UCSB Utility & Energy Services

UCSB Sustainability

# UCSB
# 2012 CLIMATE ACTION PLAN

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Administrative Services

- Marc Fisher, Senior Associate Vice Chancellor
- Ron Cortez, Associate Vice Chancellor, Co-Chair of Campus Chancellor's Sustainability Committee
- Jasmine Syed, Campus Sustainability Coordinator

Budget and Planning

- Terry Macy, Senior Facilities Planner
- Steven Velasco, Director of Institutional Research

Bren School of Environmental Science & Management

- Sougandhica Hoysal, Climate Action Intern

Campus Planning and Design

- Mark Peppers, Project Manager, Design and Construction Services
- Alissa Hummer, Acting Director Campus Planning and Design
- Shari Hammond, Senior Planner

College of Creative Studies

- Bruce Tiffney, Dean, Co-Chair of Campus Chancellor's Sustainability Committee

Department of Geography

- Mo Lovegreen, Executive Officer
- Katie Maynard, Sustainability Coordinator

Division of Student Affairs

- Bill McTague, Executive Director
- Bill Shelor, Sustainability Planner

Environmental Health & Safety

- Stacey Calloway, Environmental Compliance Specialist

Housing and Residential Services

- Mark Rousseau, Environmental & Energy Manager
- Barry Colwell, Resource Planning Coordinator

Utility & Energy Services

- David McHale, Associate Director of Energy and Utilities
- Jordan Sager, LEED Program Manager

Reviewing Committees

- Chancellor's Campus Sustainability Committee
- Academic Senate

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# 1 EXECUTIVE SUMMARY

In March 2007, University of California (UC) President Robert C. Dynes signed the American College and Universities Presidents Climate Commitment (ACUPCC) on behalf of all UC Chancellors. ACUPCC membership requires development of a Climate Action Plan to establish strategic Greenhouse Gas (GHG) reduction measures as well as set a target date for climate neutrality.

The UC Policy on Sustainable Practices sets system-wide policy guidelines and implementation procedures for environmental impact minimization and operational sustainability, including the following provisions regarding Climate Protection Practices:

- With an overall goal of reducing GHG emissions while maintaining enrollment accessibility for every eligible student, enhancing research, promoting community service and operating campus facilities more efficiently, the University will develop a long term strategy for voluntarily meeting the State of California's goal, pursuant to California Assembly Bill 32 (AB32), *The California Global Warming Solutions Act of 2006* that is, by 2020 to reduce GHG emissions to 1990 levels.

- The University will pursue the goal of reducing GHG emissions to 2000 levels by 2014.

- The University will develop an action plan for becoming climate neutral which will include: a feasibility study for meeting the 2014 and 2020 goals (and) a target date for achieving climate neutrality as soon as possible while maintaining the University's overall mission. Climate neutrality means that the University will have a net zero impact on the Earth's climate, and will be achieved by minimizing GHG emissions as much as possible and using carbon offsets or other measures to mitigate the remaining GHG emissions.

In accordance with these initiatives, the University of California, Santa Barbara (UCSB) created a Climate Action Plan (CAP), approved by the Chancellor's Sustainability Advisory Committee in August 2009. The 2009 CAP was drafted with the best available data and methodology. It was intended to establish an institutional framework for the inventorying, annual tracking, and strategic reduction of GHG emissions, to be updated on a bi-annual basis. Thus, the 2012 CAP supersedes the 2009 document. The 2012 CAP includes revised GHG emissions baselines and reduction goals, as well as updated GHG emissions inventory results through calendar year 2010. Additionally, GHG emissions from commuting and University-funded air travel have been included in the 2012 CAP.

GHG emissions resulting from activities under UCSB's operational control were inventoried and reported annually to the California Climate Action Registry (CCAR) for years 2004 through 2009. In 2010 UCSB reported to The Climate Registry (TCR), which has replaced CCAR. Total 2010 GHG emissions were **92,563** metric tons of carbon dioxide equivalents (MT $CO_2e$).

The 2012 CAP details the following GHG emissions reduction targets:

- 2014: 2000 Emissions Level – **99,699** MT $CO_2e$
- 2020: 1990 Emissions Level – **90, 736** MT $CO_2e$
- 2050: Carbon Neutrality

These reduction targets are estimates based on the methodology used to inventory 2010 emissions. Where data was not available for 2000 and 1990, emissions have been scaled for campus population. UCSB's ability to achieve its stated GHG emissions reduction targets depends on the growth of the campus, the level of available state/utility sponsored energy efficiency programs, the build-out of renewable energy generation capacity on campus, and reductions in carbon intensity of transportation fuels and purchased electricity consumed by the campus and its population.

UCSB has achieved the 2014 reduction target and is projected to achieve the 2020 emissions reduction target, primarily through energy efficiency projects funded through the continuation of the Strategic Energy Partnership and through reducing business air travel by 10% through encouraging remote conferencing. After forecasting for planned reduction measures in energy conservation, on-site renewable energy production, energy efficiency projects and commuter and air travel reductions, UCSB's 2020 projected emission level is approximately **89,791** MT $CO_2e$. This represents an emission reduction of **2,772** MT $CO_2e$ from the 2010 baseline and a **16,966** MT $CO_2e$ reduction from 2020 business as usual projections, which account for campus growth.

To reach carbon neutrality by 2050, additional emission reduction measures including deployment of new technologies and further procurement of carbon offsets will be necessary. The procurement of carbon offsets will be maintained as the final strategy toward achievement of the 2050 carbon neutrality goal. In the case that carbon offsets are determined to be the least-cost strategy for achievement of UCSB's GHG emissions reduction goals, any offsets procured shall be generated locally or regionally to the greatest extent possible.

## 2 BACKGROUND

The University of California, Santa Barbara (UCSB) has long been a leader in the advancement of environmental issues, education, and research. In 1969, Santa Barbara experienced an oil spill in the Santa Barbara Channel that forever changed the University California, Santa Barbara (UCSB) campus and local community. Triggered by this event, the campus established the UCSB Environmental Studies Program in 1970, an undergraduate curriculum designed to train leaders, develop new knowledge, and devise solutions that will restore and sustain the health of our planet. In 1990, then-Chancellor Barbara Uehling was one of the first chancellors in the US to sign the Talloires Declaration. This document, originally signed by 22 university presidents, declares that institutions of higher learning will be world leaders in developing, creating, supporting, and maintaining sustainability on their campuses. As a result of this declaration, the School of Environmental Science and Management was established on the UCSB campus in 1994 to provide Master and Ph.D. students with training in research and assessment of environmental issues.

In the late 1990s, UCSB Energy Services began implementing aggressive energy efficiency measures, such as de-lamping, HVAC upgrades, lighting retrofits, metering, building commissioning, and installation of chilled water loops. As a result, UCSB reduced its per square foot electricity use by over 25 percent since 1998. Additionally, in 2002, Bren Hall was the first laboratory building in the US to achieve Platinum-level certification in Leadership in Energy and Environmental Design (LEED) for New Construction (NC), a rating system developed by the US Green Building Council. Subsequently in 2009, Bren Hall was awarded a second LEED Platinum certification for its ongoing maintenance and operational practices, making it the only facility in the world to have achieved such a distinction. In 2004, Chancellor Henry T. Yang instituted a campus-wide Green Building Practice, which called for all new facilities to be designed and constructed to a minimum LEED Silver level. Also in 2004, UCSB was the first UC campus to achieve a LEED for Existing Buildings (EB) certification for Girvetz Hall, and to date has successfully certified more facilities through LEED for Existing Buildings than any college or university in the nation. By partnering with the U.S. Green Building Council (USGBC) to pilot the first volume certification program for existing facilities, UCSB will certify 25 buildings under LEED EB by 2014. UCSB has maintained this leadership position in green building design, construction and operation for over a decade with the first LEED for Homes certification in the UC system completed in 2011. The campus' robust building program emphasizes energy efficiencies and reduced environmental impact across all building types, and thus will significantly reduce GHG emissions associated with future build-out. UCSB is currently updating its sustainability practices to require additional sustainability protocol in building operations, construction, energy consumption,

laboratory practices, bicycle accessibility and furniture, equipment and paper procurement.

In September 2006, Governor Arnold Schwarzenegger signed into law AB 32 – the Global Warming Solutions Act of 2006. In March 2007, the University of California President Robert Dynes, approved the Policy on Sustainable Practices – guidelines for the UC system to minimize its impact on the environment and decrease its dependence on non-renewable energy. Within this policy is a section on Climate Protection Practices that mandates each campus to develop, by December 2008, a long-term plan for (1) meeting 2000 emissions levels by 2014, (2) meeting 1990 levels by 2020, and (3) eventual climate neutrality. An update to these Policies was adopted in Summer 2011 raising the bar higher for sustainable operations and continuing to require all campuses to create Climate Action Plans and update on an annual basis.

In 2007, President Robert Dynes, signed the American College and University Presidents Climate Commitment (ACUPCC), and UCSB Chancellor Henry T. Yang was appointed to the ACUPCC advisory board. As part of this commitment and ongoing development of sustainability initiatives, in October 2008, Chancellor Yang appointed a high-level campus-wide sustainability committee consisting of staff, faculty and students. This committee reviews and prioritizes sustainability projects and initiatives, and submits recommendations to the Chancellor for project approval and funding.

Most recently, the campus has established the Institute for Energy Efficiency IEE in 2009, an institute which is dedicated to researching and developing technological solutions to critical energy issues. Innovative research initiatives at the Institute for Energy Efficiency are taking place across the efficiency spectrum. The Institute has organized these efforts into six Solutions Groups: Lighting, Production and Storage, Buildings and Design, Computing, Electronics and Photonics and Economics and Policy.

# 3 INTRODUCTION

In the summer of 2009, the UCSB campus approved its first Climate Action Plan (CAP) based on GHG emissions data gathered during calendar year 2007. The 2009 CAP included emissions data and addressed mitigation strategies for scope 1 (on-site combustion and campus fleet GHG emissions) and scope 2 (purchased electricity consumption).

The Climate Action Plan 2012 quantifies and analyzes UCSB's current, historical and projected emissions, and evaluates the campus' progress toward meeting reduction targets in years 2014, 2020 and 2050. Planned and conceptual climate change mitigation strategies outlined in this document demonstrate UCSB's ability to achieve a 1990 GHG emission level by 2020 as the campus' building stock and population continue to grow.

The 2012 Climate Action Plan includes:

- 2010 GHG emissions inventory methodology and results
- Historical and projected GHG emissions
- Mitigation strategies and projected reductions
- Curriculum and Research efforts on Climate Change
- Community Outreach efforts around Climate Change
- Student Life Initiatives: The Division of Student Affairs Zero-Net Energy Strategic Plan

Continuing engagement and evaluation of this plan by the Chancellor's Campus Sustainability Committee and The Academic Senate Workgroup on Sustainability will help in ensuring that UCSB meets its commitments to reducing campus climate impacts. The Climate Action Plan is intended to assist in this process by documenting progress, identifying unknowns and framing next steps.

# 4 CAMPUS EMISSIONS

The following summarizes UCSB's approach to emissions inventorying. UCSB's GHG emissions inventory includes emissions of the six Kyoto Protocol gases – carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride ($SF_6$) – resulting from fossil fuel consumption and refrigerant use at facilities under operational control of the University, including the main campus and off-campus housing and auxiliary facilities, as well as emissions associated with the commuting patterns and business air travel of the UCSB population.

UCSB's annual GHG emissions inventory quantifies emissions in three categories:

**Scope 1** – Direct Emissions: on-site natural gas, diesel and propane combustion, campus fleet emissions, marine vessel and fugitive emissions

**Scope 2** – Indirect Emissions: purchased electricity

**Scope 3** – Indirect Emissions (Other): University-funded business air travel, student, staff and faculty commuting

## 4.1 GHG EMISSIONS REPORTING HISTORY

In 2005, UCSB began voluntary reporting its GHG emissions to the California Climate Action Registry (CCAR). To date, emissions inventories have been submitted and verified for calendar years (CY) 2004 through 2010. In the first three years, the inventory specifically examined $CO_2$ emissions. Beginning in CY 2007, the inventory included all six Kyoto Protocol gases for scope 1 and 2 emissions.

## 4.2 CURRENT EMISSIONS – CALENDAR YEAR 2010

2010 was the first year during which UCSB reported scope 3 in addition to scope 1 and 2 GHG emissions to The Climate Registry (TCR). 2010 GHG emissions and sources as reported to TCR in Metric Tons Carbon Dioxide Equivalent (MT $CO_2e$) are presented in Table 1 and Figure 1 below.

| GHG Emission Scope and Source | $MTCO_2e$ | Percent of Total |
|---|---|---|
| Scope 1 - Stationary Combustion (Campus) | 19,630 | 21.21% |
| Scope 1 - Stationary Combustion (Other) | 2,729 | 2.95% |
| Scope 1 - Mobile Combustion | 1,212 | 1.31% |
| Scope 1 - Fugitive Emissions | 10 | 0.01% |
| Scope 2 - Purchased Electricity (Campus) | 27,974 | 30.22% |
| Scope 2 - Purchased Electricity (Other) | 1,450 | 1.57% |
| Scope 3 - Air Travel | 26,991 | 29.16% |
| Scope 3 - Commuting | 12,566 | 13.58% |
| TOTAL | 92,563 | 100.00% |

**Table I: 2010 GHG Emissions Reported to TCR [MT $CO_2e$]**

Scope 1 emissions reported to TCR are calculated following a thorough analysis of current and historical fuel and refrigerant consumption data for all UCSB operations, and by applying fuel-specific emissions factors as prescribed by the TCR General Reporting Protocol (GRP) version 1.1.

Scope 2 emissions reported to TCR are calculated by applying the Environmental Protection Agency (EPA)-published Emissions & Generation Resource Integrated Database (eGRID) regional emissions factors. The WACC eGRID factor is an average efficiency for electricity delivered in California, which includes generation from natural gas, nuclear, coal, wind, solar, biomass, and hydropower. During calendar year 2010, UCSB's primary electricity transmission provider was Southern California Edison (SCE), and the campus' Direct Access generation provider was Noble Americas.

Scope 3 emissions reported to TCR include emissions resulting from University-paid business air travel and staff, faculty and student commuting to and from campus. Air travel emissions calculations are based on mileage calculations derived from a subset of total air spend. The Connexxus travel system tracks air miles for approximately 13 percent of the campus $6 million total air spend. From this data, a campus-specific cost factor can be applied to derive air miles traveled. It is noted that UCSB's average cost per mile is 25 percent higher than the national average as reported by the Air Transport Association (ATA). Miles are converted to resultant GHG emissions using air travel emissions factors from the Clean Air Cool Planet Calculator version 6.7-2010. The UC Transportation Working Group and Climate Change Working Group expect to refine and standardize this calculation method for inclusion in further iterations of UC Climate Action Plans. Commuter emissions are based on accurate mode-split data derived from comprehensive campus surveys administered annually during spring quarter. Using guidance developed by the UC Transportation working group, GHG emissions for the entire population of the campus are

calculated and updated annually. GHG-emitting transportation modes include single-occupancy vehicles, carpooling, vanpools, motorcycles, and bus commuting. These figures are adjusted for average ridership.

