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Community Greenhouse Gas Solutions

A Case Study: Ventura, CA

Masters Group Project
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Abstract

Partnering with AECOM Environment, this project will provide recommendations for effective strategies to reduce greenhouse gas emissions on a community scale. We will provide a menu of detailed reduction strategies such as building efficiency, renewable energy sources, and conservation practices. We will then build an Excel-based model to determine optimal combinations of the strategies, based on community-specific parameters. We will devise a method for assigning a metric to describe the political feasibility of each of the strategies, as well as the political will of the community, to be used as a final input for the model. A case study, using the city of San Buenaventura (Ventura), California, will be conducted to test the model and methods. The final report will provide a "toolkit" that encompasses detailed methods, geographic constraints, as well as financial and political feasibility in a series of scenario-based reduction strategies. The results of the study will provide recommended scenarios tailored specifically to Ventura.

Executive Summary

Climate change, the net warming of the Earth due to the build-up of greenhouse gases (GHG) in the atmosphere, is unequivocal and largely human-caused (IPCC, 2007). While this global problem requires global thinking, there is not time to wait for an international treaty to be ratified and implemented. This dilemma requires a bottom-up approach to climate change mitigation. For various reasons (regulation, political and community pressure, environmental stewardship, economics, energy security, etc), individual communities will be increasingly responsible for reducing their GHG emissions. The questions communities will ask are: What must we do? How do we do it? How much will it cost? While there have been sporadic and organized attempts to answer these questions, on the city- to regional-scale, there are currently few, if any, successful and widely applicable tools.

AECOM is a large international corporation with a common purpose — to enhance and sustain the world's built, natural, and social environments ("AECOM: About Us," 2009). AECOM's Environment branch offers critical in-depth knowledge of local and regional requirements in fields such as air quality, impact assessment and permitting, project management, water and natural resources, and specialty and emerging technologies ("AECOM: Environment," 2009). They see the future of development, in California and beyond, as necessarily considering GHG emissions. AECOM has developed a few basic tools to determine baseline emissions data and model reduction scenarios on a limited scope and scale. The major constraints they have identified are:

- 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, but these are numerous and varied

This Bren Masters group project will contribute steps towards a comprehensive GHG management approach that allows communities to meet the challenges and opportunities in a newly carbon-conscious world.

We will take three steps to address the above issues and develop a "toolkit" that can be used for community GHG emissions reduction:

- GHG Baseline Assessment: We will evaluate the baseline GHG footprint of San Buenaventura, California (Ventura) - 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.

- Reduction Strategy Development: Using the Ventura's baseline GHG footprint and emissions profile as a starting point, we will conduct a comprehensive literature review and evaluation of the most promising GHG reduction strategies for the particular community. This menu of strategies will include energy conservation, efficiency, and local/available renewable resources,.

- 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, we can develop a strategic combination of technologies that optimizes the balance of the financial and political considerations. These scenarios will be developed using a two-phase, Excel-based model that we design.

For Phase I of the model, we will use economics, through cost-benefit analysis and return on investment calculations, to determine the lowest cost reduction strategy. Phase II of the model will focus on a determined metric for political feasibility. Political feasibility will be the most difficult and abstract aspect to quantify, but we plan to do just that. Using a variety of data, including elected officials' voting record, citizen involvement in environmental events, number of environmental NGOs, number of industry interest groups, environmental legislation history and voting trends, and possibly a survey, we will quantify political feasibility on a graduated scale. After developing a menu of reduction strategies and scenarios, taking geographic and economic constraints into account, we will input the political feasibility metric for the model.

Ultimately, the Bren Group will provide to the client, AECOM, the following products:

- A "toolkit" that includes:
    - Detailed methods and procedures for calculating the baseline, evaluating reduction strategies, utilizing the two-phase model, and delivering recommendations.
    - A menu of all GHG reduction strategies investigated, which will enhance AECOM's ability to help communities develop meaningful GHG reduction plans
    - A potentially Excel-based modeling tool that is developed to assess the viability of multiple GHG reduction scenarios
- A Final Report that will include, in addition to the above items and the Ventura case study, below, detailed methods and approximate hours necessary to complete each step of the project.

In addition to AECOM, the following products will also be presented to the Ventura Community Development Planning Division and the larger Tri-County and Bren Community:

- A strategic combination of possible GHG reduction strategies specifically for Ventura
- A report and presentation that explains the methodology and assumptions, as well as results and recommendations for the Ventura case study.

It is our hope that the toolkit will be robust and applicable to nearly any community. We will be working in tandem with a Chinese PhD student who is undertaking a similar project for the Wuxi community. Our Final Report will include a discussion of the similarities and differences of the two projects, regions, and results. Additionally, we hope that our results and recommendations for the Ventura case study are helpful to, and used by, the Ventura Planning Department.

