

Conclusion



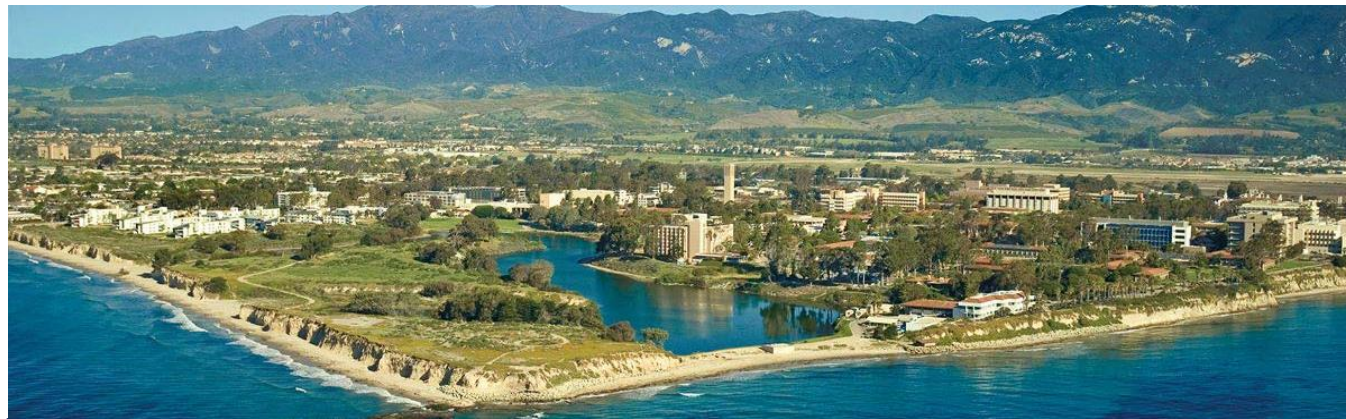
We identified 18 rooftops as priority sites for solar panel installations, with the top buildings including: **the Recreation Center, University Center, and Student Health**. Installing solar panels to the maximum capacity will reduce GHG emissions by almost **2000 metric tons annually**



The recommended UCRF structure, with approximately \$6M in seed funding, will deliver between **\$10.4 to \$24.2M in cumulative utility savings**, \$17 to \$35M in project investments, and a **15 to 31% reduction in annual GHG emissions** at UCSB by 2025.



We developed a set of recommendations for campus administrators and students to improve collaboration during the decision-making process for the CNI. Administrators should **target students willing to take action** and students should **leverage the unique role and influence they hold**.



Acknowledgements

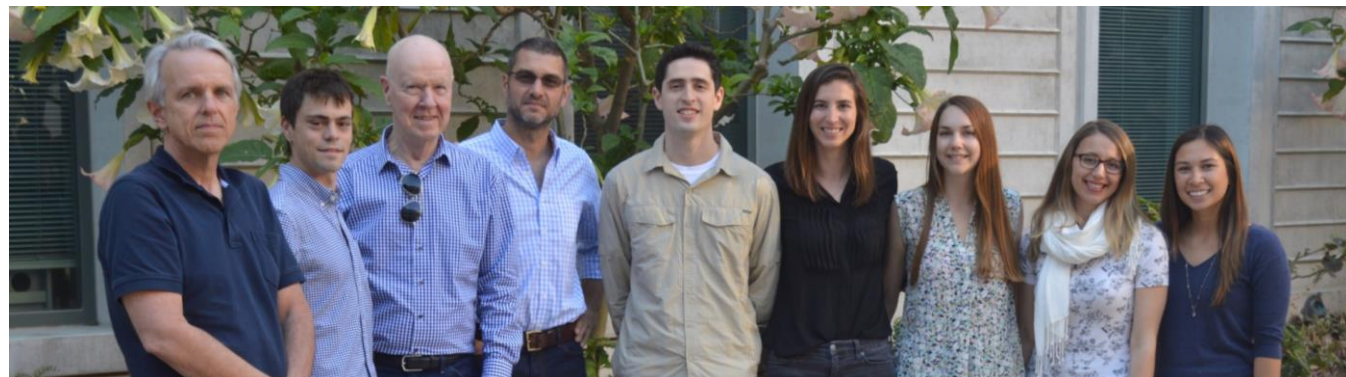
We would like to extend our deepest thanks to our client, Dr. David Auston, as well as our faculty advisors, Dr. Roland Geyer and Dr. James Frew. We gratefully appreciate to Dr. Lisa Leombruni and Jordan Sager for all of their advice and guidance. Sincerest thanks to the James S. Bower Foundation for funding.

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References:

¹ UCSB Office of Sustainability. 2015. Climate Action Plan 2016 Draft. Santa Barbara, CA.