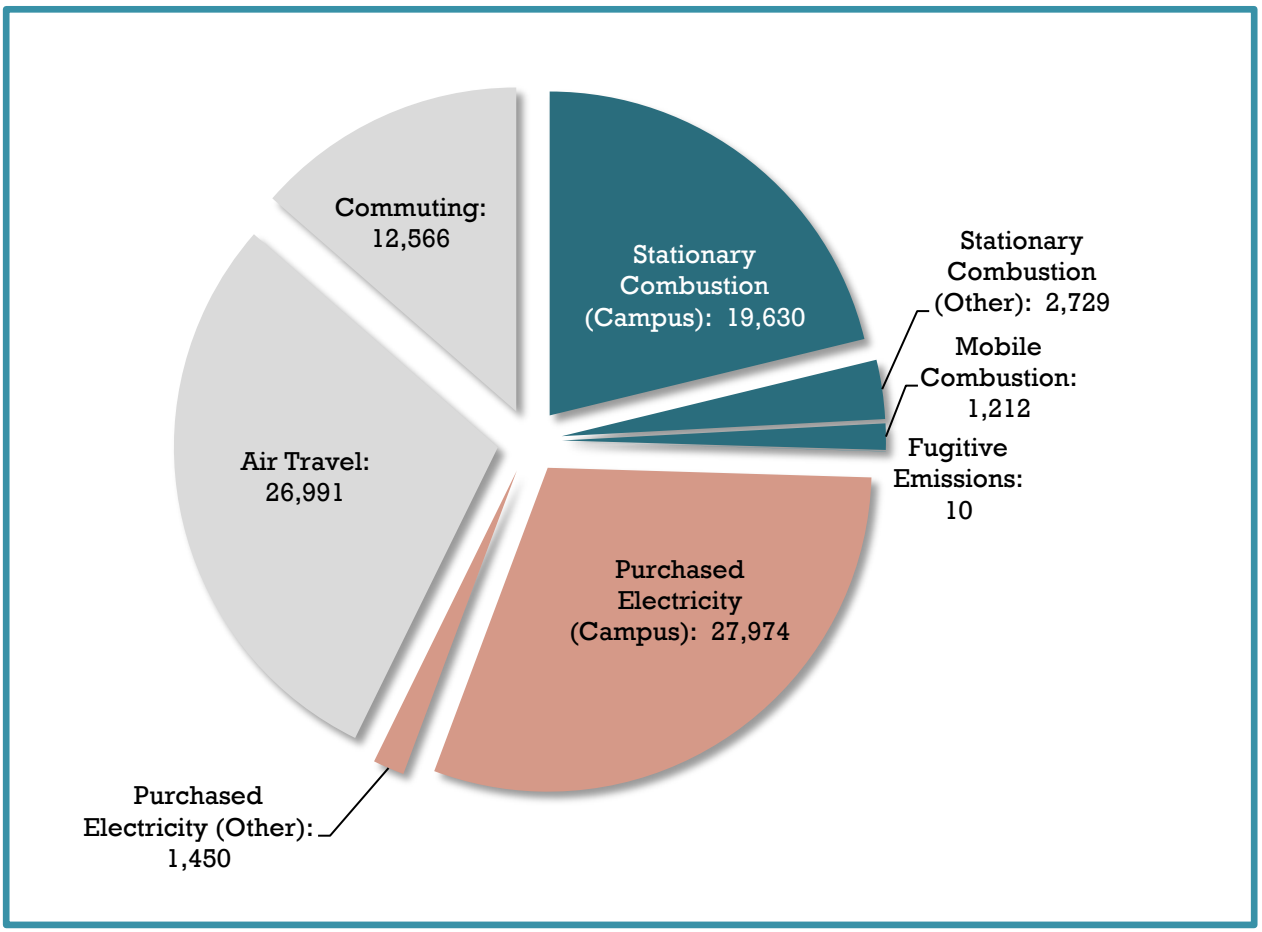


**Figure 1: 2010 GHG Emissions by Source [MT CO2e]**

## 4.3 HISTORICAL EMISSIONS

Figure 3 below depicts the trend in GHG emissions levels between 1990 and 2010. While the majority of scope 1 and 2 historical electricity and fuel consumption data is available, this analysis relies on extrapolated usage data for years 1990-1995. Scope 3 commuter emissions are based on historical mode-split survey data and are normalized for population. Additionally, air travel emissions data for the years 1990-2009 are normalized for population as well.

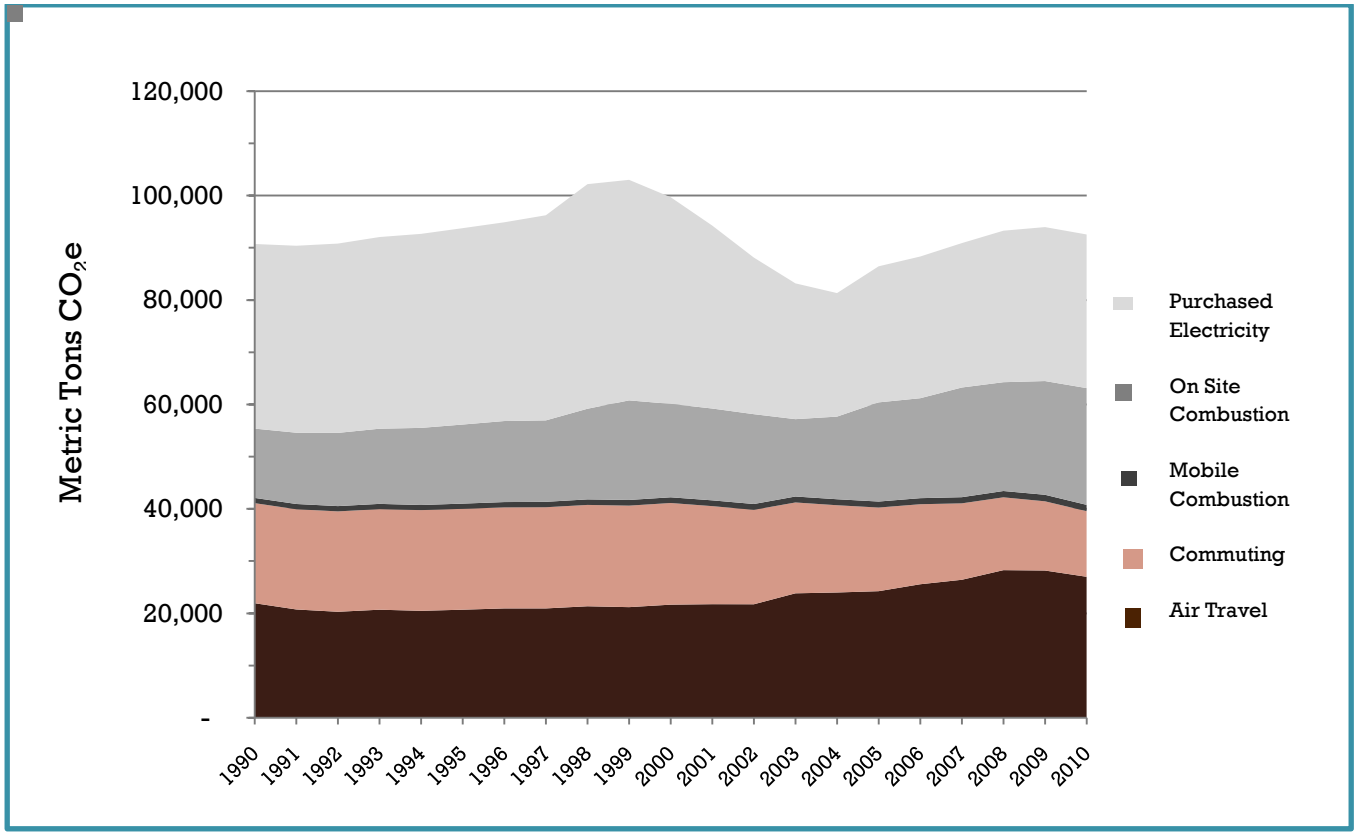


**Figure 2: Historical GHG Emissions – 1990 to 2010**

Emissions increased relatively steadily from 1990 to 1999 followed by a decline in emissions from 1999 to 2004 and an increase in emissions from 2004 to 2009. The decrease in emissions from 1998 to 2004 was due to the implementation of a number of energy efficiency projects which reduced campus electricity usage intensity considerably, while the increase from 2004 to 2009 is due to the increase in square footage resulting from new building construction and from an increase in associated natural gas consumption. Examination of the GHG intensity factors for electricity and natural gas based on gross square footage show that electricity related GHG emissions per GSF have decreased from 1998 through 2010. The campus natural gas usage intensity has fluctuated over the years, which is partly due to winter weather conditions. Although natural gas intensity appears to have increased in recent years, it is within the range of variability.

Commuting and air travel data to 1990 has been normalized for population based on 2010 calculation methods. Although some data is available on commuting and air travel in the past, it was largely incomplete using current calculation methods. This CAP presents the

best estimation for consistent back casting given limited or absent data. It is worth noting that this method does not capture reduction trends in commuting or air travel and likely under represents commuting and travel emissions in 1990. Current accounting systems do not track air miles or resulting GHG emissions. Mechanisms to capture this data will be incorporated into new accounting systems in the future.

During the period of 1990 to 2010 the total student, faculty, and staff counts have increased from 22,261 to 27,124 for an increase of 22 percent, and building GSF has increased from 4,995,616 to 7,971,792 for an increase of 60 percent. The increase in students, faculty, and staff has been fairly steady through 2009, and dropped slightly in 2010. UCSB experienced its most rapid build-out during the time period between 2004 to 2008, resulting in a recent increase in GSF per capita.

For the purposes of this CAP, historical (prior to 2010) and projected emissions are calculated using Southern California Edison utility-specific emissions factors. For year 2010 and 2011 the campus was contracted for Direct Access power generation with Nobel Americas, therefore this CAP applies state-wide eGRID factors to determine carbon intensity of power consumed by the UCSB campus in 2010 and 2011. The California Investor Owned Utilities do not maintain an accurate database on emissions factors inclusive of the 1990 and 2000 baseline years. The UC Climate Change Working Group has developed guidance referencing the August 2002 Lawrence Berkeley National Laboratory study *Estimating Carbon Dioxide Emissions Factors for the California Electric Power Sector*. The Southern California Edison factors calculated by LBNL are applied to baseline years in calculating Scope 2 GHG emissions.

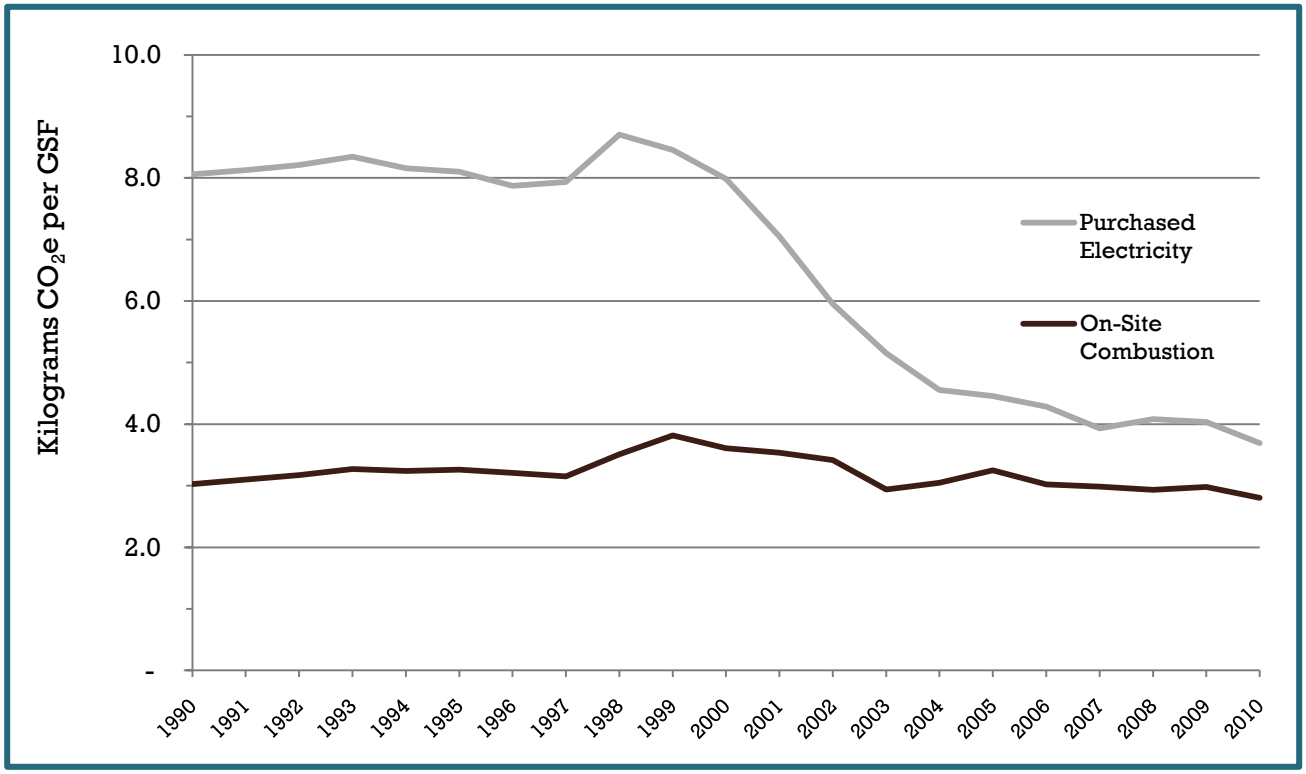


**Figure 3: Historical Electricity and Onsite Combustion GHG Intensity – 1990 to 2010**

## 4.4 PROJECTED EMISSIONS

The 2010 LRDP and accompanying Environmental Impact Report (EIR) were originally circulated in Spring 2008, recirculated in 2009, and recirculated most currently in 2010 . The LRDP and EIR were approved by the UC Board of Regents in September 2010, followed by submission to the California Coastal Commission in May of 2011 and is still pending final approval. These documents describe future campus growth. The 2010 version describes development through 2025. The following LRDP projections informed CAP projections through 2020:

- Increase in undergraduate and graduate student population 1 percent per year for a total of approximately 25,000 in 2025.
- Increase in faculty and staff population to a total of 6,431 in 2025.
- Add sufficient housing to accommodate each new student, faculty member, and staff employee.

- Add an estimated 3,000,000 GSF for general uses.

The draft LRDP implements principles of sustainability in urban planning. Specifically, the LRDP adds housing for each new individual without increasing the carbon footprint of the campus. Thus, development that will occur is considered in-fill and many new commuting trips that would otherwise have been in a vehicle will be made by alternative means (e.g. cycling, walking, and public transit).