Introduction

Climate Change, due to increased greenhouse gas (GHG) levels, largely from anthropogenic sources, is a scientifically accepted problem of increasing magnitude. The atmosphere, a common-pool resource shared by everyone on Earth, is suffering from Garret Hardin's Tragedy of the Commons (Hardin, 1968). Each exploiter of the commons – a person, city, state, region, or country - adds incremental amounts of GHGs to the atmosphere, generally not thinking about their effect on the global atmosphere. Economic theory would argue that individual users of the commons do not have incentive to reduce their exploitation for the good of the whole without an agreement to do so that is binding on all commons users (Engel, 2005). Due to the United States' refusal to participate in the Kyoto Protocol, a binding international agreement to reduce GHG emissions, and lack of explicit national regulation of GHG emissions, individual cities and states have begun to take the challenge of mitigating GHG emissions on their own accord.

The driving force behind the desire to reduce emissions may lie in economics, regulation, environmental stewardship, political or community pressure, and varies from location to location. No matter the motivation, reducing GHGs is a large undertaking in primarily uncharted legislative and implementation territory. To aid in the transition to low-carbon communities our Bren Group Project will work with the environmental branch of our client, AECOM, to develop a customizable "toolkit" that can be used to provide community-scale emissions reduction scenarios based on current emissions data and reduction goals. The toolkit will include detailed methods and a model that will uniquely take into account economic and political feasibility. We hope that the model developed will be applicable to any community that either has the necessary inputs or determines them through the detailed methods that will be outlined in our Final Report.

We have chosen the city of San Buenaventura (Ventura), California as a case study to test our methods and model. Ventura is a member of the California Climate Action Registry (CCAR) and has shown a high level of political will to reduce the community's GHG emissions. Our research and modeling efforts will allow us to deliver a comprehensive report to AECOM, with the toolkit that includes our methods, model, detailed reduction strategies, and the Ventura case study. AECOM sees the future of development, in California and across the globe, giving increasing consideration to GHG emissions. We will supply the city of Ventura Planning Department with our results and recommendations in the hope that they will be considered in current and future City plans.

This project will guide communities, regardless of their size, location, economics, and political willpower, in their efforts to reduce GHG emissions. Communities have the power, with or without overarching legislation, to aggregately mitigate climate change.

Objectives

The objective of this project is to develop a comprehensive GHG reduction toolkit for communities. Ventura will be used as a case study. This project will require our group to assess a baseline for our target city and study possibilities based on political, economic, and geographic contexts. We will ultimately provide recommendations for improving the greenhouse gas emissions of San Buenaventura, California and a toolkit to assist in recreating the process in other communities. Over the duration of our project, our research will complete the following objectives listed under three major categories in relation to our methodology:

1) Baseline Greenhouse Gas Inventory
   a) Calculate a baseline of emissions for San Buenaventura, California
   b) Create a set of procedures to make this reproducible for other cities

2) Emissions Reduction Strategies
   a) Conduct a literature review of possible reduction strategies
   b) Design a model to project multiple reduction scenarios using baseline emissions data

3) Political and Economic Feasibility
   a) Assess the local politics of the region, city, and citizens therein
   b) Perform a cost-benefit analysis for economic strategies
   c) Incorporate feasibility information with the reduction scenarios to create a more robust model

4) Recommendations and Deliverables
   a) Use the information collected and the model developed to make suggestions for reduction strategies specific to Ventura
   b) Create a toolkit of methods and procedures that can be applied to other communities

Significance

As public discourse and political agendas have increasingly addressed the issue of climate change mitigation, the question has now become how to act? Local and state-level governments will likely be subject to new regulations forcing them to account for and lower their greenhouse gas emissions. Climate change is likely to be the driving force behind several regulations that will dramatically shape California's urban and economic landscapes over the next decade and beyond.

The amendments to the California Environmental Quality Act (CEQA) and Global Warming Solutions Act of 2006 (AB 32) are both examples of regulations that will substantially change California's future development and economic operations. On the national level, a federally controlled cap-and-trade system appears likely and will create new markets for greenhouse gas emissions (GHG) trading. These regulatory, political, and moral drivers have increased the desire of many communities and other entities to develop strategies for GHG reductions that will result in a more sustainable energy future and allow them to remain ahead of the curve, rather than waiting for federal legislation to mandate changes.

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. Additionally, the political will to act is a necessity at this stage of regulations. The benefit of this project will be to set up a toolkit for helping communities to assess their current GHG emissions and strategies to reduce them. By targeting Ventura as a case study, a real city can be used to show the potential for such suggestions. Climate change is a global phenomenon but one that must be tackled locally in every place where humans dwell. Communities must become more sustainable sooner rather than later. Using our education and experience, along with guidance from Bren faculty and environmental professionals, while working with AECOM Environment, we hope to build a significant step towards low carbon societies.

Literature Review

Legislative Motivation: *Communities will be tasked with implementing current and future legislation to curb greenhouse gas emissions. Strategies for obtaining emissions reduction are valuable for local planning departments.*

California's Global Warming Solutions Act of 2006 (AB 32) establishes a near-term greenhouse gas reduction goal of reducing to 1990 emission levels by 2020. The California Air Resources Board (CARB) created a scoping plan for AB 32 that relies on local governments for implementation. Local government is given authority and responsibility for housing, zoning, and transportation planning (CARB, 2008). Further legislation has been passed to help achieve the goals of AB 32.