For further information please visit carbonzeroucsb.wordpress.com or send an email to carbonzero@lists.bren.ucsb.edu



CURBING CLIMATE CHANGE AND DRIVING ENERGY EFFICIENCY

A Critical Analysis of Strategies for Implementing Carbon Neutrality at UCSB by 2025



Project Members: Charles Diamond, Evan Ritzinger, Lydia Rudnick, Dawnielle Tellez, Emily Waddington

Project Advisors: Dr. David Auston, Dr. James Frew, Dr. Roland Geyer, Dr. Lisa Leombruni, Jordan Sager

Overview of the UC Carbon Neutrality Initiative

In 2013, University of California (UC) President Janet Napolitano, instituted the **Carbon Neutrality Initiative (CNI)**, a commitment for all ten UC campuses and five medical centers to emit net zero greenhouse gas emissions by 2025. If successful, the UC system will be the first university system in the world to become carbon neutral.

UC Santa Barbara (UCSB) has a history of green initiatives and student-driven sustainability efforts. Achieving carbon neutrality offers the institution an opportunity to further its sustainability and climate goals in its operations, teaching, and research. Our project addresses targeted solutions and recommendations for improving CNI implementation in three fundamental categories: solar project deployment, project financing, and strategies for communication and engagement.

What is carbon neutrality?

To be carbon neutral is to have a net zero carbon footprint by balancing carbon released with carbon sequestered.



Scope 1
Direct on-site emissions

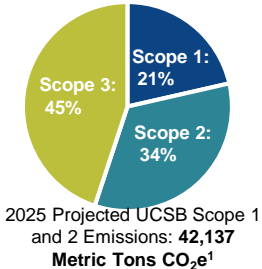


Scope 2
Purchased electricity



Scope 3
Travel and commuting

The CNI pledges for the UC system to become carbon neutral for Scope 1 and Scope 2 greenhouse gas (GHG) emissions by 2025, and for Scope 3 emissions by 2050.



Approach

Working with our client, UCSB's Institute for Energy Efficiency, we identified three distinct areas at UCSB where we could find ways to effectively implement carbon neutrality:



Solar Project Deployment

Goal: Streamline information to increase pace of new on-campus solar installation

How: Prioritize rooftop sites with a multi-criteria solar assessment



Financial Tools & Strategies

Goal: Assess available financial resources and potential impact

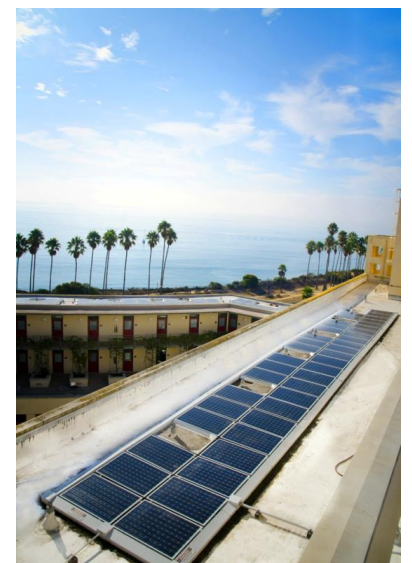
How: Scenario analysis of UCSB's Utility Conservation Reinvestment Fund



Strategic Communication & Engagement

Goal: To understand and recommend how to move CNI through the UCSB decision-making process given current attitudes and challenges

How: Administrator interviews, student focus groups, campus-wide student survey



Key Findings

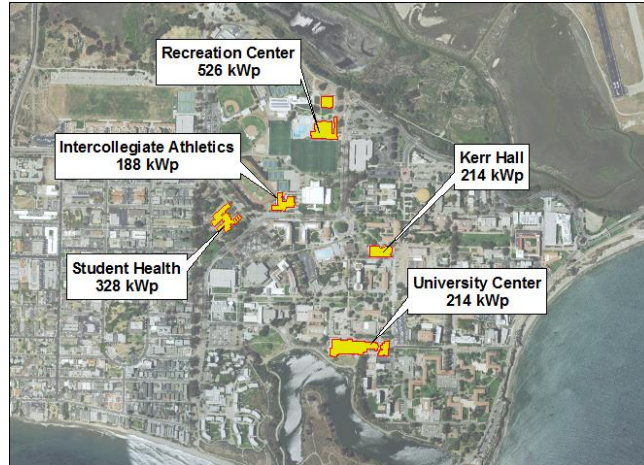
Solar Project Deployment

How can UCSB prioritize rooftops for new on-campus solar installation?

UCSB plans to install an additional **5 MWs** of solar, but is unsure of site placement to maximize efficiency and power. We identified **1st, 2nd, and 3rd priority sites** to install solar PV. We analyzed each site for: total available capacity, total annual incoming solar radiation, and other critical site characteristics (slope, age, and roof material).

1st Priority Sites: 1.6 MW
2nd Priority Sites: 2.4 MW
3rd Priority Sites: 0.8 MW
Total Capacity of Preferred Sites: 4.8 MW

First Priority Sites



First priority sites had all preferred characteristics – new, flat roofs - and high energy generation potential totaling 1.6 MW, or 11% of UCSB's peak power demand.