## 4.5 BUSINESS AS USUAL

While UCSB is prepared for the projected growth approved by the UC Regents and detailed in the LRDP by 2025, this CAP assumes roughly a two-thirds build-out of the LRDP by 2025, representing the addition of approximately 2,000,000 GSF. The 2012 CAP projections are based in large part on the 2011-21 Capital Financial Plan (CFP) to predict future growth at a consistent rate. Based on the most current version of the CFP, the CAP projections assume that approximately 670,000 ASF and 1,500,000 GSF will be built out by 2020 and will be within the scope of our campus GHG emissions inventory. Several for-sale housing projects for faculty and staff are not included in these projections since UCSB does not maintain operational control or ownership of these housing units.

Business as usual BAU emissions for future years, 2011 though 2020, are calculated based on conditions described in the current CFP and forecasted GHG energy intensities. Emissions assume an average annual campus growth rate of 1 percent. Intermediate year emissions are interpolated assuming linear growth. Energy use will increase stepwise as each new building is commissioned. Future versions of this CAP will schedule emissions from each new development to phase in as planned rather than at a constant rate of growth.

As detailed in Section 4.3 Historical Emissions, the campus procured the generation component of its purchased electricity through Direct Access contracts for years 2010 and 2011. For this reason, campus emissions for 2010 and 2011 are based on the Environmental Protection Agency (EPA) statewide E-GRID emissions factors for the WECC region. However, projected Scope 2 emissions from 2012-2020 are based on Renewable Portfolio Standard (RPS)-adjusted Southern California Edison (SCE) utility-specific power generation. The California RPS mandates that SCE must increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020.

BAU emissions from UCSB's fleet of mobile sources (i.e. on-road and marine fleets) are estimated by scaling the 2010 mobile source emissions by the increase in faculty/staff. Backup generator, gas cylinder, and refrigerant emissions are each scaled by the increase

in square footage of the main campus buildings. Similarly, scope 3 emissions from commuting and air travel have been scaled for population increases.

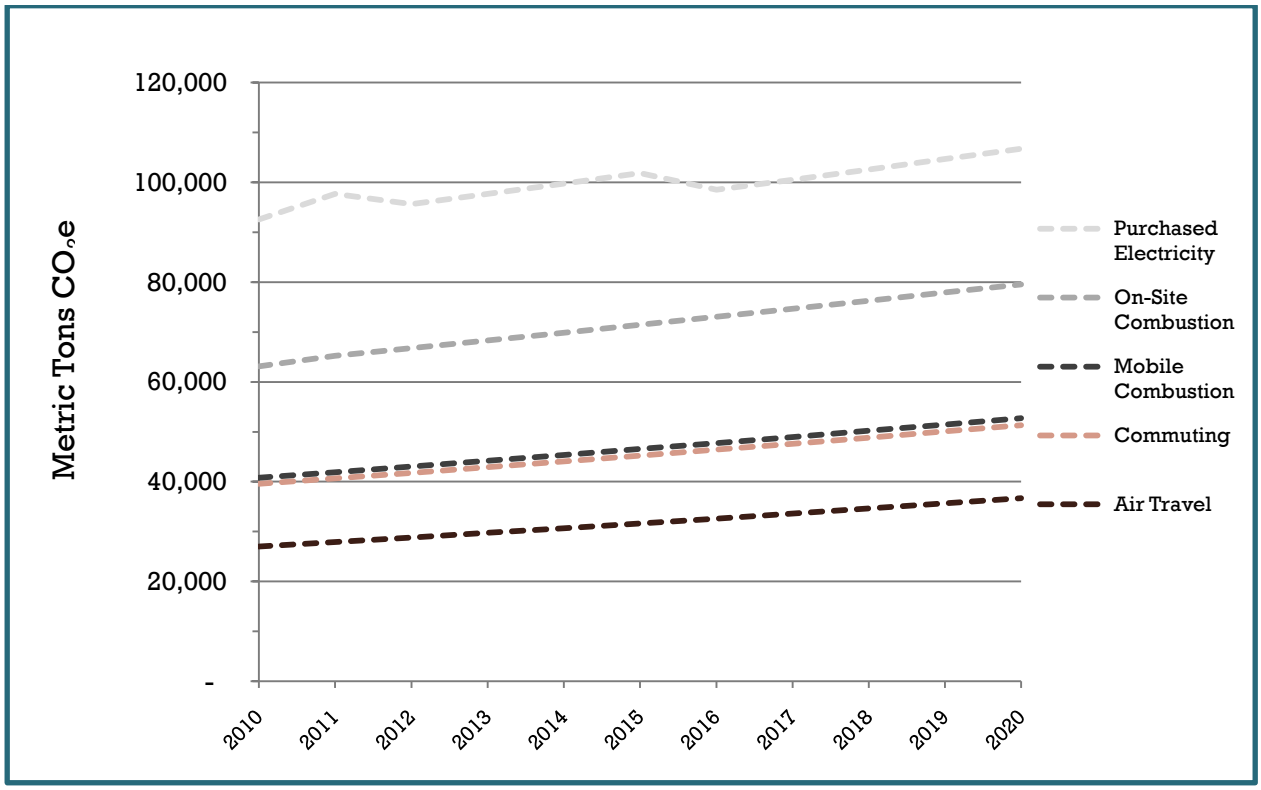


**Figure 4: Projected Business as Usual Emissions 2010-2020**

| | | Metric Tons Emitted Annually ($CO_2e$) |
|---|---|---|
| **GHG Emission Scope and Source** | **2014** | **2020** |
| Scope 1 - Stationary Combustion (Campus) | 21,770 | 24,080 |
| Scope 1 - Stationary Combustion (Other) | 2,748 | 2,770 |
| Scope 1 - Mobile Combustion | 1,288 | 1,403 |
| Scope 1 - Fugitive Emissions | 10 | 10 |
| Scope 2 - Purchased Electricity (Campus) | 28,586 | 26,060 |
| Scope 2 - Purchased Electricity (Other) | 1,313 | 1,108 |
| Scope 3 - Air Travel | 30,679 | 36,693 |
| Scope 3 - Commuting | 13,393 | 14,635 |
| **TOTAL $CO_2e$** | **99,787** | **106,757** |

**Table II: Projected Business as Usual Emissions**

| Growth Comparisons | 2010 | 2020 | Growth by 2020 |
|---|---|---|---|
| Total Bldgs | 404 | 424 | 20 |
| Calif OGSF | 7,971,792 | 9,488,875 | 1,517,083 |
| Students | 22,218 | 25,551 | 3,333 |
| Faculty/Staff | 4,906 | 6,039 | 1,133 |
| Total Population | 27,124 | 31,590 | 4,466 |

**Table III: Projected Campus Growth 2010-2020**

## 4.6 FORECASTED FUTURE GHG EMISSIONS

Forecasted future GHG emissions take into account campus growth, currently planned mitigations, and projected changes in SCE percent renewable. These estimates are discussed in more detail in Section IV Mitigation Strategies.

## 4.7 EMISSION REDUCTION TARGETS (2014, 2020 AND 2050)

The interim emissions reduction goals are Calendar Year (CY) 2000 emissions levels by 2014 and CY 1990 emissions by 2020. Emissions for 1990 and 2000 have been calculated based on current and historical information and are presented in Table 2. For comparison, 2010 emissions and projected BAU emissions for each of the target years are presented in Table 3.

UCSB has committed to achieving carbon neutrality by 2050. In order to reach neutrality, the campus must mitigate and/or offset all greenhouse gas emissions produced by sources that are within the scope of the campus emissions inventory. The first step in achieving this will be avoiding and reducing emissions as much as possible using mitigation strategies described in Section IV. The second step will be to provide offsets for any remaining emissions, as covered in Section V.

| | Metric Tons Mitigated Annually ($CO_2e$) | |
|---|---|---|
| **Mitigation Measure and Associated Reduction** | **2014** | **2020** |
| SEP | 6,179 | 9,874 |
| Onsite Renewables | 304 | 429 |
| Conservation (UCIP) | - | 1,616 |
| Commuter Reductions | 552 | 1,379 |
| Virtual Travel | 920 | 3,669 |
| **TOTAL $CO_2e$** | **7,954** | **16,966** |

**Table IV: Emission Reduction Targets**

| | Metric Tons Mitigated Annually ($CO_2e$) | |
|---|---|---|
| **Emission Reduction Targets** | **2014** | **2020** |
| **TOTAL $CO_2e$** | **91,833** | **89,791** |

**Table V: Emission Reduction after applying Targets**

# 5 MITIGATION STRATEGIES

Comparing BAU projections for 2020 with UCSB's target 1990 GHG emissions level, the campus must reduce GHG emissions by 14,396 MT $CO_2e$. Several existing UCSB documents incorporate policies and mitigation measures that will reduce GHG emissions. These include the Strategic Energy Partnership (SEP) Project List, the Campus Sustainability Plan, the draft Long Range Emissions Plan, the Capital & Financial Plan, the Long Range Development Plan (LRDP) and the LRDP Environmental Impact Report.

The overall mitigation strategy for the campus is to avoid emissions where possible through improved planning and reducing the carbon intensity of development; to reduce emissions through improved efficiency in campus operations; and to replace high-carbon energy sources with lower carbon sources. These strategies will be implemented through changes in new construction, retrofitting of existing sources, changes in policy and practices, and education and outreach to promote behavioral change.

The campus has adopted several documents and plans which include measures that will reduce GHG emissions both directly and indirectly. In addition, the State of California has adopted measures that will result in GHG emissions reductions. Finally, additional potential mitigation measures were identified as part of the preparation of the CAP.

The mitigation objective of the 2012 CAP is to identify quantifiable planned measures and additionally address a broader range of potential measures, which will be assessed in the next iteration of the CAP with regard to technical feasibility, cost, ease of implementation, and estimated reduction in emissions. New measures may also be adopted in future plans and thus, the list of mitigation measures will evolve with time. Commitments to specific measures will be noted in each CAP update as applicable.

## 5.1 MITIGATIONS IN BUILDINGS

Buildings are accountable for a large portion of campus energy use and GHG emissions. Operations and activities in buildings span multiple areas considered in this CAP. For the most part, building measures in the CAP are a result of sustainability efforts that may or may not reduce GHG emissions while energy efficiency projects that can be quantified are considered energy measures. The Campus Sustainability Plan seeks to "create superior places to study, work, and live that enhance the health and performance of building occupants through sustainable planning, design, construction, operations, retrofits, and biomimicry." Many of the sustainability principles that are applied under this category will result in avoidance or reduction of GHG emissions, but the amount of

reductions is not known. Nevertheless, sustainable buildings initiatives will be important in minimizing campus impacts on the environment. Building mitigation measures include: development of strategic plans for energy efficiency in existing buildings and operation of buildings according to LEED guidelines; certification of 25 existing campus facilities through LEED-EBO&M; surpassing Title 24 by at least 20 percent on new buildings; and increased energy efficiency requirements for new buildings under the LRDP.

In August of 2011, The University of California approved a revised Sustainable Practices Policy that established goals in eight areas of sustainable practice: green building, clean energy, transportation, climate protection, sustainable operations, waste reduction and recycling, environmentally preferable purchasing, and sustainable foodservice. All new and renovation building projects shall outperform the California Building Code CBC energy-efficiency standards by at least 20 percent and should strive for 30 percent or more. All new and renovation buildings projects will achieve a minimum LEED certification of "Silver" and strive to achieve "Gold." System-wide, UC has committed to provide up to 10 megawatts of on-site renewable power by 2014 and will reduce consumption of non-renewable energy by using a portfolio approach that includes a combination of energy efficiency projects, the incorporation of local renewable power measures for existing and new facilities, green power purchases from the electrical grid, and other energy measures with reduction in fossil fuel usage. Additionally, the University will pursue the expansion of Transportation Demand Management (TDM) programs and projects to reduce environmental impacts from commuting.

## 5.2 MITIGATIONS IN ENERGY USE AND EFFICIENCY

Mitigation strategies that are considered energy measures in this CAP include: energy efficiency projects (e.g. SEP), installation of on-site renewable energy generation capacity, procurement of off-site green power, and evaluating future decentralization of the campus utility budget to incentivize conservation.

The Strategic Energy Partnership SEP program has been in place at the University of California since 2004. Two program periods have passed (2004 – 2005 and 2006 – 2008) in which energy efficiency projects were completed at each UC campus. Since its inception, UC Santa Barbara has implemented $22.0 million worth of energy conservation projects. Electric and natural gas Utilities which serve the campus have provided a combined $5.8 million in incentive funding for these projects and the cumulative energy savings yielded are estimated to be $3.0 million per year. In March 2009 the SEP program for the current funding cycle between the California Investor Owned Utilities,

the California State University, and University of California was approved. According to the UC Office of the President, this partnership "provides substantial energy and cost savings, reduces UC's greenhouse gas emissions, and helps UC meet its sustainability goals. The current phase of the SEP will provide an estimated $220 million to help fund energy efficiency projects for 2009-12, which are expected to reduce The University's annual utility costs by $36 million."

UCSB's commitment for the current funding cycle 2009-2012 is $16.1 million and affords a more rapid rate of progress towards reducing energy use and related GHG emissions than in years past. The SEP is the most effective mitigation strategy facilitating the achievement of UCSB's 2020 GHG reduction target. Future funding cycles are anticipated to extend the SEP program through 2016. An additional $15 million will be requested in the next funding cycle spanning 2013-16.

SEP projects for the current funding cycle have fallen into three main categories:

- Lighting fixture and controls retrofits have remained consistently successful projects at academic, residential and athletic facilities, yielding simple paybacks of three to four years.

- HVAC equipment replacement has been a focus of major investment on campus. Installation of high-efficiency chiller and boiler systems, extension of the campus chilled water loop, and optimization of chiller staging yield longer returns on investment, but provide a mechanism for deep energy savings in addition to financing of necessary deferred maintenance.

- Monitoring Based Commissioning (MBCx) projects at various campus buildings allow campus engineering staff to optimize building systems operation and identify inefficient or malfunctioning equipment. UCSB has achieved a high degree of success with MBCx projects, generating typical returns on investment for these projects in one year or less.

Appendix C includes a list of SEP projects under current and future utility funding cycles. An estimated **9,874** MT $CO_2e$ will be reduced annually through program measures planned through 2016. SEP is the primary mitigation strategy to reduce campus GHG emissions in this CAP.

On-Site renewable energy generation capacity will contribute increasingly to GHG emission mitigation efforts on the main campus as well as at auxiliary facilities and campus-adjacent housing development. UCSB owns nine installed on-site solar PV systems, ranging in size from 2kW to 155 kW DC. The aggregate capacity of these systems is 255 kW DC. The campus plans on adding two large photovoltaic arrays

(approximately 500 kilowatts each) before 2020 resulting in a build out of an additional 1000 kilowatts of on-site solar production, yielding an additional reduction in annual GHG emissions of **429** MT $CO_2e$ by 2020.