California's Senate Bill 375, signed into law in September 2008, links regional transportation planning with greenhouse gas reduction. CARB has estimated a 5 $MMTCO_2e$ reduction target for the entire state (CARB, 2008). Each region is represented by a Metropolitan Planning Organization (MPO), and will be assigned a greenhouse gas reduction target, for the years 2020 and 2035, by CARB. The 18 MPOs throughout California will be required to develop a Sustainable Communities Strategy (SCS) as part of their Regional Transportation Plans (SB 375, 2008). Each SCS will be reviewed by CARB to ensure that the GHG reduction target can be met. State transportation funds will be given priority to those regions that have completed their SCS. For additional incentive, SB 375 provides California Environmental Quality Act (CEQA) exemptions and streamlining for projects that conform to the new regional plans, even if they conflict with local plans (SB 375, 2008).

California's Senate Bill 97 requires the Governor's Office of Planning and Research to create CEQA guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions (SB 97, 2007). Many groups have already started including GHG effects in their Environmental Impact Reports, however, under SB 97 this is an enforced requirement.

A 2007 lawsuit filed by the State of California against San Bernardino County - for failing to incorporate climate change into its blueprint for growth - shows that California is serious about its commitment to effective climate change legislation and will nullify growth plans that fail to include emissions reduction strategy (Reiterman, 2007).

The centerpiece of state climate change legislation, AB 32, only applies to California. However with Barack Obama in the White House and Rep. Henry Waxman, a Californian, heading the Energy and Commerce Committee, it appears AB 32 will be "a scale model of the national system" (Doniger, 2009). In fact, Waxman has co-authored the prominent federal climate change bill, the American Clean Energy and Security Act, with Markey (head of the key Subcommittee on Energy and the Environment), and they have pledged to complete work on a bill by Memorial Day 2009 (Doniger, 2009). Speaker Nancy Pelosi has promised action by the full

House of Representatives later this year (Doniger, 2009). The new administration in the White House has encouraged the EPA to take action against climate change and the Agency has quickly responded. In March 2009, the EPA proposed a Mandatory GHG Reporting Rule, which is currently open for public comment (EPA, March 2009). Additionally, EPA Administrator Lisa Jackson has stated that they will be reconsidering California's waiver to regulate GHG emissions from automobile tailpipes (EPA, February 2009). The waiver was denied in December 2007.

Focusing on AB 32, and California's other climate change legislation, will allow this project to, at least, address GHG mitigation required in California. The models and plans developed will ideally be compatible with federal legislation, likely to be passed during the course of the project.

Motivation for Ventura, CA Case Study: *Ventura has created a Post Peak Oil Plan, which includes many low carbon solutions. However, in light of current and forthcoming legislation, California communities need concrete strategies for meeting goals in the short-, medium-, and long-term.*

California's climate change legislation has tasked communities with implementation of greenhouse gas reduction measures, however, many cities, communities, and counties do not yet have concrete plans for reaching the reduction targets outlined in the legislation. The California Governor's Office of Planning and Research has gathered a list of the cities and counties that have made commitments to addressing climate change and as of 2008, neither the City of Ventura nor Ventura County is included on the list (OPR, 2008). Although Ventura has made significant efforts toward developing plans for a sustainable community and reducing greenhouse gas emissions, they still lack a cohesive strategy to achieve the goals of California's climate change legislation.

In 2007, researchers in the Department of Landscape Architecture at California State Polytechnic University, Pomona collaborated with the City of Ventura to create a plan for transforming urban environments for a Post-Peak Oil future in 2050. The plan outlines the current systems in place in the city with regards to water, food, energy, mobility, among other areas, and describes the need to alter these systems in order for the community to thrive in a society without oil. The plan focuses on city planning efforts, behavioral changes, energy efficiency, and limited use of renewable energies (Chen et al. 2007).

Although the Post-Peak Oil plan provides many strategies for creating a sustainable community free of a dependency on oil, it is limited for addressing current and forthcoming greenhouse gas reduction legislation in California. The strategies are focused on achieving goals by the year 2050, while much of the current legislation has deadlines in 2012 and 2020. Further, the economic and political feasibility of the strategies are not addressed in the Post-Peak Oil plan. Economics and politics are two critical elements of the planning process for addressing greenhouse gas emission reductions that must be included in an analysis of potential strategies for reduction.

Also in 2007, the City of Ventura released an administrative report detailing the plans behind the "Green Initiative" for the city. The "Green Initiative" takes an inventory of all environmental services in the city and recommends changes to the services that improve the environmental sustainability of the city. With regards to greenhouse gases, the "Green Initiative" makes limited recommendations and acknowledges that the level of implementation for the changes recommended is low (Calkins, 2007).

