton, Director, John Muir Institute of the Environment; Large team of from 3 UCs, LBL, & external partners.	compost, rock, & biochar land application
Unite to Light	John Bowers, Director, Institute for Energy Efficiency, UCSB	solar lanterns
Adopt a Cookstove	Sangwon Suh, Professor, Bren School of Environmental Science and Management, UCSB	cookstoves
Production of Red Seaweed to Mitigate Methane Emissions in California's Livestock	Dr. Jennifer Smith, Associate Professor, Center for Marine Biodiversity and Conservation, Scripps Institution of Oceanography, UCSD	grow seaweed to feed to cattle
CO2Concrete	Gaurav Sant, Professor, Department of Civil & Environmental Engineering, UCLA	low-carbon concrete
The Ebony Project	Virginia Zaunbrecher, Associate Director of the Center for Tropical Research, Institute of the Environment and Sustainability, UCLA	tree planting

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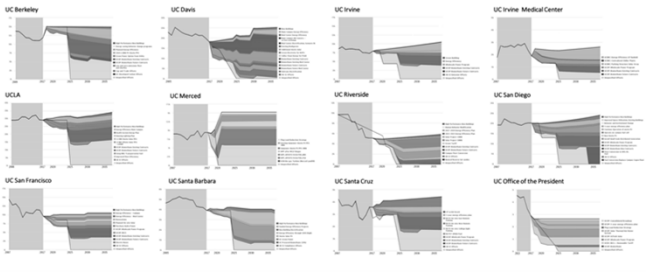
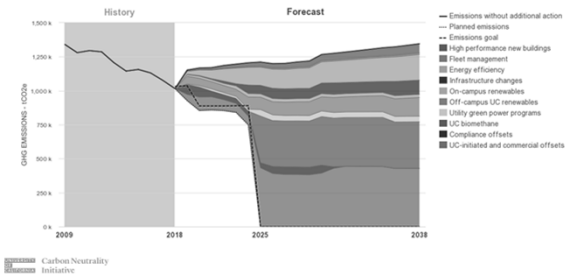
UC's Climate Action Plans



Systemwide Roll-up of Planned Actions



UC'S CLIMATE SOLUTIONS

REFERENCES

- David Phillips' email: david.phillips@ucop.edu
- UC's Carbon Neutrality Initiative https://www.ucop.edu/carbon-neutrality-initiative/
- Clean Energy Optimization Pilot https://energized.edison.com/stories/fighting-climate-change-through-higher-education
- *UC Strategies for Decarbonization: Replacing Natural Gas* https://www.nceas.ucsb.edu/files/research/projects/UC-TomKat-Replacing-Natural-Gas-Report_2018.pdf
- *Annual Sustainability Report* https://www.ucop.edu/sustainability/_files/annual-sustainability-report2017.pdf
- *Sustainable Practices Policy* https://policy.ucop.edu/doc/3100155/Sustainable%20Practices

Learning Objectives

At the conclusion of this session participants will be able to:

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- Summarize how well-designed policies can be an effective tool to achieve complex goals in decentralized organizations.
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This concludes The American Institute of Architects Continuing Education Systems Course

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