This CAP also forecasts **1,616** MT $CO_2e$ in annual emissions reductions resulting from energy conservation. One option under assessment to increase energy conservation through behavioral change is to decentralize the campus utility budget. The specific program details are still under consideration; however the campus is evaluating models in place at Stanford University and UC Berkeley. By decentralizing the campus-wide utility budgets, the campus could incentivize energy conservation in the future.

The UCSB Alternative Energy Subcommittee of the Chancellor's Sustainability Committee approved Energy Goals in the spring of 2011. In this document, the Chancellor's Sustainability Committee has committed to decrease energy used on campus through behavior changes and efficient technology resulting in a goal for total campus average energy intensity (kBtu/sq ft/yr) reduction of 8.0 percent on a five-year rolling average basis. Additionally, the campus has committed to continually increase the fraction of sustainable energy sources in the campus' electricity supply resulting in energy consumption from sustainable sources of at least 43 percent of the campus total electricity consumption by 2020. This target is 10 percent above the estimated renewable sources provided by SCE.

## 5.3 MITIGATIONS IN TRANSPORTATION

The UCSB Alternative Transportation Subcommittee of the Chancellor's Sustainability Committee is currently drafting formal proposals to reduce scope 3 emissions from commuting and air travel on university business. While members of the subcommittee participate in the UCOP Transportation Work Group to develop a better system to capture accurate data on air travel, the subcommittee simultaneously is working on proximal advances in reducing transportation emissions. For the purpose of this CAP, it is assumed that a 10 percent reduction in university-funded business air travel by 2020 is achievable. Through discussion with campus and UC travel offices, airfare costs are anticipated to increase over time, while travel budgets will likely decrease due to budget constraints. The Subcommittee is working on the following actions:

- Estimating what portion of air travel could possibly be reduced by using teleconferencing based on the current year's travel data.

- Assessing the effectiveness of teleconferencing through having one academic council try meeting annually face to face & substitute additional meetings virtually throughout the year.
- Advocating for the new financial system to include a mileage component of all air travel.

Additionally, the campus will work more closely with the Santa Barbara Metropolitan Transit District SB MTD to improve service in an effective manner through various options including:

- Supporting MTD in taking a national leadership role in addressing ridership.
- Suggesting that MTD go from Hybrid Diesel to compressed natural gas (CNG) – Hybrid Diesel is 12 percent more efficient than conventional Diesel while the CNG is approximately 20 percent more efficient. One option is to have the campus install a CNG station and allow MTD to use it.

Currently, the campus has not approved tiered parking rates. Parking rates in general are anticipated to rise in the present year in order to meet debt requirements. The Transportation subcommittee will urge the campus to explore developing tiered rates that truly reflect the cost of parking on a daily basis. The subcommittee feels that the current low monthly cost of parking does not incentive alternative transportation enough.

As outlined in the LRDP, transportation emissions will be substantially reduced in the future through housing all new student growth adjacent to campus and adding additional housing for faculty & staff nearby, thus reducing the demand for parking and motorized transportation. The subcommittee also urges the campus to improve bicycle circulation to accommodate for additional population growth. Particularly improved North-South circulation for bicycles could greatly increase the number of potential bike users living within three miles north of campus.

The university fleet currently hosts 20 CNG cars and many flex-fuel ethanol vehicles on campus. While Housing & Residential Services has a CNG station, it is far smaller than the campus needs. In further transportation development, in 2012 the campus will be installing 12 electric vehicle charging available for campus and community use.

Based on Transportation studies from the current LRDP, this CAP assumes a 2/3 reduction in projected commuter emissions resulting from new campus population growth, largely housed close to the main campus. Through increasing the campus population living in proximity to campus, approximately **1,379** MT $CO_2e$ in annual avoided emissions from commuting will be achieved.

## 5.4 GOVERNMENT REGULATIONS AND PROGRAMS

State and local governments are currently developing programs that will result in GHG emissions reductions related to external sources. These reductions will flow through to UCSB indirectly. These include:

- 20 percent renewables by 2010 for Independently Owned Utilities (IOU) – California Renewable Portfolio Standard (RPS), SB 1078 and SB 107, in effect.
- 33 percent renewables by 2020 for IOUs – AB 32 Scoping Plan, under development. When analyzing the effect of increasing renewables on emissions reduction for the campus, it is necessary to take into account that electricity supplied by SCE currently includes from 20 percent renewables and approximately 26 percent non-GHG emitting sources. Therefore only the incremental change may be counted.
- Low carbon fuel standard to reduce the carbon content of transportation fuels by 10 percent by 2020 – AB 32 Scoping Plan and SB 1007, under development.
- California Clean Car Law estimated to reduce emissions from passenger vehicles by 18 percent by 2020 and 27 percent by 2030 – AB 1493 Vehicular Emissions; Greenhouse Gases (Pavley), under development.

Additionally, as required by California Senate Bill 375, the Santa Barbara County Association of Governments SBCAG is preparing a new, long-range plan, called a Sustainable Communities Strategy SCS, which will evaluate future land use, housing and transportation scenarios in the Santa Barbara County region. The SCS must consider a range of land use and transportation scenarios, measures, and policies which would reduce GHG emissions from automobiles and light trucks to achieve the GHG emission reduction target set by the State. The SCS will be part of the Regional Transportation Plan RTP, a long-range planning document simultaneously being updated by SBCAG that defines how the region will invest available funding over the next 20 years to meet the region's transportation needs. SBCAG is in the early stages of crafting this plan and is partnering with our campus for input goals and options for GHG emissions reductions.

## 5.5 PROJECTED FUTURE EMISSIONS AND REDUCTIONS

Figure 4 details UCSB's forecasted GHG emissions between 2010 and 2010. The trend contains several specified reduction measures:

- Conservation: emission reduction estimate- **1,616** MT $CO_2e$ resulting from behavioral change. Based on case studies, a 15 percent reduction in energy use by 2020 is achievable if the campus successfully decentralized the main utility budget.

- On-site Renewable Energy: emission reduction estimate- **429** MT $CO_2e$ resulting from build-out of renewable energy generation capacity on campus. Current planned and funded solar photovoltaic generation capacity for the campus will add an additional 496 kilowatts, and mitigation measures include the build out of an additional 500 kilowatts of on-site solar production by 2020. The first half-megawatt photovoltaic array is planned for installation by the fall of 2012.

- Strategic Energy Partnership: emission reduction estimate: **9,874** MT $CO_2e$ resulting from 90 energy efficiency projects. These projects are funded through utility incentives, capital project costs and UC bond financing.

- Air Travel Reduction: emission reduction estimate: **3,669** MT $CO_2e$ resulting from reduced travel budgets coupled with increased use of video conferencing. This CAP assumes a 10 percent reduction in air travel through incentivizing teleconferencing over in-person travel. In further iterations of this CAP, air travel emissions will be revised through a standard UC approach currently under development. Additionally, the university has no formalized programs to incentivize video/tele-conferencing, but promoting/subsidizing this alternative shall be actively pursued.

- Commuting Reduction: emissions reduction estimate: **1,379** MT $CO_2e$ resulting from housing new population growth in proximately to campus. This CAP assumes at least a 2/3 reduction on projected commuter emissions from this new population.

UCSB's planned mitigation and reduction measures put the campus on a trajectory to achieve the 2014 and 2020 emissions targets. Additional measures will be necessary in order for the campus to achieve GHG neutrality by 2050. Projections beyond 2020 are highly speculative and are not quantified in this CAP.

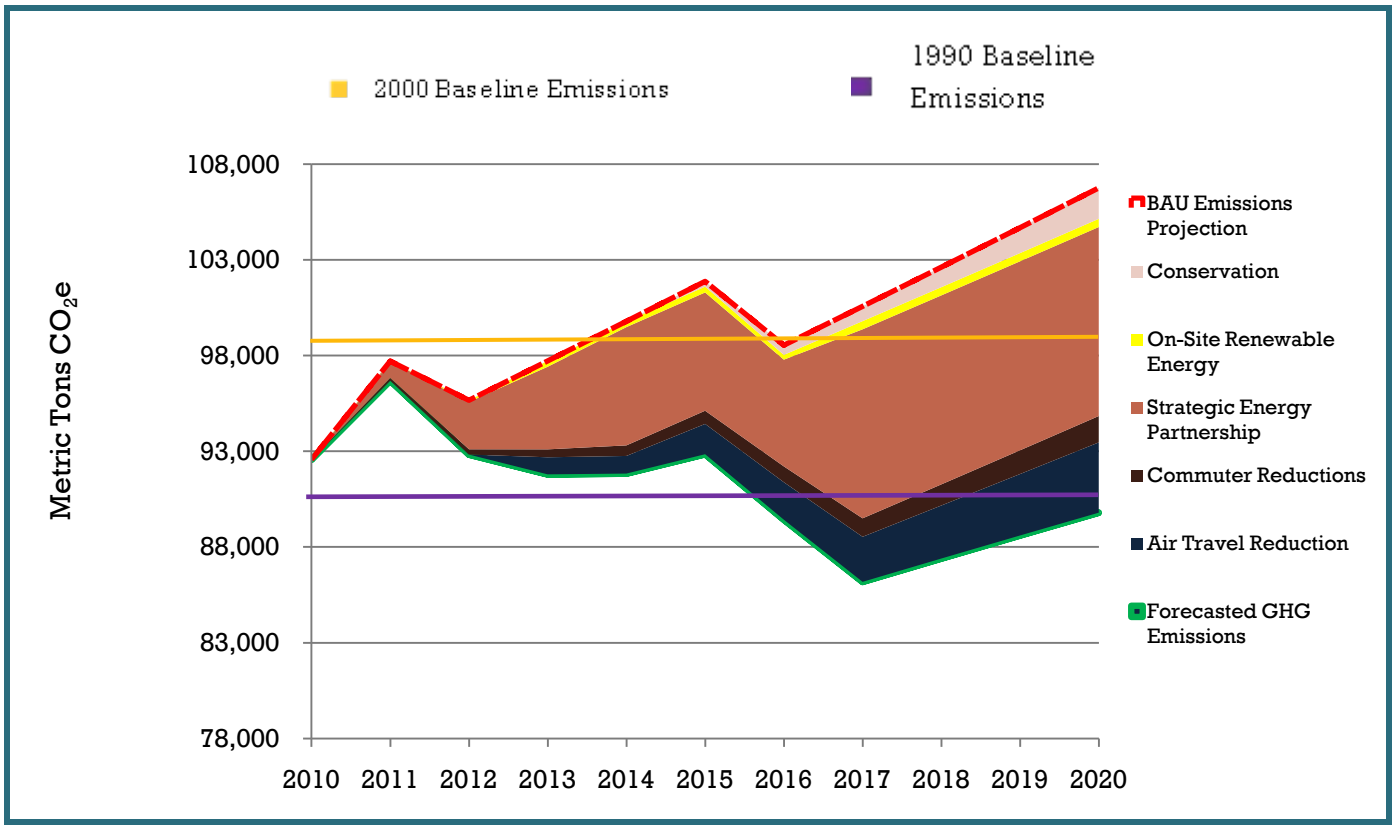


**Figure 5: Projected GHG Emissions and Reductions**

## 5.6 FURTHER EMISSIONS REDUCTIONS OR OFFSETS REQUIRED FOR CARBON NEUTRALITY

Emissions reductions can be achieved by energy efficiency measures. However, GHG emissions cannot be reduced to zero through efficiency measures. At some point, emissions must be further reduced by increasing the use of renewable energy or obtaining offsets. Emissions from electricity can be eliminated with the purchase of 100 percent renewable energy. Emissions that may require offsets result from natural gas, propane and diesel usage that cannot be eliminated or substituted, air travel, and commuting.

# 6 OFFSETS

After mitigating campus emissions with energy efficiency projects and implementing new technology, the purchase of renewable energy certificates and/or carbon offsets will likely be necessary to achieve carbon neutrality. The definitions, prices and markets for offsets are rapidly changing. Future iterations of the UCSB CAP will include specific information for strategizing the campus approach to purchasing offsets.

The following information is drawn from a graduate seminar study at U.C. Berkeley conducted in spring of 2011 on the purchase of carbon offsets as a strategy to reaching climate neutrality. The report looks at carbon offset protocols recognized under the cap-and-trade program being designed by the California Air Resources Board (ARB) pursuant to AB 32, the Global Warming Solutions Act. Additionally, a discussion of the requirements by American College & University President's Climate Commitment (ACUPCC) Voluntary Carbon Offset Protocol is outlined below.

According to the American College & University President's Climate Commitment (ACUPCC) Voluntary Carbon Offset Protocol, "A carbon offset is a reduction or removal of $CO_2e$ GHG emissions that is used to counterbalance or compensate for ("offset") emissions from other activities; offset projects reducing GHG emissions outside of an entity's boundary generate credits that can be purchased by that entity to meet its own targets for reducing GHG emissions within its boundary. Generally, offsets fall into two categories: 1) emissions reductions or avoidance, such as replacing a diesel generator with solar panels, and 2) sequestration, or removing GHGs from the atmosphere, such as planting trees that will absorb CO2 as they grow. There are many different types of projects that generate offsets in both categories; however different offset markets and offset standards only recognize certain project types as acceptable."

AB 32, the Global Warming Solutions Act in California, also states that carbon offsets must be real, permanent, quantifiable, verifiable, enforceable, and additional. Additional means that the offset will reduce carbon that wouldn't have been reduced anyway without the existence of the carbon offset project. Permanence can be difficult to prove when sequestering carbon, whether in trees or underground. For instance, if the forest is eventually burned down, then the carbon in the trees will no longer be sequestered and the offset no longer exists. Though carbon offsets can be controversial and risky, guidelines for protocols and guidelines continue to be formalized.

On December 16, 2010, ARB approved regulations for the proposed cap-and-trade program. Under the cap-and-trade program, ARB will set the total amount of GHG emissions allowable for covered facilities, and will issue these as "allowances," which will be denominated in metric tons of CO2e. Entities that emit more than **25,000** MT $CO_2e$

through scope 1 direct onsite emissions can trade these allowances to the extent that they have too many or too few for their operations. In addition, the program would allow covered entities to meet a certain amount of their emissions limit through the use of offsets.

It should be noted that UCSB is not currently included in the cap-and-trade program, but may be subject to regulation over a ten-year planning horizon. Thus, while the direct relevance of ARB's guidelines for carbon offsets is limited, a review of ARB's proposed regulations for offsets is still useful for campus planning purposes.

Existing protocol through ACUPCC provides a common framework for managing carbon emissions on college and university campuses to achieve GHG neutrality. As indicated in the ACUPCC Voluntary Carbon Offset Protocol, a university should first try to meet the self-imposed GHG emission reductions. If the campus cannot achieve GHG neutrality in a certain time period, then the campus should consider purchasing carbon offsets. From the perspective of the ACUPCC, it is not necessary to incorporate carbon offsets into each college or university's climate action plan. The campus should rather evaluate the effect and the value of offsets in accordance with its own unique circumstances. The ACUPCC participating institutions should go through each carbon offset investment option and compare the costs and risks between offset investment, purchasing credits, project development and forward delivery of offsets. If UCSB purchases or invests in offsets from another entity, the campus must ensure that offsets are not double counted reducing both institutions' climate change impact. The ACUPCC Protocol indicates that the term "offset" refers to the reduction and removal of GHG emissions, therefore, avoidance projects are not recognized as offsets. The campus will most likely invest in a portfolio of offsets over time from the AB 32 compliant list and the voluntary-compliant list and in accordance with ACUPCC protocol.