There is also more up-to-date information available since 2007 when these plans were completed. The Cali-

fornia Air Resources Board has approved the AB 32 Scoping Plan that details implementation for the Global Warming Solutions Act of 2006. SB 375 was signed into law in 2008. Both of these pieces of legislation will direct the timeline and reduction targets for the community's strategies for addressing greenhouse gas emissions.

The City of Ventura has made some efforts to address greenhouse gas reductions, however the city still needs a concrete set of strategies that are economically and politically feasible. All cities in California will, similarly, require strategies for their respective community. Ventura is representative of many California communities, so the strategies developed for Ventura can be applied to other communities with limited adaptations.

Energy Reduction and Efficiency Strategies: *Strategies to reduce emissions include energy efficiency, increase in use of renewable energy, building efficiency, green city planning and behavioral changes.*

Energy conservation and efficiency strategies for the reduction of GHGs are vast and dynamic. New ideas and technologies continuously expand on the various possibilities in GHG reductions and climate change mitigation. Renewable energy sources, building efficiency, green city planning and behavioral changes are the key members of a narrow list of categories for a broad range of strategies that exist. An important aspect of analysis is the determination of strategies that best fit a particular region. Expanding knowledge on the strategies available and then understanding regional variability of the city of Ventura, CA will allow us to determine the best possible strategies based on political and economic feasibility.

Renewable energy technologies are consistently expanding. Potential directions in renewable energy include: on and off shore wind power, solar photovoltaics, wave and tidal, hydroelectric, and geothermal power, as well as biofuels (Lund). Technologies in this wide range of possible energy sources can be utilized in the Ventura case study. Conjecture on technology direction and general political feasibility of competing energy options can be applied to fit a community's geographic and political needs (Lewis & Wiser, 2007). De Vries et al. (2009) offer specific cost modeling of solar, wind, and biofuel resources over time, providing context for economic feasibility analysis of three key renewable sources.

Community-owned wind turbine farms may be an important aspect to reaching such prominence in European nations and may contribute to increased adoption rates in the US (Bolinger, 2009). Tidal energy is also a possibility for a coastal community such as Ventura (Khan et al, 2009). Solar photovoltaic energy can be utilized either as distributed to individual property owners or leased property on top of commercial real estate as in popular with Clean Renewable Energy Bonds (CREBs) (Cory et al, 2008). Aforementioned articles include expected costs and expenditures along with payback periods.

Green city planning is an important cost-effective way to reduce GHG emissions and enhance overall appeal of a city. City Manager Rick Cole has promulgated and implemented some mixed-use, green planning in Ventura, however these strategies have not been assessed in the context of forthcoming greenhouse gas reduction requirements. Further promotion by city officials of green transportation options and strategic marketing techniques can offset large numbers of GHG emissions (Taniguchi & Fujii, 2007). Establishing a cost and reductions estimate for green planning will allow us to quantitatively examine the effectiveness.

Conservation, through behavioral changes, is perhaps the most important strategy to reduce GHG emissions, yet the most difficult to achieve and quantify. Numerous strategies exist that are easy to implement,

and if the information is accessible may promote some social change (Weizsacker et al, 1998). Further information on economic incentives to conservation is found in the section on Economic Feasibility below.

Each of the strategies: renewable energy, building efficiency, green city planning, and behavioral change are integral to reducing GHG emissions. Understanding the geography, economy, and political temperature of Ventura will provide relevant insight into which strategies to focus on.

Economic Feasibility: *Capital needs for renewable projects, rate of return, incentives, rebates (electricity generation, home/building and industry efficiency, vehicle upgrades), electricity infrastructure (aggregate, community choice, etc).*

Despite regulation, a major factor that will determine whether or not deadlines are met is the economic feasibility of implementation. With California's seemingly continuous budget crisis, new environmental initiatives are often looked at as too expensive for current implementation and are relegated to the future. Economic modeling can be done to show payback periods and certain models can entice community adoption of community-scale "wind farms" while also creating tax breaks for certain collaborative groups (Bolinger et al, 2004). Ventura has a specific geography that should be taken into account for two major reasons: as a coastal community, it has lower than average heating, ventilating, and air conditioning (HVAC) requirements and greater than average renewable energy potential. Per capita electricity consumption in coastal Southern California is also lower, due in part to these lower averaged HVAC needs ("California State Energy Profile," 2009).

California has had historically high and volatile energy prices with drastic measures taken in the past to alleviate demand pressures, as evidenced in the 2000 and 2001 blackouts (Wolcott, 2001). Combining energy efficiency and conservation with renewable energy projects can stabilize end user energy prices while reducing emissions.

Conservation of energy will fall largely with economic incentives and legislation that backs it up. An analysis on market incentives to promote behavioral change can direct strategies of conservation (Spees & Lave, 2007). Furthermore, existing Community Choice Programs allow for communities to cooperatively take action prompting social change ("Community Choice," 2009). Multiple advocate groups have worked up legislative plans that tie in economic incentives such as the Architecture 2030 group led by Ed Mazria (Mazria, 2009). A community such as Ventura does have the ability to support conservation through tax incentives in addition to those provided at the federal and state level, but would do better to collaborate with the larger bodies of government.

