Changing the Campus Climate: Strategies for UCSB to Reduce Greenhouse Gas Emissions

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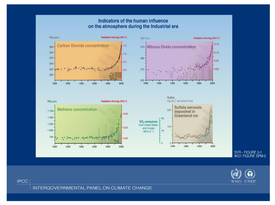
Background & Significance



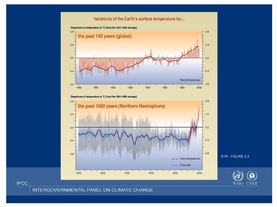


Figure 1 & 2: Show the increase in GHGs and corresponding increase in temperature

Anthropogenic climate change is arguably the most significant problem of our generation. Unfortunately, its drivers – greenhouse gas (GHG) emissions and land use change – are among the most integral inputs into the current economic system.

With the lack of federal leadership, action at the state and local level is all the more important. California is already leading the way with a number of policies enacted (i.e., Assembly Bill 1493 (Pavley), Renewable Portfolio Standard) or in the development stages that directly or indirectly address global warming. With the Governor's new executive order (S-3-05) committing California to eighty percent reductions below 1990 levels by 2050, California will continue to be a leader into the future.

As part of the main educational system in California, UCSB is strategically poised to play a leadership role in addressing climate change for public universities nationally and globally.

Project Goals

This Group Project encourages UCSB to be a leader in responding to global warming – by demonstrating the feasibility and financial profitability of modest GHG mitigation - and to provide lessons learned to other universities with a similar vision.

Analysis

Step 1: UCSB GHG Emissions Inventory

For the purposes of our primary analysis, we focused on emissions from electricity consumption, natural gas consumption and UCSB fleet vehicles. This is because these are the emissions sources for which UCSB has committed to measuring and certifying with the California Climate Action Registry (CCAR).

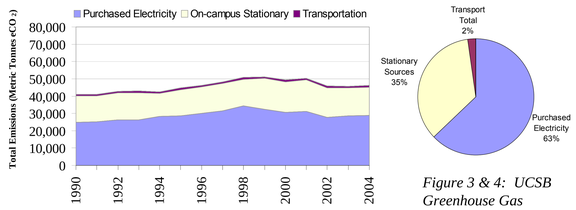
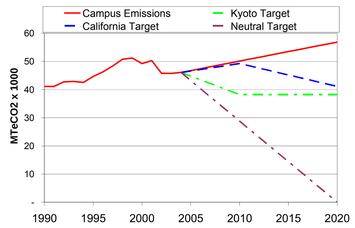


Figure 3 & 4: UCSB Greenhouse Gas Emissions by Source

Step 2: Emissions Targets Applied to UCSB

We analysed the potential emissions reduction targets – California (2000 levels by 2010, 1990 levels by 2020), Kyoto Protocol (7% below 1990 levels by 2010), and Climate Neutrality (net zero GHG emissions) – as applied to UCSB, given projected campus growth through 2020.

Figure 5: Projected Emissions and Potential Targets



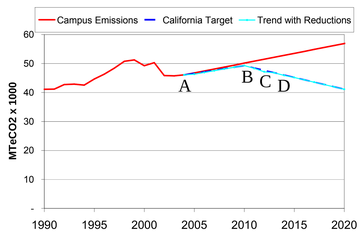
Step 3: Mitigation Strategies and Schedule

We profiled a range of mitigation opportunities available to UCSB, including energy efficiency and conservation projects, on campus renewable energy projects, alternative fuel vehicles, and carbon offsets.