Currently, the campus has invested in Renewable Energy Credits from several wholesale renewable energy providers as part of LEED certification projects. The Education and Social Science Buildings, San Clemente Villages and Engineering II purchased 2.76m kWh of renewable energy in 2010. Although these reductions account for approximately 2 percent of total energy use, these credits are not quantified in our annual GHG inventory and therefore not included in our Climate Action Plan per directions from The Climate Registry.

# 7 FINANCING

UCSB currently does not have a specified budget for sustainability and GHG emission reduction actions. In addition, due to the current economic state of the UC system, UCSB will have limited funds and will experience a continued staff shortage over the next several years. Therefore, the majority of the funds for mitigation projects will likely come from extramural sources and/or creative financing/partnerships. The following sources of funding are available, or are being considered for financing these actions.

- Strategic Energy Partnership – This is a UCOP partnership program with Southern California Edison (SCE) and Sempra Energy, the local investor owned utilities for the UCSB campus. This program provides for funding through UCOP and rebate funding by SCE for SEP projects. From the first funding cycle 2009-2012 UCSB has identified $16.1 million in potential energy projects on the SEP list. We anticipate that the program will extend through 2016 with an addition $15 million requested for investment in energy efficiency projects. If the full $31.1 million is invested in SEP projects spanning 2009-2016, the campus is will save an estimated 8,603 MT $CO_2e$. Since 2009 SEP projects have already been completed, we estimate that an additional 8,424 MT $CO_2e$ annually will be reduced through SEP financing.

- UC Funding – UC financing can be secured with energy cost savings or other income sources. There is a minimum project return requirement for University borrowed funds and Department of Finance approval is needed to allow for capital debt service to be paid with energy cost savings.

- The Green Initiative Fund - Smaller projects may be funded by The Green Initiative Fund (TGIF), a student fee-generated grant program that receives approximately $150,000 annually to allocate towards green projects. Students pay $2.60 per quarter towards TGIF with the primary mission to reduce the campuses impacts on the environment, specifically GHG emissions. This program is currently funded through 2014. Examples of projects funded to date include solar power projects, wind turbines, natural gas meters, an on-campus hourly rental Zipcar, electric vehicle charging stations, student internship funding to assist with campus energy intensity data collection and real-time energy consumption displays in office spaces. UCSB's Green Initiative Fund was the first established in the UC system in 2006.

- Student Services Renewable Energy Initiative- In April 2010 UCSB's students approved the "Student Services Renewable Energy Initiative." The revenue generated by quarterly student fees will be used to fund large-scale renewable energy projects at UCSB, which includes a half-megawatt array designed for the roof

of Parking Structure 22, scheduled for completion in November 2012. The fee increase of $6 per quarter will generate nearly $3.4 million dollars by the time it sunsets in 2020. According to information from the Association for the Advancement of Sustainability in Higher Education (AASHE), the "Student Services Renewable Energy Initiative" will surpass all other U.S. colleges and universities in the amount of funding generated annually for the creation of on-site renewable energy. The Renewable Energy Initiative is being administered by the student-majority Renewable Energy Initiative Governance Board and is part of the Division of Student Affairs Zero-Net Energy Plan.

- Power Purchase Agreements – Power Purchase Agreements (PPAs) will be examined for installation of more photovoltaic arrays. PPAs provide initial capital for the University and solar projects are paid off with energy savings over time. An added advantage of these agreements is that, as a private enterprise, the third party provider is eligible for tax rebates that the University is not.

- California Programs – State agencies that have programs which already do or are expected to provide energy efficiency and climate action funding include the following:

  - California Air Resources Board (CARB) – The final AB 32 Implementation Program is expected to collect revenues from GHG emissions producers through either a carbon fee or a cap and trade program. The use of these revenues has not been determined. UCSB recommends that the UCOP submit a recommendation to CARB to allocate a portion of revenues to energy efficiency projects in state funded buildings including the UC and state college campuses. Such an allocation will reduce GHG emissions as well as provide ongoing operating cost savings for the University, freeing up money for additional projects and education.

  - California Energy Commission (CEC) – The CEC provides funding through research grants and energy efficiency programs. The CEC will also be administering the American Recovery and Reinvestment Act funds for energy efficiency.

- Federal Programs – Federal government programs that can be used to provide funding for projects include:

  - Federal Tax Credits – The federal government provides tax credits for solar energy systems, wind energy systems, fuel cells, and energy-efficient commercial buildings. These credits cannot be received by the University but can be received by a private sector third party owner.

    - Department of Energy – Research grants.

- New Construction – Several mitigations are related to standards for new buildings. These measures will be incorporated into the building design and the cost will be covered within the capital budget for each project. Currently, the campus strives for LEED Gold in new construction and major renovations.

- Capital Plan – Energy efficiency and GHG emission reduction projects can be included in the Capital Plan. This is a rolling five-year plan that addresses capital improvements for the campus. Projects can be moved into the plan depending on priority.

- Department budgets – Measures taken by individual departments can be funded within their department budgets.

- UCSB research projects – U.S. Department of Energy and other research grants may be sought to advance the technology for measures of a research nature, such as methane capture from coastal seeps.

# 8 TRACKING PROGRESS

Sustainability Efforts are coordinated through the Office of Administrative Services. Although the sustainability organizational chart includes many different players crossing multiple departments, responsibility for tracking and assessing the progress of this plan is within Administrative Services. Within Administrative Services, the office includes a Sustainability Coordinator who works under the Associate Vice Chancellor for Administrative Services. Additionally, the Sustainability Coordinator and Associate Vice Chancellor work very closely with the Senior Associate Vice Chancellor, who oversees Campus Design and Facilities, Transportation and Parking Services and Housing and Residential Services. The Office produces a website (www.sustainability.ucsb.edu) and has overall responsibility for implementation of this CAP.

The Campus Sustainability Committee advises the Chancellor and campus administrators on matters of campus sustainability, makes recommendations on sustainability initiatives, helps prioritize and monitor the execution and progress of the Campus Sustainability Plan toward campus goals, makes recommendations on allocations of available funding resources, and provides guidance in the creation and fostering of alliances. The Committee will conduct an ongoing and thorough consultative process to solicit campus input in developing the vision to enhance the University's international leadership in this critically important area. These efforts will use the Campus Sustainability Plan and this CAP as blueprints for the campus's sustainability efforts.

Beginning in August 2010 and annually thereafter, UCSB reports progress in implementing this CAP to UCOP and the campus community. This report will include an assessment of:

- Campus performance for the previous year including total GHG emissions, progress toward targets and GHG emissions metrics.
- Record of mitigations implemented, effectiveness of all mitigations and explanation of mitigations that were not implemented.
- Campus growth and operational changes that occurred in the reporting year.
- Proposed changes in the CAP to improve performance or respond to policy changes.

In 2011 and then biennially thereafter, UCSB will submit a narrative progress report.

In addition, UCSB will continue to report GHG emissions information and planned reductions to the ACUPCC and the Association for Advancement of Sustainability in Higher Education (AASHE) through their websites and an annual GHG emissions inventory to The Climate Registry.

# 9 CONCLUSIONS AND RECOMMENDATIONS-

The campus is on track to meet the 2014 and 2020 targets with implementation of currently planned energy efficiency and emission reduction measures. Current and anticipated economic conditions of the UC system will affect funding for implementation of many planned projects, which could in turn slow progress toward achieving the near-term targets. Additional unidentified measures will be needed to achieve carbon neutrality by 2050 and offsets may be required to meet this final target.

Even with current economic constraints, there are a number of no-cost and low cost measures that can be pursued. These include:

- Develop and implement a campus-wide campaign to encourage behavioral changes to reduce energy usage, business air travel, GHG emissions and costs to the university.
- The campus is working towards decentralizing the utility budget for all campus buildings. Currently State-funded buildings are not charged for electricity, natural gas or water. UCSB plans to pilot the Utility Conservation Incentive Program in three academic buildings to start this process.
- Implement larger projects through contracts with private energy service companies (ESCO), or donors whereby the ESCO or philanthropic PPA provides the capital for a renewable energy or energy efficiency project and UCSB contracts to purchase power for a set period of time at a set price. These types of contracts enable the private third party to take advantage of tax savings and can be designed to allow for early buyout at a future date when capital may be more readily available to the university.
- Investigate external funding opportunities for energy efficiency, renewable energy and GHG emission reduction research and academic projects.

Economic conditions will continue to cycle and new solutions will continue to emerge. It is essential that the university maintain a consistent effort with the flexibility to adjust to changing conditions in order to achieve the ultimate target of GHG neutrality by 2050.

# 10 APPENDICES

## 10.1 UCSB PLANS AND COMMITMENTS

### Table A 1: Related Campus Plans and Commitments as of March 2009

| Plan | Description | Latest Version |
|---|---|---|
| Campus Sustainability Plan | A dynamic document intended to provide a roadmap for major steps toward achieving sustainability over the next 20 years. | April, 2008, Working Document |
| Long Range Development Plan, Vision 2025 | Encompasses the physical development, land use, transportation systems, open space areas, and infrastructure needed to achieve the academic goals of the campus through year 2025. | 2010 LRDP |
| Long Range Development Plan, Draft EIR | Evaluates and discloses environmental impacts of the LRDP as required by the California Environmental Quality Act. Includes mitigation measures that will reduce GHG emissions. | Final EIR |
| Strategic Academic Plan 2007 – 2025 | The SAP guides the LRDP for the next phase in UCSB's development and identifies strengths and opportunities as well as broad challenges that the campus faces. Once the LRDP is approved, then implementation of the broad goals of the SAP will be driven by the creative and entrepreneurial skills of the faculty and enabled by the administration. | 2007-2025 Academic Plan |
| AB32 Global Warming Solutions Act of 2006 | In response to Governor Schwarzenegger's Executive Order (S-3-05), the California Global Warming Solutions Act (Assembly Bill 32) was adopted in 2006. The law requires the CARB to adopt rules and regulations that would reduce greenhouse gas emissions statewide to 1990 levels by the year 2020. | AB-32 approved on September 27, 2006. The climate change section of the UC Policy on Sustainable Practices (March 2007) is consistent with AB-32. |
| AB 32 Scoping Plan | The AB 32 Scoping Plan contains the main strategies California will use to reduce greenhouse gases (GHG) that cause climate change. The Scoping Plan has a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, | These measures have been introduced through four workshops between November 30, 2007 and April 17, 2008. A draft |

| | | |
|---|---|---|
| | monetary and nonmonetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an administration fee to fund the program | Scoping Plan was released for public review and comment on June 26, 2008 followed by more workshops in July and August, 2008. The Proposed Scoping Plan was released on October 15, 2008 and approved at the Board hearing on December 12, 2008. In August 2011, the Scoping Plan was re-approved by the Board, and includes the Final Supplement to the Scoping Plan Functional Equivalent Document (FED). Draft Scoping Plan |
| American College & University Presidents Climate Commitment (ACUPCC) | The ACUPCC is a high-visibility effort by college and university presidents to address global warming. Signatories commit to eventually neutralize their institution's greenhouse gas emissions, and to help accelerate the research and educational efforts of higher education to equip society to re-stabilize the Earth's climate. | UC signed the ACUPCC on March 15, 2007. |
| Sustainability Tracking, Assessment & Rating System (STARS) | STARS is a collaborative effort to develop a formal classification system for campus sustainability, with guidelines by which institutions may measure themselves and qualify for different levels of recognition of accomplishment. The Association for the Advancement of Sustainability in Higher Education (AASHE) operates the STARS program and, in partnership with Second Nature and ecoAmerica, is providing implementation and administrative support for the ACUPCC initiative as well. | UCSB participated in STARS pilot program between February and December 2008.<br><br>UCSB will submit for rating by May 1, 2012<br><br>AASHE STARS |
| The Climate Registry (TCR) | The Climate Registry is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry. | UCSB began reporting GHG emissions to TCR in the 2010 reporting year. |
| Association for the Advancement of Sustainability in Higher Education (AASHE) | The Association for the Advancement of Sustainability in Higher Education (AASHE) operates the STARS program and, in partnership with Second Nature and ecoAmerica, is providing implementation and administrative support for the ACUPCC initiative as well. | AASHE |
| U.S. Green Building Council (USGBC) Leadership in Energy | LEED is a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. | • Bren Hall (2002) was first laboratory building in<br>• US to achieve NC-Platinum certification. |

| | | |
|---|---|---|
| and Environmental Design (LEED) | | • Grivetz Hall (2004) was first building in the UC to<br>• achieve EB-Silver certification.<br>• UCSB implemented NC-Silver as a minimum<br>• standard in 2004. (http://www.usgbc.org)<br>• MSRB certification, 2007.<br>• SRB, Silver 2008.<br>• Recreation Center, Silver 2008.<br>• San Clemente, Gold 2009.<br>• Education & Social Sci. Bldg, Silver 2010<br>• Engineering II Addition, Gold 2010<br>• Tripton Meeting House, Platinum, 2011<br>• OSEB, 2012<br>• Bioengineering, 2013<br>• Davidson Library. 2013<br>• North Campus Faculty Housing, In Review, 2011<br>• Life Sciences Buildings, Silver, 2010<br>• Harder Stadium Office Annex, Silver, 2011<br>• Kohn Hall, Silver, 2011<br>• Material Research Laboratory, Certified, 2011 |
| Talloires Declaration | Composed in 1990 at an international conference in Talloires, France, this is the first official statement made by university administrators of a commitment to environmental sustainability in higher education. The Talloires Declaration (TD) is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. It has been signed by over 350 university presidents and chancellors in over 40 countries. | Signed by UCSB chancellor in 1990.<br>Full Talloires Declaration |