Political Feasibility: *Political feasibility of emissions reductions in each of the five sectors: city municipality, residential, industry, transportation, and renewable energy.*

The quality of environmental programs must include political as well as economic variables. In a 1996 study, environmental spending was not found to be related to the quality of environmental programs (Agthe & Billings, 1996). The focus of this project is not the political feasibility of legislation, but rather the political feasibility of reduction techniques.

The transition to a low-carbon society can be broken into five sectors: city municipality, residential, industry,

transportation, and energy production. Each of these sectors presents specific political considerations:

Municipality

The level of interest that cities and states express in regards to climate change action can be gleaned from readily available sources. The League of Conservation Voters has a scorecard that ranks state and national congressmen based on their environmental voting record ("2008 National Environmental Scorecard," 2009). States that are members of the Clean Energy States Alliance CESA are "actively supporting the deployment of clean energy technologies such as solar PV, wind, biomass and fuel cells; they are driving renewable energy markets in the U.S. by investing hundreds of millions of public dollars each year to stimulate the technology innovation process and moving clean energy out of the laboratory and toward wider use and application in business, residential, agricultural, community and industrial settings" ("Clean Energy States Alliance," 2009). The Cities for Climate Protection (CCP) aids cities in adoption of policies and implementation plans to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability ("ICLEI - Local Governments for Sustainability : our members," 2009). More than 700 local governments participate in the CCP, integrating climate change mitigation into their decision-making processes.

Building Efficiency and Weatherization

There is a myriad of Federal and State efficiency and weatherization programs and incentives. Besides contacting local utility companies and state energy agencies, there are sources that compile this information: Database of State Incentives for Renewables & Efficiency ("DSIRE: DSIRE Home," 2009), Business.gov ("State and Local Energy Efficiency Programs | Business.gov," 2009), and the U.S. Department of Energy ("State Energy Alternatives: Tax Incentives," 2009).

Industry

Industry emits GHGs both indirectly through power consumption, and directly through the on-site burning of fossil fuels or as a result of a specific industrial process (i.e. cement manufacturing). The political feasibility of reducing industry emissions will vary depending on the industries in question. Regulations aside, businesses are more heavily influenced by economics than policy. Much of the necessary reduction can be achieved through successes in other sectors. Renewable energy will reduce or eliminate indirect emissions. Efficiency, as discussed above, can also be applied to industries. Opportunities for greenhouse gas reduction include: on-site power production, cogeneration, closed-loop processes, enhanced recycling, and increased efficiency of physical processes.

Feasibility of Transportation and Land-use

Vehicle emissions can be reduced through increased efficiency, decreased carbon content of fuel, and reduced vehicle miles travelled (VMT). California is the only state fortunate enough to have the ability to apply for a waiver from the federal standards to set vehicle emissions standards (efficiency) at stricter levels (Clean Air Act). The current administration, however, has announced new Corporate Average Fuel Efficiency (CAFÉ) standards that are just as stringent as the California standard. Cleaner fuels, those with less life-cycle carbon content, are currently the most actively pursued method of vehicle emissions reduction on the national and state level (Shepardson, 2007, Shaheen & Sperling, 2001). Though clean fuel mandates are gaining traction, some states still have political barriers. In Arkansas, legislation to require all diesel to have 5% biodiesel content was voted down in the Joint House and Senate Energy Committee. Reduction in VMT is a behavioral change and faces the largest political barriers. There is non-binding language in the Clean Air Act that requires development and traffic planning to reduce VMT and California has passed legislation (SB 375) to require carbon emissions to be addressed in regional transportation plans. Smart growth, through well-

designed master plans and zoning ordinances will play the largest role in this conservation aspect of vehicle efficiency. Current master plans, zoning, and public transportation systems must be explored, at the individual city level, to determine the level of emissions reductions that may be attained through reduction in VMT.