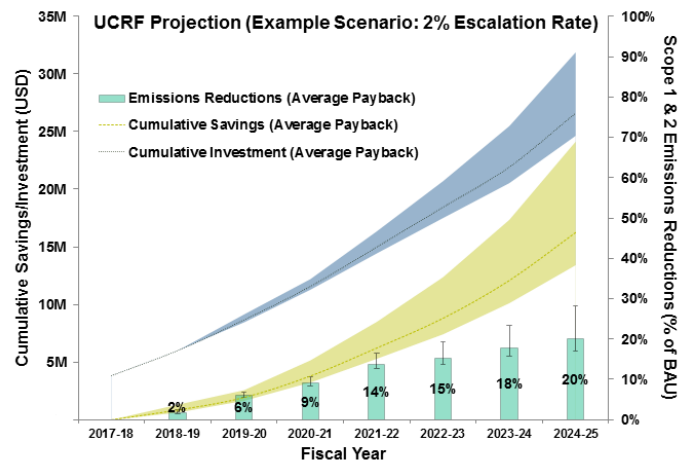
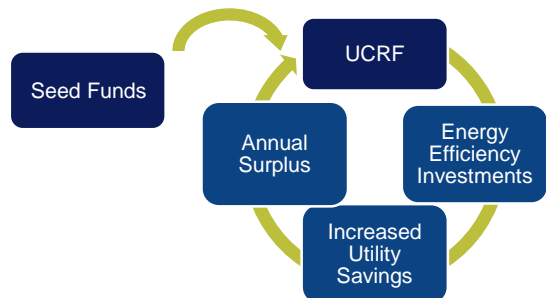
Recommendations:

- Install solar panels to meet the estimated rooftop capacity of the main campus by targeting high priority sites first. Employ Power Purchase Agreements, which allow UCSB to lease out panels and avoid upfront costs.
- Incorporate solar rooftop potential in building standards.

Financial Tools & Strategies

How can UCSB finance energy efficiency projects?

A **Utility Conservation Reinvestment Fund (UCRF)** uses initial seed funding to finance projects, generates savings, and creates more funds for future projects. We examined the potential impact of instituting a UCRF using **current utility surplus** as seed funding and varying future **key variables**: utility prices, utility rebates, and project payback.



Assuming a 2% annual increase in utility prices, with utility rebates, and a 9.5 year average project payback, the UCRF will generate:

- **20% GHG emissions reduction**
- **\$16M in utility savings**
- **\$27M in project investments**

Recommendations:

- Institute a Utility Conservation Reinvestment Fund to fund energy efficiency projects.
- Develop strategies to overcome staffing constraints.

Key Findings

Strategic Communication & Engagement

How can UCSB move the CNI through the UCSB decision-making process given current attitudes and challenges?

We performed an assessment of student and administrative sentiment towards the CNI as well as researched the policy-making process at UCSB. Our aim was to provide UCSB's administrators and students with information to help leverage knowledge of the administrative system, current attitudes, and culture, with **bottom-up coalition-building** tactics to further engage **top-down decision-makers**.

Key Themes for Administrator Interviews, Student Focus Groups and Campus-Wide Student Survey:



Administrators

We interviewed **25 key decision-makers** on campus and the most common perceived challenges and solutions to the CNI are listed below.

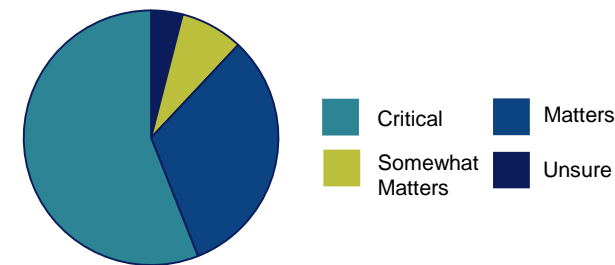
Top Challenges:

- Financial Resources
- Unclear Value to UCSB
- UCSB Governance

Top Solutions:

- Buildings
- Increased Engagement
- Financial Resources

Administrators answer the question, "Does student opinion matter during the decision-making process?"



"when students speak, it carries a lot of weight...we recognize that they are the future. it's their future."

Recommendations:

- Administrators: Recruit, engage, and retain more students on campus committees.
- Align UCSB's core mission of teaching and research with topics of the CNI that resonate with students.
- Students: Target CNI messaging to environmental students and organizations first.
- Students: Utilize known pathways to make change, such as committees, to influence the process.

Students

We recorded nearly 900 responses from students for our survey we found that students care and want to take action but are unsure how to get involved. Of note is that the least popular action listed was to serve as a student representative, but through our administrator interviews this was mentioned as the most direct way to make change.

Students most willing to take action:

- Environmental Studies
- Students Involved in Sustainability Organizations

Interest in carbon neutrality topics:

- Solar Power
- Energy Efficiency
- Divestment

Most popular actions to show support:

- Sign a petition
- Attend an Informal Event

Least popular:

- Serve as a Student Representative on a Committee