## 10.2 CAMPUS EMISSIONS DATA & INFORMATION

### Table B 1: UCSB Demographics

| Year | Students | Faculty/Staff | Total Population | Calif OGSF |
|---|---|---|---|---|
| **1990** | 18,391 | 3,870 | 22,261 | 4,385,989 |
| **1991** | 18,519 | 3,825 | 22,344 | 4,407,300 |
| **1992** | 18,655 | 3,795 | 22,450 | 4,417,041 |
| **1993** | 18,581 | 3,840 | 22,421 | 4,399,750 |
| **1994** | 17,834 | 3,863 | 21,697 | 4,555,371 |
| **1995** | 18,224 | 3,922 | 22,146 | 4,641,618 |
| **1996** | 18,531 | 4,118 | 22,649 | 4,834,028 |
| **1997** | 18,940 | 4,094 | 23,034 | 4,953,109 |
| **1998** | 19,363 | 4,177 | 23,540 | 4,943,327 |
| **1999** | 20,056 | 4,177 | 24,233 | 4,995,616 |
| **2000** | 19,962 | 4,344 | 24,306 | 4,956,902 |
| **2001** | 20,373 | 4,321 | 24,694 | 4,971,128 |
| **2002** | 20,559 | 4,275 | 24,834 | 5,039,013 |
| **2003** | 20,847 | 4,642 | 25,489 | 5,044,098 |
| **2004** | 21,026 | 4,627 | 25,653 | 5,194,757 |
| **2005** | 21,016 | 4,629 | 25,645 | 5,846,097 |
| **2006** | 21,082 | 4,834 | 25,916 | 6,332,012 |
| **2007** | 21,410 | 4,947 | 26,357 | 7,034,889 |
| **2008** | 21,868 | 5,240 | 27,108 | 7,106,531 |
| **2009** | 22,850 | 5,175 | 28,025 | 7,309,577 |
| **2010** | 22,218 | 4,906 | 27,124 | 7,971,792 |
| **2011** | 22,551 | 5,019 | 27,571 | 8,123,500 |
| **2012** | 22,885 | 5,133 | 28,017 | 8,275,209 |
| **2013** | 23,218 | 5,246 | 28,464 | 8,426,917 |

| | | | | |
|---|---|---|---|---|
| **2014** | 23,551 | 5,359 | 28,910 | 8,578,625 |
| **2015** | 23,885 | 5,473 | 29,357 | 8,730,334 |
| **2016** | 24,218 | 5,586 | 29,804 | 8,882,042 |
| **2017** | 24,551 | 5,699 | 30,250 | 9,033,750 |
| **2018** | 24,884 | 5,812 | 30,697 | 9,185,458 |
| **2019** | 25,218 | 5,926 | 31,143 | 9,337,167 |
| **2020** | 25,551 | 6,039 | 31,590 | 9,488,875 |

## Table B 2: UCSB Scope 1 Emissions (BAU)

| Year | Scope 1 - Stationary Combustion (Campus) | Scope 1 - Stationary Combustion (Other) | On-Site Combustion | On-Site Combustion per SF | On-Site Combustion per Capita | Scope 1 - Mobile Combustion | Scope 1 - Fugitive Emissions |
|---|---|---|---|---|---|---|---|
| **1990** | 11,281 | 1,996 | 13,277 | 3.03 | 596 | 1,004 | 10 |
| **1991** | 11,652 | 1,998 | 13,650 | 3.10 | 611 | 1,007 | 10 |
| **1992** | 12,022 | 2,001 | 14,023 | 3.17 | 625 | 1,012 | 10 |
| **1993** | 12,393 | 2,004 | 14,397 | 3.27 | 642 | 1,010 | 10 |
| **1994** | 12,764 | 2,007 | 14,771 | 3.24 | 681 | 979 | 10 |
| **1995** | 13,135 | 2,010 | 15,145 | 3.26 | 684 | 999 | 10 |
| **1996** | 13,507 | 2,014 | 15,521 | 3.21 | 685 | 1,020 | 10 |
| **1997** | 13,583 | 2,015 | 15,598 | 3.15 | 677 | 1,037 | 10 |
| **1998** | 15,335 | 2,028 | 17,362 | 3.51 | 738 | 1,058 | 10 |
| **1999** | 17,032 | 2,040 | 19,072 | 3.82 | 787 | 1,088 | 10 |
| **2000** | 15,862 | 2,031 | 17,893 | 3.61 | 736 | 1,091 | 10 |
| **2001** | 15,557 | 2,029 | 17,587 | 3.54 | 712 | 1,108 | 10 |
| **2002** | 15,178 | 2,027 | 17,205 | 3.41 | 693 | 1,114 | 10 |
| **2003** | 12,805 | 2,010 | 14,815 | 2.94 | 581 | 1,142 | 10 |
| **2004** | 13,808 | 2,018 | 15,826 | 3.05 | 617 | 1,149 | 10 |
| **2005** | 16,297 | 2,696 | 18,993 | 3.25 | 741 | 1,148 | 10 |
| **2006** | 16,443 | 2,700 | 19,143 | 3.02 | 739 | 1,160 | 10 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2007** | 18,291 | 2,716 | 21,007 | 2.99 | 797 | 1,179 | 10 |
| **2008** | 18,124 | 2,715 | 20,840 | 2.93 | 769 | 1,211 | 10 |
| **2009** | 19,059 | 2,723 | 21,782 | 2.98 | 777 | 1,250 | 10 |
| **2010** | 19,630 | 2,729 | 22,359 | 2.80 | 824 | 1,212 | 10 |
| **2011** | 20,615 | 2,743 | 23,358 | 2.88 | 847 | 1,231 | 10 |
| **2012** | 21,000 | 2,741 | 23,741 | 2.87 | 847 | 1,250 | 10 |
| **2013** | 21,385 | 2,745 | 24,130 | 2.86 | 848 | 1,269 | 10 |
| **2014** | 21,770 | 2,748 | 24,518 | 2.86 | 848 | 1,288 | 10 |
| **2015** | 22,155 | 2,752 | 24,907 | 2.85 | 848 | 1,307 | 10 |
| **2016** | 22,540 | 2,756 | 25,295 | 2.85 | 849 | 1,326 | 10 |
| **2017** | 22,925 | 2,759 | 25,684 | 2.84 | 849 | 1,345 | 10 |
| **2018** | 23,310 | 2,763 | 26,072 | 2.84 | 849 | 1,365 | 10 |
| **2019** | 23,695 | 2,766 | 26,461 | 2.83 | 850 | 1,384 | 10 |
| **2020** | 24,080 | 2,770 | 26,849 | 2.83 | 850 | 1,403 | 10 |

## Table B 3: UCSB Scope 2 Emissions (BAU)

| Year | Scope 2 - Purchased Electricity (Campus) | Scope 2 - Purchased Electricity (Other) |
|---|---|---|
| **1990** | 34,355 | 1,000 |
| **1991** | 34,801 | 1,005 |
| **1992** | 35,248 | 1,009 |
| **1993** | 35,694 | 1,014 |
| **1994** | 36,140 | 1,019 |
| **1995** | 36,587 | 1,023 |
| **1996** | 37,033 | 1,028 |
| **1997** | 38,240 | 1,044 |
| **1998** | 41,932 | 1,083 |
| **1999** | 41,162 | 1,075 |
| **2000** | 38,534 | 1,047 |
| **2001** | 34,096 | 939 |
| **2002** | 29,166 | 825 |
| **2003** | 25,282 | 722 |
| **2004** | 23,021 | 636 |
| **2005** | 24,685 | 1,374 |
| **2006** | 25,753 | 1,385 |
| **2007** | 26,265 | 1,390 |
| **2008** | 27,609 | 1,404 |
| **2009** | 28,055 | 1,431 |
| **2010** | 27,974 | 1,450 |
| **2011** | 30,961 | 1,483 |
| **2012** | 27,575 | 1,302 |
| **2013** | 28,080 | 1,307 |
| **2014** | 28,586 | 1,313 |

| | | |
|---|---|---|
| **2015** | 29,091 | 1,318 |
| **2016** | 24,393 | 1,090 |
| **2017** | 24,810 | 1,095 |
| **2018** | 25,226 | 1,099 |
| **2019** | 25,643 | 1,103 |
| **2020** | 26,060 | 1,108 |

## Table B 4: UCSB Purchased Electricity (BAU)

| Year | Purchased Electricity | Purchased Electricity per SF | Purchased Electricity per Capita | Purchased Electricity plus Onsite Combustion per SF |
|---|---|---|---|---|
| **1990** | 35,356 | 8.06 | 1,588 | 11 |
| **1991** | 35,806 | 8.12 | 1,603 | 11 |
| **1992** | 36,257 | 8.21 | 1,615 | 11 |
| **1993** | 36,708 | 8.34 | 1,637 | 12 |
| **1994** | 37,159 | 8.16 | 1,713 | 11 |
| **1995** | 37,610 | 8.10 | 1,698 | 11 |
| **1996** | 38,061 | 7.87 | 1,680 | 11 |
| **1997** | 39,285 | 7.93 | 1,706 | 11 |
| **1998** | 43,014 | 8.70 | 1,827 | 12 |
| **1999** | 42,237 | 8.45 | 1,743 | 12 |
| **2000** | 39,581 | 7.99 | 1,628 | 12 |
| **2001** | 35,035 | 7.05 | 1,419 | 11 |
| **2002** | 29,992 | 5.95 | 1,208 | 9 |
| **2003** | 26,004 | 5.16 | 1,020 | 8 |
| **2004** | 23,657 | 4.55 | 922 | 8 |
| **2005** | 26,059 | 4.46 | 1,016 | 8 |
| **2006** | 27,138 | 4.29 | 1,047 | 7 |
| **2007** | 27,655 | 3.93 | 1,049 | 7 |
| **2008** | 29,013 | 4.08 | 1,070 | 7 |
| **2009** | 29,486 | 4.03 | 1,052 | 7 |

| | | | | |
|---|---|---|---|---|
| **2010** | 29,425 | 3.69 | 1,085 | 6 |
| **2011** | 32,445 | 3.99 | 1,177 | 7 |
| **2012** | 28,877 | 3.49 | 1,031 | 6 |
| **2013** | 29,388 | 3.49 | 1,032 | 6 |
| **2014** | 29,898 | 3.49 | 1,034 | 6 |
| **2015** | 30,409 | 3.48 | 1,036 | 6 |
| **2016** | 25,483 | 2.87 | 855 | 6 |
| **2017** | 25,904 | 2.87 | 856 | 6 |
| **2018** | 26,325 | 2.87 | 858 | 6 |
| **2019** | 26,746 | 2.86 | 859 | 6 |
| **2020** | 27,167 | 2.86 | 860 | 6 |

## Table B 5: UCSB Scope 3 Emissions (BAU)

| Year | Scope 3 - Air Travel | Scope 3 - Commuting |
|---|---|---|
| **1990** | 16,705 | 19,166 |
| **1991** | 16,199 | 19,196 |
| **1992** | 16,484 | 19,227 |
| **1993** | 16,207 | 19,258 |
| **1994** | 16,876 | 19,288 |
| **1995** | 16,727 | 19,319 |
| **1996** | 17,733 | 19,350 |
| **1997** | 17,846 | 19,380 |
| **1998** | 18,518 | 19,411 |
| **1999** | 19,144 | 19,442 |

| | | |
|---|---|---|
| **2000** | 19,668 | 19,472 |
| **2001** | 21,431 | 18,782 |
| **2002** | 22,815 | 18,091 |
| **2003** | 24,762 | 17,400 |
| **2004** | 24,932 | 16,710 |
| **2005** | 24,397 | 16,019 |
| **2006** | 24,034 | 15,328 |
| **2007** | 24,320 | 14,638 |
| **2008** | 24,529 | 13,947 |
| **2009** | 28,127 | 13,256 |
| **2010** | 24,248 | 12,566 |
| **2011** | 24,808 | 12,773 |
| **2012** | 25,368 | 12,980 |
| **2013** | 25,928 | 13,186 |
| **2014** | 26,488 | 13,393 |
| **2015** | 27,048 | 13,600 |
| **2016** | 27,608 | 13,807 |
| **2017** | 28,168 | 14,014 |
| **2018** | 28,728 | 14,221 |
| **2019** | 29,288 | 14,428 |
| **2020** | 29,848 | 14,635 |

## Table B 6: UCSB Total Carbon Dioxide Emissions (BAU)

| Year | TOTAL CO2e |
|---|---|
| 1990 | 90,736 |
| 1991 | 90,400 |
| 1992 | 90,817 |
| 1993 | 92,068 |
| 1994 | 92,678 |
| 1995 | 93,769 |
| 1996 | 94,892 |
| 1997 | 96,240 |
| 1998 | 102,199 |
| 1999 | 103,023 |
| 2000 | 99,699 |
| 2001 | 94,262 |
| 2002 | 88,136 |
| 2003 | 83,194 |
| 2004 | 81,334 |
| 2005 | 86,462 |
| 2006 | 88,337 |
| 2007 | 90,905 |
| 2008 | 93,281 |
| 2009 | 93,973 |

| | |
|---|---|
| **2010** | **92,563** |
| **2011** | **97,706** |
| **2012** | **95,662** |
| **2013** | **97,716** |
| **2014** | **99,787** |
| **2015** | **101,873** |
| **2016** | **98,540** |
| **2017** | **100,569** |
| **2018** | **102,615** |
| **2019** | **104,677** |
| **2020** | **106,757** |

## Table B 7: UCSB Scope 1 Emissions (After Reduction Measures)

| Year | Scope 1 - Stationary Combustion (Campus) | Scope 1 - Stationary Combustion (Other) | Scope 1 - Mobile Combustion | Scope 1 - Fugitive Emissions |
|---|---|---|---|---|
| **1990** | 11,281 | 1,996 | 1,004 | 10 |
| **1991** | 11,652 | 1,998 | 1,007 | 10 |
| **1992** | 12,022 | 2,001 | 1,012 | 10 |
| **1993** | 12,393 | 2,004 | 1,010 | 10 |
| **1994** | 12,764 | 2,007 | 979 | 10 |
| **1995** | 13,135 | 2,010 | 999 | 10 |
| **1996** | 13,507 | 2,014 | 1,020 | 10 |

| | | | | |
|---|---|---|---|---|
| **1997** | 13,583 | 2,015 | 1,037 | 10 |
| **1998** | 15,335 | 2,028 | 1,058 | 10 |
| **1999** | 17,032 | 2,040 | 1,088 | 10 |
| **2000** | 15,862 | 2,031 | 1,091 | 10 |
| **2001** | 15,557 | 2,029 | 1,108 | 10 |
| **2002** | 15,178 | 2,027 | 1,114 | 10 |
| **2003** | 12,805 | 2,010 | 1,142 | 10 |
| **2004** | 13,808 | 2,018 | 1,149 | 10 |
| **2005** | 16,297 | 2,696 | 1,148 | 10 |
| **2006** | 16,443 | 2,700 | 1,160 | 10 |
| **2007** | 18,291 | 2,716 | 1,179 | 10 |
| **2008** | 18,124 | 2,715 | 1,211 | 10 |
| **2009** | 19,059 | 2,723 | 1,250 | 10 |
| **2010** | 19,630 | 2,729 | 1,212 | 10 |
| **2011** | 20,615 | 2,743 | 1,231 | 10 |
| **2012** | 21,000 | 2,741 | 1,250 | 10 |
| **2013** | 21,385 | 2,745 | 1,269 | 10 |
| **2014** | 21,770 | 2,748 | 1,288 | 10 |
| **2015** | 22,155 | 2,752 | 1,307 | 10 |
| **2016** | 22,540 | 2,756 | 1,326 | 10 |
| **2017** | 22,925 | 2,759 | 1,345 | 10 |
| **2018** | 23,310 | 2,763 | 1,365 | 10 |
| **2019** | | | | |

| | | | | |
|---|---|---|---|---|
| | 23,695 | 2,766 | 1,384 | 10 |
| **2020** | 24,080 | 2,770 | 1,403 | 10 |

