

MESM 2010 Group Project Proposal:

PROPOSER

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FACULTY SPONSORS

TBD
CLIENT: AECOM Environment &
CCAR Registered Communities

PROBLEM STATEMENT

Climate change has become a major focus of environmental agencies on a state and Federal level, and the driving force behind several new regulations that will dramatically shape California's urban and economic landscapes over the next decade and beyond. The California Environmental Quality Act (CEQA) and Global Warming Solutions Act of 2006 (AB32) are both examples of regulations that will substantially change California's future development and economy operations. On the national level, a federally controlled cap and trade system appears likely and will create new markets for greenhouse gas (GHG) trading. All of these drivers have increased the desire of many communities and other entities to enact planning and strategies for GHG reductions and a more sustainable energy future.

As communities strive to reduce their GHGs, they are confronted by technical, financial and political constraints. Meeting these challenges requires an interdisciplinary GHG management approach that allows a community to understand its baseline GHG footprint, evaluate the optimal available resources for reducing this footprint, and determine the financial feasibility of these reduction strategies under consideration.

PROJECT OBJECTIVES

The primary objective of this project is to provide a strategic combination of GHG reduction options that can be appropriate for a specific community in California. This goal can be met by building upon the community GHG modeling approach established by AECOM Environment, and include the following key steps:

1. **GHG Baseline Assessment:** Student project team members will evaluate the baseline GHG footprint of a community that is a member of the California Climate Action Registry (CCAR), and has completed at least one calendar year GHG inventory that has been certified as consistent with CCAR's General Reporting Protocol (GRP) Version 3.0.
2. **Reduction Strategy Development:** Using the community's baseline GHG footprint and emissions profile as a starting point, project team members will conduct an evaluation of the most promising GHG reduction strategies for the

- particular community. These strategies can include energy conservation, efficiency, and local/available renewable resources.
3. **Financial and Political Feasibility Analysis:** After identifying the most promising reduction strategies for the community, project team members will conduct an initial feasibility assessment of implementing those reduction strategies. As certain technologies can be more costly, while others might be more politically controversial, the analysis should center on “scenario playing.” In this way, the students can develop a strategic combination of technologies that optimizes the balance of the financial and political considerations.

SIGNIFICANCE

Navigating a carbon constrained future is a challenge for a number of communities and private entities for the following reasons:

- Emissions sources may be numerous and not well understood by those who are subject to GHG regulations or wish to participate in carbon trading markets.
- Options for GHG reduction involve many different technologies which have varying technical requirements, costs, and political constraints that may not be well understood by affected entities.
- The emerging national and state focus on climate change mitigation provides powerful incentives and opportunities for communities to make significant steps towards a more sustainable energy future.

The Bren project would contribute to the necessary emergence of a comprehensive GHG management approach that allows communities to meet the challenges and opportunities of the carbon constrained world.

BACKGROUND

The regulatory implications of climate change are developing rapidly within California and are already impacting both public and private entities. On April 13th 2007, the California Attorney General’s office sued the City of San Bernardino under the California Environmental Quality Act (CEQA) for failure to address climate change in its updated general plan. On December 2nd 2008, the California Air Resources Board enacted the *Regulation for the Mandatory Reporting of Greenhouse Gas Emissions*, requiring that all California facilities emitting over 25,000 metric tons of CO₂ report their annual emission totals to the state. Under AB 32, major rulemaking for reducing GHG emissions will be completed by January 1, 2011 at which time many public and private entities will need to implement steps to reduce their emissions the following year, beginning January 1, 2012.

While California has been the United States leader on climate change mitigation to date, the new Obama administration has sent clear signals that it intends to position the US as a leader on this pressing issue. Some of the key proposed initiatives include a federal cap and trade system for GHG reduction (as previously mentioned), a significant investment

in renewable energy, and the necessary accompanying upgrades to the electricity transmission system.

POTENTIAL STAKEHOLDERS

- AECOM Environment
- California communities/municipalities that are current CCAR members (possibilities include the City of Santa Barbara, Palo Alto or the City of Santa Monica).
- The county in which the community is located, in which renewable resource development might occur.
- Local land owners
- The California Air Resources Board
- The California Attorney General

APPROACH

The project will build upon the GHG modeling approach developed by AECOM Environment. AECOM will provide the Bren students with general guidance on the community GHG management approach utilized to date, including relevant protocols and data for baseline GHG inventories, some potentially helpful sources of energy efficiency and renewable energy data, and a general framework for detailed financial analysis. The students will then be responsible for analyzing the baseline GHG emissions of the chosen community, and gathering the energy resource and financial data necessary to develop a workable emissions reduction strategy.

The project will focus on developing an integrated GHG reduction strategy for a community with a GHG inventory that has been certified by CCAR and made available to the public. In developing this overall strategy, the students will explore the technical, political and financial viability of GHG reduction scenarios through the use of various technologies and incentives.

DATA

The GHG reduction scenario model will take into account the following data as part of a two phased approach:

Phase I – Baseline inventory

- A CCAR-certified GHG emissions inventory/energy use profile that can serve as a starting point for Phase II analysis (below).
- The annual metric tons of carbon dioxide equivalent (MT CO₂e) will be the baseline against which GHG reduction strategies will be defined.

Phase II – Reduction scenario planning

- Energy Efficiency (demand reduction below baseline)
- Energy Conservation (demand reduction below baseline)
- Renewable energy data (feasible and practical technologies)
- Energy Storage
- Financial Assessment; including capital costs, annual cash flows, payback and IRR analysis for the energy scenarios chosen.

Industry data for renewable energy technologies (solar, wind, geothermal, biomass, etc.) and energy efficiency improvements such as lighting upgrades will be used to determine the most feasible combination of reduction options for the specific community. Some possible sources of data are:

- The publicly available energy assessment tool RETScreen (developed by the Canadian government in participation with NASA)
- The National Renewable Energy Laboratory (NREL)
- The Database of State Incentives for Renewable Energy (DSIRE)
- Renewable energy manufacturers
- Energy efficiency contractors
- Energy research groups such as the Santa Barbara based Community Environmental Council, which has created sustainable energy strategy blueprint for Santa Barbara County.

DELIVARABLES

The project deliverables will include:

- A compilation of the GHG reduction strategies investigated, which will enhance AECOM's ability to help communities throughout California and beyond develop meaningful GHG reduction plans.
- A potentially excel-based modeling tool that is developed to assess the viability of GHG reduction scenarios over the course of the project.
- A strategic combination of GHG reduction strategies for the chosen community.
- A report that explains the methodology, as well as results and recommendations to the chosen community following assessments.

AECOM SUPPORT

AECOM will offer to a student member of the project team an internship as a employee at the Santa Maria, Camarillo or other Southern California office. The internship, anticipated to be a temporary full-time position, will have an estimated duration of 2 ½ months during the summer months. Up to twenty hours/week of this summer employment will be available for work on the student project. The employment will be subject to AECOM's conditions of employment.

REFERENCES:

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Keohane, Nathaniel. "Cap and Trade, Rehabilitated: Using Tradable Permits to Control U.S. Greenhouse Gases." *Oxford University Press*. 7 January, 2009.
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