Renewable Energy Production

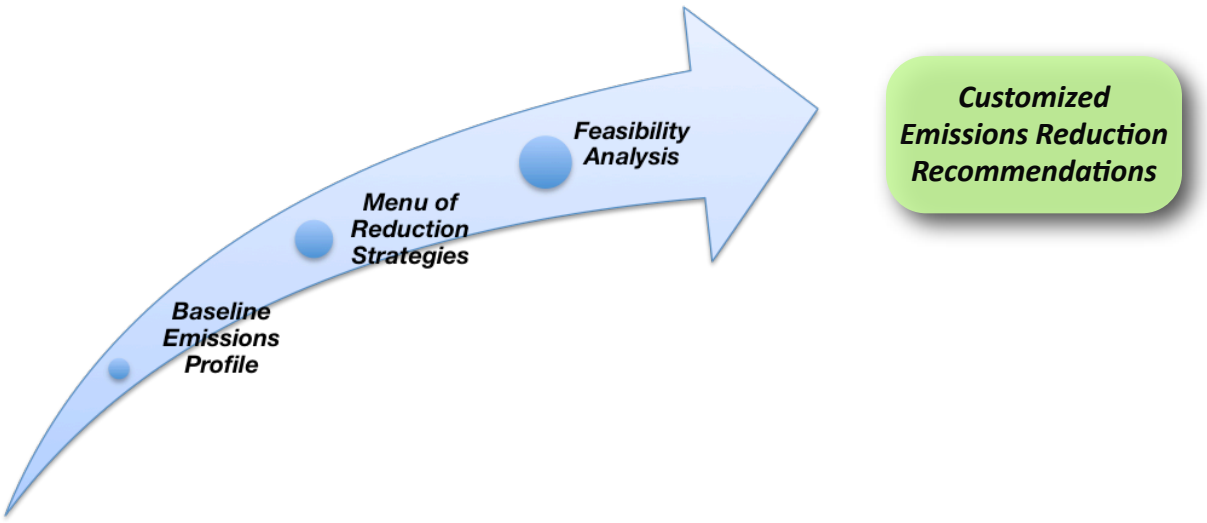
Even with economic and geographic conditions that are conducive to renewable energy development, some states and communities will be more favorable to renewable energy development than others. For example, Wyoming has a state law prohibiting mandatory GHG emissions reductions due to coal industry influence (Fershee, 2007). California was the wind-energy leader for years, but both Texas and Iowa have become the number one and two wind-energy producers in the country (Galbraith, 2009), despite their generally poor environmental track record.

Political Feasibility in Ventura

The City of Berkeley's Climate Action Plan (BCAP), a conceptually similar project, lists numerous strategy recommendations for emissions reduction, including sustainable transportation and land use, building energy use, waste reduction and recycling, and community outreach and empowerment. While these strategies could be useful for other communities as well as projects like ours, Berkeley enjoys an environmental political advantage over a vast majority of communities, even within the historically environmentally minded state of California. 81 percent of voters passed Berkeley's Measure G in November 2006, advising the Mayor to develop and implement a plan consistent with 80 percent GHG emissions reduction by 2050. The ballot included the language, "Financial Implications: Unknown costs, plan dependent," and still garnered over four fifths of community support (BCAP, 2009). This overwhelming support for a climate action plan is unparalleled, and provides optimism to Berkeley environmentalists, as far as political feasibility is concerned.

Ventura, unfortunately, will likely not enjoy the same unequivocal support for drastic community action to combat climate change. Compared to Berkeley's Alameda County, which registered 58% Democratic and 15% Republican voters in February 2009, Ventura County is much more politically diverse, with 40% Democratic and 37% Republican voters (CA Secretary of State, 2009). This project will equip communities with tools to address political feasibility and uncertainty in the earliest stages of climate action planning, so as to pursue strategies that will not only reduce emissions on paper, but brave political processes and cater to local interests in ways that will benefit the community and the environment alike.

Methods



1) Baseline Emissions Profile - City of San Buenaventura
   a) Stationary Sources
      i) Community Purchased Energy Sources: Electric and Natural Gas
         (1) Obtain citywide annual gas consumption data from Ventura's Director of Environmental Services
            (a) Utilize ICLEI software to calculate GHG footprint by applying Gas Company data and census data to associated emissions
         (2) Obtain annual electricity consumption from Ventura's Director of Environmental Services
            (a) Utilize ICLEI software and EPA eGrid algorithm to calculate GHG footprint by applying electricity generation data from Southern California Edison power production.
      ii) Municipality Energy Usage
         (1) Utilize current CCAR data to obtain emissions data
   b) Mobile Sources
      i) Utilize EMFAC software to calculate vehicle GHG emissions footprint within the City of Ventura
   c) Rogue Emissions
      i) Investigate presence of industries prone to fugitive emissions (i.e., chemical manufacturing, electrical services, petroleum)
         (1) Data collected from census
      ii) If present, obtain actual emissions data from CCAR or, if unavailable, estimate rogue emissions using industry intensity and company output.

2) Identification of Emissions Reduction Strategies
   a) Literature Review of Potential Strategies
      i) Renewable Energy Sources
         (1) Solar, Wind, Geothermal, Tidal
      ii) Efficiency
         (1) Technology upgrades and innovations
         (2) Green building and city planning
      iii) Conservation
         (1) Promotion of reduced resource use
            (a) Incentive programs, Non-profit campaigns, Community events
   b) Mapping of Ventura using GIS- comparing location with technology needs
      i) Land-use Classification
         (1) Agriculture, Commercial, Industrial, Residential
      ii) Data Sources
         (1) NREL, TruWind Solutions, CARB, USGS, ESRI

3) Bridge between Strategies and Feasibility
   a) Utilize baseline estimates and reductions strategies to establish potential reductions scenarios
      i) Potential reductions scenarios will be based on three levels of reduction; low, medium, and high
         (1) Scenarios will be established by selecting percentage reductions and deadlines that correspond with current and expected climate policy.
         (2) The relative contribution of each reduction strategy will be determined through the mapping and analysis of the city and its demographics.