## Table B 8: UCSB Scope 2 Emissions (After Reduction Measures)

| Year | Scope 2 - Purchased Electricity (Campus) | Scope 2 - Purchased Electricity (Other) |
|---|---|---|
| **1990** | 34,355 | 1,000 |
| **1991** | 34,801 | 1,005 |
| **1992** | 35,248 | 1,009 |
| **1993** | 35,694 | 1,014 |
| **1994** | 36,140 | 1,019 |
| **1995** | 36,587 | 1,023 |
| **1996** | 37,033 | 1,028 |
| **1997** | 38,240 | 1,044 |
| **1998** | 41,932 | 1,083 |
| **1999** | 41,162 | 1,075 |
| **2000** | 38,534 | 1,047 |
| **2001** | 34,096 | 939 |
| **2002** | 29,166 | 825 |
| **2003** | 25,282 | 722 |
| **2004** | 23,021 | 636 |
| **2005** | 24,685 | 1,374 |

| | | |
|---|---|---|
| **2006** | 25,753 | 1,385 |
| **2007** | 26,265 | 1,390 |
| **2008** | 27,609 | 1,404 |
| **2009** | 28,055 | 1,431 |
| **2010** | 27,974 | 1,450 |
| **2011** | 30,961 | 1,483 |
| **2012** | 27,575 | 1,302 |
| **2013** | 28,080 | 1,307 |
| **2014** | 28,586 | 1,313 |
| **2015** | 29,091 | 1,318 |
| **2016** | 24,393 | 1,090 |
| **2017** | 24,810 | 1,095 |
| **2018** | 25,226 | 1,099 |
| **2019** | 25,643 | 1,103 |
| **2020** | 26,060 | 1,108 |

## Table B 9: UCSB Scope 3 Emissions (After Reduction Measures)

| Year | Scope 3 - Air Travel | Scope 3 - Commuting |
|---|---|---|
| **1990** | 21,925 | 19,166 |
| **1991** | 20,729 | 19,196 |

| | | |
|---|---|---|
| **1992** | 20,288 | 19,227 |
| **1993** | 20,685 | 19,258 |
| **1994** | 20,469 | 19,288 |
| **1995** | 20,686 | 19,319 |
| **1996** | 20,930 | 19,350 |
| **1997** | 20,931 | 19,380 |
| **1998** | 21,343 | 19,411 |
| **1999** | 21,175 | 19,442 |
| **2000** | 21,651 | 19,472 |
| **2001** | 21,740 | 18,782 |
| **2002** | 21,724 | 18,091 |
| **2003** | 23,823 | 17,400 |
| **2004** | 23,983 | 16,710 |
| **2005** | 24,233 | 16,019 |
| **2006** | 25,559 | 15,328 |
| **2007** | 26,417 | 14,638 |
| **2008** | 28,260 | 13,947 |
| **2009** | 28,188 | 13,256 |
| **2010** | 26,991 | 12,566 |
| **2011** | 27,890 | 12,773 |
| **2012** | 28,804 | 12,980 |
| **2013** | 29,734 | 13,186 |
| **2014** | 30,679 | 13,393 |
| **2015** | 31,640 | 13,600 |

| | | |
|---|---|---|
| **2016** | 32,617 | 13,807 |
| **2017** | 33,611 | 14,014 |
| **2018** | 34,622 | 14,221 |
| **2019** | 35,649 | 14,428 |
| **2020** | 36,693 | 14,635 |

## Table B 10: UCSB Total Carbon Dioxide Emissions (After Reduction Measures)

| Year | TOTAL CO2e |
|---|---|
| **1990** | **90,736** |
| **1991** | **90,400** |
| **1992** | **90,817** |
| **1993** | **92,068** |
| **1994** | **92,678** |
| **1995** | **93,769** |
| **1996** | **94,892** |
| **1997** | **96,240** |
| **1998** | **102,199** |
| **1999** | **103,023** |
| **2000** | **99,699** |
| **2001** | **94,262** |
| **2002** | **88,136** |

| | |
|---|---|
| 2003 | 83,194 |
| 2004 | 81,334 |
| 2005 | 86,462 |
| 2006 | 88,337 |
| 2007 | 90,905 |
| 2008 | 93,281 |
| 2009 | 93,973 |
| 2010 | 92,563 |
| 2011 | 96,688 |
| 2012 | 92,826 |
| 2013 | 91,791 |
| 2014 | 91,833 |
| 2015 | 92,843 |
| 2016 | 89,423 |
| 2017 | 86,267 |
| 2018 | 87,394 |
| 2019 | 88,598 |
| 2020 | 89,791 |

## 10.3 STRATEGIC ENERGY PARTNERSHIP PROJECT LIST 2010-2016

### Table C 1 : Project Type - 'Equipment'*

| Year | Project Name | Cost | Payback (years) | Electricity Saved (kWH/yr) | GHG Reduction MTCO2e/year |
|---|---|---|---|---|---|
| **2012** | PC Thin Client Network | $93,312 | 1.1 | 270,123 | 73 |
| **2013** | Server Consolidation/Virtualization | $50,000 | 1.9 | 116,432 | 31 |
| **2014-2016** | Server Consolidation/Virtualization | $200,000 | 5.9 | 240,000 | 65 |
| **TOTAL** | | **343,312** | | **626,555** | **169** |

## Table C 2 : Project Type - 'Lighting Systems'*

| Year | Project Name | Cost | Payback (years) | Electricity Saved (kWH/yr) | GHG Reduction MTCO2e/year |
|---|---|---|---|---|---|
| **2010** | Mesa Parking Lighting | $169,860 | 5.6 | 212,430 | 57 |
| **2010** | Housing Lighting Retrofit | $45,672 | 2.4 | 95,700 | 26 |
| **2011** | Event Center Lighting Retrofit | $232,903 | 8.0 | 223,832 | 60 |
| **2011** | Stairwell Lighting Retrofit | $135,179 | 18.0 | 66,380 | 18 |
| **2011** | North Hall Lighting Retrofit | $151,680 | 16.6 | 79,650 | 22 |
| **2011** | Marine Biotech Lighting Retrofit | $112,600 | 20.0 | 50,258 | 14 |
| **2012** | MSRB Lighting | $67,771 | 7.4 | 69,293 | 19 |
| **2012** | Girvetz Hall Lighting | $83,648 | 11.2 | 61,684 | 17 |
| **2012** | Buchanan Hall Lighting | $97,798 | 10.2 | 77,773 | 21 |
| **2012** | Kerr Hall Lighting | $120,815 | 22.5 | 48,528 | 13 |

| | | | | | |
|---|---|---|---|---|---|
| **2012** | MAC Lighting | $19,583 | 6.4 | 22,250 | 6 |
| **2012** | Rec Cen Lighting | $62,645 | 19.9 | 28,137 | 8 |
| **2012** | South Hall Lighting | $295,266 | 11.7 | 208,777 | 56 |
| **2012** | Ellison Hall Lighting | $105,390 | 5.5 | 132,986 | 36 |
| **2012** | Bio II Lighting | $94,911 | 5.6 | 118,485 | 32 |
| **2012** | San Clemente Lighting | $95,000 | 10.3 | 74,760 | 20 |
| **2012** | Rob Gym Lighting | $63,710 | 7.3 | 65,979 | 18 |
| **2012** | Davidson Library Lighting | $500,000 | 7.6 | 500,000 | 135 |
| **2012** | Phelps Hall Lighting | $500,149 | 12.7 | 331,424 | 89 |
| **2013** | Housing & Residential Services Lighting Projects | $100,000 | 7.6 | 100,000 | 27 |
| **2013** | ICA Lighting Retrofit | $17,000 | 7.6 | 17,000 | 5 |
| **2013** | ICA Lighting Controls | $129,082 | 11.1 | 95,457 | 26 |
| **2013** | MAC Hockey Gym Lighting | $44,000 | 6.3 | 50,625 | 14 |
| **2013** | Rec Cen Pavillion Lighting | $47,000 | 6.1 | 55,350 | 15 |
| **2013** | Rec Cen  Gym Lighting | $47,000 | 6.1 | 55,350 | 15 |
| **2013** | Lighting Retrofits | $1,000,000 | 7.6 | 1,000,000 | 270 |
| **2014-16** | Housing & Residential Services Lighting Projects | $200,000 | 7.6 | 200,000 | 54 |
| **2014-16** | MSRB Lighting | $179,862 | 9.2 | 154,771 | 42 |
| **2014-16** | Snidecor Hall Lighting | $179,862 | 9.2 | 154,771 | 42 |
| **2014-16** | State Funded Bldg TBD Lighting Retrofits | $500,000 | 7.6 | 500,000 | 135 |
| **2014-16** | Solatube Retrofits with Lighting Controls | $50,000 | 10.1 | 40,000 | 11 |

| | | | | | |
|---|---|---|---|---|---|
| **2014-16** | LED Roadway Lighting | $878,599 | 44.2 | 188,467 | 51 |
| **TOTAL** | | **$6,326,985** | | **5,080,117** | **1,372** |

## Table C 3 : Project Type - 'HVAC' *

| Year | Project Name | Cost | Payback (years) | Electricity Saved (kWH/yr) | Natural Gas Saved (therms/yr) | GHG Reduction MTCO2e/year |
|---|---|---|---|---|---|---|
| **2010** | Bio II AHU Upgrade | $516,685 | 13.1 | 332,685 | - | 90 |
| **2010** | Chilled Water Loop Extension | $712,000 | 17.4 | 359,675 | - | 97 |
| **2011** | CNSI Server Replacement | $116,640 | 1.9 | 270,012 | - | 73 |
| **2011** | Bren Hall Lab Vent Upgrade | $350,000 | 12.0 | 39,906 | 28 | 11 |
| **2011** | De La Guerra Kitchen Hoods | $146,706 | 5.5 | 159,689 | 3,901 | 64 |
| **2011** | Bio II Heating Boilers | $806,000 | 13.0 | - | 70,725 | 375 |
| **2011** | North Hall Data Center Upgrade | $340,000 | 7.2 | 352,799 | - | 95 |
| **2011** | North Hall Data Center Ventilation | $65,000 | 22.4 | 26,127 | - | 7 |
| **2011** | Bio II Lab (Cage Wash) Infrastructure Improvement | $50,000 | 3.6 | 18,506 | 10,140 | 59 |
| **2012** | Bio II Chiller Retrofit | $2,450,000 | 11.4 | 1,778,785 | - | 480 |
| **2012** | Santa Catalina Thermal Retrofit | $70,000 | 5.7 | - | 19,165 | 102 |
| **2012** | Santa Catalina Electrical Retrofit | $70,000 | 5.7 | 41,415 | - | 11 |
| **2012** | Campus Hot Water Loop | $3,200,000 | 69.3 | 73,213 | 47,421 | 271 |
| **2013** | Housing HVAC Projects | $200,000 | 7.3 | 100,000 | 15,000 | 107 |
| **2013** | MSRB: Exhaust Fan | $75,000 | 2.9 | 142,499 | - | 38 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Control per Wind Velocity | | | | | |
| **2013** | Event Center AHU Retrofit | $200,000 | 47.5 | 24,440 | 2,000 | 17 |
| **2013** | Broida Hall Lab Ventilation Aircuity Upgrade | $1,000,000 | 6.5 | 319,835 | 115,722 | 700 |
| **2013** | Noble Hall Lab Ventilation Aircuity Upgrade | $317,771 | 6.5 | 101,655 | 36,773 | 223 |
| **2013** | Chilled Water Loop Optimization | $400,000 | 3.3 | 699,750 | - | 189 |
| **2013** | Bren Hall: Exhaust Fan Control per Wind Velocity | $50,000 | 3.0 | 92,535 | - | 25 |
| **2014-16** | Housing HVAC Projects | $400,000 | 7.3 | 200,000 | 30,000 | 213 |
| **2014-16** | MSRB Lab Ventilation Aircuity Upgrade | $424,132 | 6.5 | 135,652 | 49,081 | 297 |
| **2014-16** | CNSI Lab Ventilation Aircuity Upgrade | $801,563 | 6.5 | 256,007 | 92,759 | 561 |
| **2014-16** | Eng. Sciences Lab Ventilation Aircuity Upgrade | $631,619 | 6.5 | 202,014 | 73,130 | 442 |
| **2014-16** | Life Sciences Lab Ventilation Aircuity Upgrade | $561,496 | 6.5 | 179,586 | 65,011 | 393 |
| **2014-16** | Rob Gym Ventilation Upgrade | $72,780 | 3.0 | 40,871 | 15,013 | 91 |
| **2014-16** | Conversion of Six Open Equip Cool Loops to Closed | $600,000 | 9.6 | 500,000 | - | 135 |
| **2014-16** | Solar Thermal & HW Loop exp to CNSI, ESB | $3,000,000 | 18.5 | 210,390 | 162,000 | 916 |
| **2014-16** | Chilled Loop Extension to Kerr, Cheadle | $900,000 | 35.4 | 238,350 | - | 64 |
| **TOTAL** | | **$18,527,393** | | **6,896,397** | **807,869** | **6,184** |