Year Stage	Mechanisms	Potential MT/year	Capital Cost	NPV/MT	Annual Saving
ASAP	Energy star computer settings	310	$0	196	$94,000
Stage A	Fleet smaller vehicles	33	$0	215	$9,545
	Fleet ethanol	1	$0		$0
2011	HVAC Upgrade – Air Handlers 1	573	$200,000	245	$112,000
Stage B	HVAC Commissioning	340	$120,000	241	$71,159
	HVAC Upgrade – Filters	607	$372,323	196	$184,053
	EE – Fume Hoods	55	$80,000	156	$14,298
	Building baseline awards	14	$15,000	127	$4385
2012	HVAC Upgrade – Fans	914	$1,574,464	125	$277,048
Stage C	Lighting Upgrades	835	$1,797,762	97	$252,919
2013	HVAC Upgrade – Air Handlers 2	174	$550,000	42	$45,328
Stage D	Reduce fleet driving – bikes	1	$2500	11	$27
	Begin purchasing offsets	763	$8,091	-11	$0

Figure 6: GHG Reduction Mechanism Schedule to Achieve California Targets

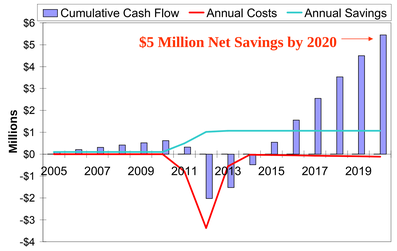
Figure 7. California Targets can be met with policies in 4 stages. Stage A (zero cost policies) should be implemented first to reach the 2010 target, after which point stages B, C and D should be implemented sequentially to achieve the second target, 1990 levels by 2020.



Key Finding

According to our proposed implementation schedule of mitigation projects, **meeting the California targets would yield cost savings of $5 million by 2020**. We performed similar analyses for two additional targets – the Kyoto Protocol and Climate Neutrality – and observed similar findings.

Figure 8. California Targets cash flow analysis. Once implemented, projects yield savings on an annual basis.



Implementation

Given the analysis, it would seem that UCSB should already be implementing GHG mitigation strategies. To some extent they are – through the energy efficiency projects implemented by the Facilities Management team, among others – and the results of these efforts can be seen in the declining aggregate GHG emission trend over the past 5 years

Notwithstanding their significant previous efforts, there are a number of institutional constraints that hinder UCSB's ability to implement more GHG mitigation projects, and to implement them more immediately. These obstacles include:

- **The state funding allocation system**, which allots separate funds for capital projects and for operations. This prevents borrowing from the operating budget to fund capital projects that save money in the long run;
- **Lack of an information management system** for GHG emissions, which hinders efforts to understand emissions sources and trends; and,
- **Institutional inertia and risk averseness**, which stems from the complexity of decision-making processes within the UC system.

Addressing these barriers is integral to the implementation of any significant GHG reduction policy.

Our Project's Contribution Thus Far:

- Facilitation of UCSB membership with California Climate Action Registry.
- Formation of The Green Initiative Fund (TGIF), up for vote on April 24, 2006.
- Participation in Phase II of the Campus Sustainability Plan.

Final Recommendations for UCSB

- Make a firm commitment to meet the California targets at a minimum and strive for to meet the Kyoto target.
- Incorporate GHG emissions as a metric in long-term campus planning.
- Formalize the UCSB Office of Sustainability.
- Implement zero cost emissions reduction projects first, followed by projects with the lowest cost $/MT CO_2e, and offset the remaining emissions to meet the target.
- Identify additional cost-effective GHG mitigation opportunities, such as more energy efficiency projects.
- Work with administrators at other UC schools to press UC Office of the President and the state legislature for capital budget funding reform.

These recommendations should allow UCSB to reap the multiple benefits previously discussed, including significant dollar savings, improved environmental performance, and positive public relations opportunities. Furthermore, UCSB's leadership on addressing climate change has the potential to have significant impacts beyond the UCSB campus, including:

- Mobilizing other public universities, in the UC system and beyond, to address climate change.
- Demonstrating the feasibility – indeed benefits – of meeting the first two commitments of the Governors' targets.
- Educating the students of UCSB, as future consumers, investors, professionals, and leaders.

Acknowledgements

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