4) Feasibility
   a) Economic Feasibility
      i) Run a cost benefit analysis of each reduction scenario
         (1) Calculate costs of each reduction scenario
            (a) Market incentives can reduce total cost
            (b) Calculate timeline for pay off
               (i) Short pay back times (5-10 years) preferable
         (2) Estimate benefits of each reductions scenario
      ii) Assess additional strategies to make reductions economically feasible
         (1) Incentives
            (a) National
            (b) State
            (c) Local
   b) Political Feasibility
      i) Establish political mood of constituents based on three metrics
         (1) Elected officials' voting records
            (a) League of Conservation Voters score of National Legislature Representatives
            (b) California League of Conservation Voters score for State Legislature Representatives
            (c) City Voting Records
            (d) Number of climate change laws passed by state/city
         (2) Contingent Valuation method to determine engagement

(a) Number of environmental NGOs and degree of public participation
(b) Number and type of industry lobby groups
(c) Levels of involvement in environmental events
(i) Earth Day, ride bike to work day, etc.
(3) Survey of community residents
(a) 10-15 questions relevant to any city or community
(b) Assess willingness to invest city resources/change behavior
ii) Assign weight to each metric and incorporate into reduction scenarios
iii) Based on political mood established, determine feasibility of each reduction scenario.
iv) Identify additional steps that community can take to make reduction strategies more politically feasible

5) Present customized emissions reduction strategy recommendations
a) Reduction strategies most feasible for the community in question:
i) Geographically
ii) Financially
iii) Politically
b) Low, medium, and high reduction scenarios may employ different strategy combinations
c) Results are contingent on model inputs, which are adjustable for:
i) Technological advancement
ii) Changes in price points
iii) Dynamic political mood

Deliverables

The Bren Group will provide to the client, AECOM, the following products:

- A "toolkit" that includes:
  - Detailed methods and procedures for each step and "tool"
  - A menu of all GHG reduction strategies investigated, which will enhance AECOM's ability to help communities develop meaningful GHG reduction plans
  - A potentially Excel-based modeling tool that is developed to assess the viability of multiple GHG reduction scenarios
- A Final Report that will include, in addition to the above items and the Ventura case study, below, detailed methods and approximate hours for each step of the project.

In addition to AECOM, the following products will also be presented to the Ventura Community Development Planning Division and the larger Tri-County and Bren Community:

- A strategic combination of possible GHG reduction strategies specifically for Ventura
- A report and presentation that explains the methodology and assumptions, as well as results and recommendations for the Ventura case study.

Milestones

Spring 2009

- Create website, www.BrenAECOM.org
- Conduct a preliminary, but expansive, review of relevant literature
- Prepare and present the project Proposal to our Advisory Committee on June 5, 2009 at 11a
  - Present Proposal for peer feedback on May 19
  - Submit draft Proposal to Project Advisor and Christina Tague on May 22
  - Submit Proposal to Advisory Committee on May 26
- Begin collection and estimation of baseline emissions data for Ventura, methodically recording our procedures

Summer 2009

- Aaron will complete an internship with AECOM, dedicating up to 20 hours/week to the Group Project
- All group members will continue independent literature review and stay in contact with Aaron to aid him in Project-related work with AECOM
    - Begin development of reduction scenario model
    - Complete baseline emissions assessment of Ventura – September 15, 2009

Fall 2009

- Develop Phase I of the model to determine least cost emissions reduction scenarios
- Input Ventura baseline data to produce a series of reduction scenarios, using various combinations of reduction strategies.
- Conduct extensive economic and political feasibility research
    - Develop metrics for economic and political feasibility to be fed into Phase II of the model
    - Conduct a survey of Ventura residents to assess the economic and political climate
- Begin writing Final Report, creating Keynote Presentation, and working on Project Poster
    - Methods, literature review, baseline, model Phase I
- Submit self and peer evaluations to Faculty Advisor

Winter 2010

- Discuss evaluations
- Complete economic and feasibility research using results from the survey
- Input economic and political metrics for Phase II of the model
    - Determine the most feasible scenario for Ventura
- Complete first draft of Final Report, Presentation, and Poster – 2 weeks before defense
    - Submit to Oran and Advisory Committee
    - Receive back in one week, incorporate feedback before defense
- Defend project
- Incorporate Defense feedback and submit draft of Final Report, Presentation, and Poster to Oran and Advisory Committee
- Submit information for Group Project Presentation program
- Submit Final Report, project brief, and project poster

Spring 2010

- Project Presentation

Management Plan

POSITION	NAME	CONTACT	ROLES
• Modeling Specialist • Communications Manager • Data Assistant	**Michael Conrardy**	mconrardy@bren.ucsb.edu	• Work with the client to research and employ any models that are used, and convey this information to the group • Manage our email alias (aecom@bren.ucsb.edu) and act as primary source of contact for the group • Assist Justin with data
• Data Manager • Model Building	**Justin Whittet**	jwhittet@bren.ucsb.edu	• Manage, store, relay, and request data • Coordinate with Michael regarding data
• Financial Manager • Minutes	**Allison King**	aking@bren.ucsb.edu	• Manage finances • Take minutes at meetings
• Web Manager • Internship Coordinator	**Aaron Sobel**	asobel@bren.ucsb.edu	• Create and manage our website (www.BrenAECOM.org) • Complete summer internship with AECOM
• Project Manager	**Gavin Feiger**	gfeiger@bren.ucsb.edu	• Coordinate meetings • Create agendas • Ensure timelines are set and enforced
• Faculty Advisor	**Oran Young**	young@bren.ucsb.edu	• Oversight and guidance

Meeting Structure

We will be having weekly meetings, all group members and our advisor are expected to attend unless prior arrangements have been made. Meeting times will be determined for each academic quarter at a universally acceptable time. Meetings will take place in Bren 4526. An agenda will be prepared by the Project Manager, with everyone's input, and emailed to our advisor and client, giving the client the option of attending in person or via conference call.

System to Ensure Deadlines are Met

Deadlines will be set in accordance with the "Milestones" section of this proposal. During the weekly meetings, individual group members will select assignments and be responsible for their completion by the corresponding deadline. If a group member will not be able to complete the assignment by the deadline, they must inform the group as soon as possible and suggest a solution. Group members are expected to take a

professional and proactive approach – only agreeing to assignments and deadlines that are feasible and informing the group if they are going to need a temporarily lighter work load, during a particularly busy week for example.

Procedures for Group Data and File Management

We will be using DropBox as our primary method of file sharing. This will include: meeting minutes, all data, financial records, relevant literature, etc. We will be using Corporate Time to schedule meetings with Oran and reserve meeting rooms if Bren 4526 is not available. We will be using Google Calendar to coordinate amongst ourselves and we will have a shared Google calendar on our website.

The website will also include: an internal blog, external blog, group member biographies, meeting minutes, progress reports, and more features as needed. We will also use the website to keep track of hours spent on each of the project steps to supply to AECOM.

References will be organized and cited using Zotero. We have discussed and coordinated aspects of writing style, such as: character spacing, outlining format, sentence structure, font, citation format (APA), and document formats (Word.doc).

Group Dynamics and Conflict Resolution

In addition to our structured weekly meetings, we will hold informal meetings, at least once a month, generally including group members only, as a way to build a strong relationship and discuss group dynamics. Openness and honesty will be the foundation of our group and we will be very proactive about avoiding, and dealing with, conflicts or disagreements.

If conflicts do arise between individual group members, the people involved will be encouraged to candidly discuss the issue between themselves. If additional group members are involved, it must occur in an open and unbiased way.

Additionally, at the end of Fall quarter 2009 we will submit self and peer reviews to our Faculty Advisor. These will be made available to the entire group after consultation with Oran. If issues that are significant and/or may create bad feelings are exposed, those passages will be omitted from the shared results and the issue(s) will be dealt with on an individual basis. A final round of self and peer evaluations will be conducted upon completion of the Final Presentation.

Overall Expectations

All group members are to act in the professional and responsible manner expected of a graduate student and environmental professional. This includes: attending meetings, contributing high quality work, achieving goals and deadlines, maintaining flexibility, encouraging individual leadership, and fostering a healthy and fun working environment. The successful group project will reflect the high quality of individual and collective work and the exceptional guidance from our advisors and the Bren community.

General Group Project Guidelines can be downloaded from the Bren website, for the public, or found on our internal blog, for the group members.

Opportunities for Links with Outside Agencies and Advisors

California Climate Action Registry
www.climateregistry.org
The California Climate Action Registry (CCAR) is a voluntary greenhouse gas registry. They provide accurate and consistent reporting standards or greenhouse gas emissions for organizations.

City of Ventura
www.cityofventura.net
Joe Yahner, Environmental Services Office
Rick Cole, City Manager
The city of Ventura Planning Department is very interested in working with us and considering our methods, results, and recommendations. They will be helping us gather baseline emissions data, assess political feasibility, answer general questions about the city, and Joe will be a member of our Advisory Committee

ICLEI – Local Governments for Sustainability
www.icleiusa.org
ICLEI – Local Governments for Sustainability is a membership organization of over 500 US local governments committed to climate protection and sustainability. They provide tools for local governments to conduct internal and community-wide greenhouse gas inventories and develop climate action plans.

Ventura County Regional Energy Alliance
www.vcenergy.org
The Ventura County Regional Energy Alliance is composed of public agencies working in collaboration to approach the availability, reliability, conservation, and innovative use of energy resources in the Ventura County region.

Companion Project in Wuxi, China
Lingxuan Liu
Research Assistant & PhD candidate
School of Environment, Nanjing University
Center of Env. Management & Policy

Lingxuan is heading a similar project, focusing on the Wuxi community in Nanjing Province, China. The two projects will be sharing our progress and deliverables. While this is only a small part of our project, and will demand very little time, the comparison will be an interesting and useful section of our Final Report. See the public blog section of our website for a brief synopsis of the Wuxi project.

Contact Information

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