## Table C 4 : Project Type - 'MCBx'* (Continued in the next page)

| Year | Project Name | Cost | Payback (years) | Electricity Saved (kWH/yr) | Natural Gas Saved (therms/yr) | GHG Reduction MTCO2e/year |
|---|---|---|---|---|---|---|
| **2010** | Bio II MBCx | $350,000 | 0.6 | 895,131 | 55,326 | 535 |
| **2011** | CNSI MBCx | $520,000 | 1.2 | 1,356,546 | 18,361 | 464 |
| **2011** | Snidecor Hall MBCx | $53,546 | 3.6 | 50,000 | 6,000 | 45 |
| **2011** | Carillo Dining Commons MBCx | $790,000 | 12.9 | 156,330 | 48,740 | 301 |
| **2011** | Santa Cruz Housing Comissioning | $392,000 | 27.7 | 72,390 | 7,492 | 59 |
| **2012** | Psychology MBCx | $170,000 | 14.2 | 80,000 | 3,000 | 38 |
| **2012** | Broida MBCx | $430,000 | 7.7 | 250,000 | 25,000 | 200 |
| **2012** | Life Sciences MBCx | $100,000 | 0.7 | 250,000 | 15,000 | 147 |
| **2012** | Environmental Health & Safety MBCx | $45,000 | 9.7 | 30,000 | 1,000 | 13 |
| **2012** | Santa Rosa MBCx | $385,500 | 76.0 | - | 6,241 | 33 |
| **2013** | 2013 TBD MBCx | $100,000 | 5.1 | 100,000 | 5,000 | 54 |
| **2013** | Davidson Library MBCx | $300,000 | 7.5 | 250,000 | 7,500 | 107 |
| **2014-16** | San Rafael MBCx | $51,974 | 3.5 | 47,334 | 6,455 | 47 |
| **2014-16** | San Nicolas MBCx | $71,823 | 3.5 | 65,412 | 8,920 | 65 |
| **2014-16** | San Miguel MBCx | $72,215 | 3.5 | 65,769 | 8,968 | 65 |
| **2014-16** | 2014 TBD MBCx | $400,000 | 5.1 | 400,000 | 20,000 | 214 |
| **2014-16** | MAC MBCx | $45,288 | 3.5 | 41,244 | 5,624 | 41 |
| **2014-16** | Ellison Hall MBCx | $55,440 | 1.2 | 87,177 | 11,888 | 87 |
| **2014-16** | Chemistry MBCx | $163,888 | 2.8 | 235,817 | 13,112 | 133 |
| **2014-16** | South Hall MBCx | $111,372 | 7.9 | 80,921 | 3,763 | 42 |
| **2014-16** | Web Hall MBCx | $55,440 | 6.1 | 33,558 | 4,576 | 33 |
| **2014-16** | Events Center MBCx | $54,335 | 3.5 | 49,485 | 6,748 | 49 |
| **2014-16** | Psychology Addition MBCx | $27,153 | 8.1 | 1,750 | 3,372 | 18 |
| **2014-16** | PSB North MBCx | $163,785 | 4.7 | 204,983 | 3,733 | 75 |
| **2014-16** | Cheadle Hall MBCx | $100,000 | 4.8 | 60,000 | 11,888 | 79 |
| **2014-16** | OSEB Commissioning | $25,000 | 14.3 | 15,000 | - | 4 |
| **2014-16** | Davidson Library Expansion Commissioning | $163,785 | 4.7 | 204,983 | 3,733 | 75 |
| **TOTAL** | | **$5,197,544** | | **5,083,830** | **311,440** | **3,025** |

## Table C 5 : RPS Adjusted SCE Emissions Factors Used between 2012 and 2020

| Year | Purchased Electricity in kWh | | | |
|---|---|---|---|---|
| | Purchased Electricity CO2 [lbs/MWh) | Purchased Electricity CH4 [lbs/GWh) | Purchased Electricity N2O [lbs/GWh) | Purchased Electricity CO2e [lbs/MWh) |
| 1990 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1991 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1992 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1993 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1994 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1995 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1996 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1997 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1998 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 1999 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 2000 | 1067.04000 | 28.29170 | 6.23160 | 1069.56592 |
| 2001 | 963.82750 | 28.29170 | 6.23160 | 966.35342 |
| 2002 | 860.61500 | 28.29170 | 6.23160 | 863.14092 |
| 2003 | 757.40250 | 28.29170 | 6.23160 | 759.92842 |
| 2004 | 654.19000 | 28.29170 | 6.23160 | 656.71592 |
| 2005 | 654.19000 | 28.29170 | 6.23160 | 656.71592 |
| 2006 | 654.19000 | 28.29170 | 6.23160 | 656.71592 |
| 2007 | 654.19000 | 28.29170 | 6.23160 | 656.71592 |
| 2008 | 654.19000 | 28.29170 | 6.23160 | 656.71592 |
| 2009 | 667.60000 | 28.29170 | 6.23160 | 670.12592 |
| 2010 | 681.01000 | 28.29170 | 6.23160 | 683.53592 |
| 2011 | 681.01000 | 28.29170 | 6.23160 | 683.53592 |
| 2012 | 595.31290 | 25.74545 | 5.67076 | 597.61149 |
| 2013 | 595.31290 | 25.74545 | 5.67076 | 597.61149 |
| 2014 | 595.31290 | 25.74545 | 5.67076 | 597.61149 |
| 2015 | 595.31290 | 25.74545 | 5.67076 | 597.61149 |
| 2016 | 490.64250 | 21.21878 | 4.67370 | 492.53694 |

| | | | | |
|---|---|---|---|---|
| **2017** | 490.64250 | 21.21878 | 4.67370 | 492.53694 |
| **2018** | 490.64250 | 21.21878 | 4.67370 | 492.53694 |
| **2019** | 490.64250 | 21.21878 | 4.67370 | 492.53694 |
| **2020** | 490.64250 | 21.21878 | 4.67370 | 492.53694 |

## *Note – Figures Are Not Adjusted For Inflation or RPS Adjusted SCE Emissions

## 10.4 EDUCATION, RESEARCH AND COMMUNITY OUTREACH EFFORTS

### 10.4.1 CLIMATE CHANGE CURRICULUM, CO-CURRICULAR & RESEARCH OBJECTIVES

### Introduction

The University of California Santa Barbara has established a leadership role in research and curriculum related to Climate Change. At least eight departments offer courses related to climate change and at least six departments house researchers actively studying climate change. In total there are at least 26 faculty across the university are specifically researching climate change. The UCSB Academic Senate established a Sustainability Work Group (SWG) in Fall 2008 to develop programs and policies related to sustainability in curriculum and research. The SWG is charged with the development and updating of the curriculum and research sections of both the Climate Action Plan and the Sustainability Plan.

**Summary of Goals**

| **Short-Term (2012-2014)** | **Mid-Term (2014-2020)** | **Long Term (2020-2050)** |
|---|---|---|

| Climate Action Plan | | | | |
|---|---|---|---|---|
| | Strategic Planning | • Develop a strategy to address the loss of climate change research faculty that can be executed with immediacy | • Execute a cluster hire of climate change research faculty (Early in Mid-term)<br>• Create and execute a plan to address the next wave of retirements (Early in Mid-term) | • Initiate a long term strategy to maintain and grow our environmental science and climate change research faculty |
| | Research | • Further develop UCSB Sustainability Website on Sustainable Research | • Expand on existing interdisciplinary research collaborations | • Develop a fellowship program for undergraduate and graduate researchers |
| | Curriculum | • Promote existing courses related to climate change | • Create a Climate Change identification in the UCSB course catalog<br>• Develop a funding source to encourage the development of climate change courses | • Document climate change curriculum and share with other universities globally |
| | Co-Curricular Activities | • Assess current co-curricular activities available to students to identify critical gaps | • Develop a climate change student peer educators program<br>• Highlight existing demonstration projects on campus and develop new demonstrations | • Develop 2-3 new large-scale demonstration projects that would engage campus researchers, link to curriculum, and set UCSB in a leadership position. |

| | | | |
|---|---|---|---|
| Outreach | • Expand on the current UCSB Speaker's Bureau to promote awareness of climate change in the local community | • Promote faculty engagement in local climate change projects where their expertise can be used effectively. | • Develop community-based research projects in the local community that engage multi-disciplinary teams of researchers |

## Short-term Goals (Present Day to 2014)

Goal: Develop a strategy to address the loss of climate change research faculty that can be executed with immediacy

Background and Existing Programs:

UCSB established its leadership role in environmental science and climate change in the 1970s. The faculty who created this foundation have been and are retiring. As an institution, we must act quickly to replace the faculty who have already retired and prepare for the retirements that are about to occur. If this crisis is not addressed with immediacy, we are unlikely to be able to accomplish any of our other objectives related to climate change in curriculum and research. A similar goal addressing the broader loss of environmental science faculty also appears in the Sustainability Plan.

Relevant Actions:

a. Circulate a letter of concern authored by the Academic Senate Sustainability Work Group

b. Develop a strategy to address this issue with immediacy

c. Lay the ground work for an environmental cluster hire to be executed as soon as possible

d. Execute a cluster hire of climate change research faculty (Early in Mid-term)

e. Create and execute a plan to address the next wave of retirements which will occur before 2020 (Early in Mid-term)

f. Initiate a long term strategy to maintain and grow our environmental science and climate change research faculty (Long-term)

Goal: Further develop UCSB Sustainability Website on Sustainable Research to better highlight existing efforts

Background and Existing Programs:

A preliminary list of researchers and research groups working on climate change can be found here:

http://www.sustainability.ucsb.edu/climate-change-research/ . The current list is likely incomplete and needs more review from faculty across campus to identify potential gaps. It is also important to integrate stories and information about climate change research throughout the website and the UCSB Sustainability social media presence. This will help to inform not only people visiting the website, but also highlight to our change agents potential opportunities for collaborations between academics and operations.

Relevant Actions:

a. Reach out to faculty that have already been identified as researching climate change to determine whether they know of any researchers or research groups that should be included but aren't yet.

b. Launch an effort to highlight one faculty member or group's research each week through the UCSB Sustainability website and social media outlets.

c. Expand current website information to be more descriptive and engaging.

Goal: Promote existing courses related to climate change

Background and Existing Programs: A preliminary list of courses on climate change can be found here: http://www.sustainability.ucsb.edu/climate-change-courses/ . This list is also likely to be incomplete and needs more review from faculty across campus to identify potential gaps. This list should be promoted to current students, especially during times when students are signing up for their classes.

Relevant Actions:

a. Reach out to faculty that have already been identified as teaching on climate change to see if they know of any other faculty/courses that should be included.

b. Launch a marketing campaign once a quarter to announce the classes that will be occurring the subsequent quarter related to climate change.

Goal: Assess current co-curricular activities available to students to identify critical gaps

Background and Existing Programs: Co-curricular activities at UCSB are not well tracked. As a part of UCSB's data collection activities for AASHE's STARS certification, we have pulled together a partial list of community service efforts, however the data is incomplete and does not differentiate between activities designed to support and build on the curriculum (co-curricular) and "community service" efforts which may or may not tie to curriculum.

Relevant Actions:

a. Survey faculty about any co-curricular activities that they encourage their students to participate in and what co-curricular activities they would envision to be beneficial for their students.

Goal:

1. Expand on the current UCSB Speaker's Bureau to better address Climate Change

Background and Existing Programs:

The UCSB Development Office's Community Relations Program has organized a speaker's bureau of faculty from many disciplines (http://www.ia.ucsb.edu/sb/index.shtml ). The main purpose of this effort is to create a resource for the local community to identify faculty that could speak on a wide variety of topics. There are currently three professors who participate in this program and speak on Climate Change:

- Catherine Gautier, Geography: Climate Change: Global Warming, Hurricanes, and Arctic Changes
- John Perona, Chemistry: Climate Change, Peak Oil, and Energy Resources
- Joshua Schimel, Environmental Studies; Humans and Climate Change

Relevant Actions:

a. Encourage other faculty who research climate change to participate in the speaker's bureau
b. Ask that climate change be specifically identified as a topic area
c. Further promote this resource to the local community

## Mid-Term Goals (2014-2020)

Goal: Execute a cluster hire of climate change research faculty; Create and execute a plan to address the next wave of retirements. See the first short-term goal for detailed explanation.

Goal: Expand on existing interdisciplinary research collaborations

Background and Existing Programs:

There are monthly meetings of UCSB Climate Researchers currently occurring. These are hosted in partnership between the Climate Variations and Change research group (CLIVAC) http://www.icess.ucsb.edu/clivac/, The Earth Space Research Group, and the Climate Hazards Group (http://hollywood.geog.ucsb.edu/). The researchers attending are primarily from Geography, Earth Science, and the Earth Research Institute. There are also a variety of other strong collaborations throughout the natural sciences on climate change.

Relevant Actions:

a. Develop forums that will encourage collaborations amongst natural and social sciences and the humanities and fine arts.

Goal: Create a Climate Change identification in the UCSB course catalog

Background and Existing Programs:

As a first step to encouraging students to enroll in courses related to Climate Change, we propose identifying those courses in the UCSB Course Catalog. This would both alert students to the availability of these courses and raise UCSB's standing as an institution that educates its students to address the most pressing problems of the future. The SWG

is also actively pursuing a more broadly focused environmental course identification as is discussed in the Campus Sustainability Plan.

Relevant Actions:

a. Develop criteria for determining whether a course fits our the criteria

b. Work with the registrar to develop a mechanism for identifying courses related to Climate Change

c. Develop a symbol that would be easily identifiable by students

Goal: Develop a funding source to encourage the development of courses related to climate change

Background and Existing Programs: Currently there is no funding which specifically encourages UCSB faculty to develop new courses on climate change. The instructional development office has created the opportunity for faculty to apply to their broadly focused mini-grant program to secure funding for course revisions however.

Relevant Actions:

a. Collaborate with the development office to develop donors who would be interested in contributing to this fund

Goal: Develop a climate change student peer educators program

Background and Existing Programs: Currently Housing and Residential Services runs an environmental representatives program. Students in this program are responsible for environmental programming in the residence halls. There are also several internship opportunities through the UCSB Sustainability Internship Program which include some aspect of peer-to-peer education. This could be greatly expanded upon using the model of UCSB Student Health's Peer Educator programs (Students Teaching Alcohol and drug Responsibility (STAR) Interns and Health and Wellness Chairs), which starts with a training course for all student educators.

Relevant Actions:

a. Research the UCSB Student Health peer educator programs to determine which best practices and lessons learned can be transferrable

b. Partner with a faculty member to develop a training course for peer educators

c. Explore partnership opportunities with the Housing and Residential Services environmental representatives program

Goal: Highlight existing demonstration projects on campus and develop new demonstrations to use as curricular tools

Background and Existing Programs: There are many cutting-edge technologies already in use at UCSB that are under-utilized within the curriculum. UCSB is also home to a variety of species and ecosystems that could be studied in the curriculum. Efforts to use the campus as a living laboratory have been led by individual staff and faculty. A coordinated effort is needed to expand the program.

Relevant Actions:

a. Create a list of existing technologies, ecosystems, etc. on the campus that could be weaved into courses

b. Identify faculty who are already using the campus as a living laboratory and highlight them as role models

c. Engage faculty to identify what additional demonstration projects could be incorporated into the campus that would support the curriculum

Goal: Promote faculty engagement in local climate change projects where their expertise can be used effectively

Background and Existing Programs: UCSB hosted its first Regional Sustainability Summit in Fall 2011. Through this summit, relationships were built between campus staff and faculty and local government agencies and non-profit organizations. Building on this foundation, we can identify additional opportunities for faculty to engage with the community on climate change projects.

Relevant Actions:

a. As collaborations are developed in follow-up to the Fall 2011 Regional Sustainability Summit, identify opportunities to engage faculty in new projects

b. Encourage more faculty to submit presentations for the 2012 Regional Sustainability Summit

c. Reach out to community partners to determine the need for faculty expertise in their projects

d. Develop new community-based research projects on climate change issues in the local community that engage multi-disciplinary teams of researchers (Long-term)

## Long-Term Goals (2020-2050)

Goal: Initiate a long term strategy to maintain and grow our environmental science and climate change research faculty. See the first short-term goal for detailed explanation.

Goal: Develop a fellowship program for undergraduate and graduate researchers working on climate change

Background and Existing Programs: UCSB has a long history of actively supporting undergraduate, as well as graduate student research. There are several fellowships available that are indirectly related to climate change such as the Institute for Energy Efficiency's Postdoctoral Fellowships, and the Holbrook Foundation and Peter J. Frenkel Fellowships which focus on Energy Efficiency. More details on these programs at: http://iee.ucsb.edu/programs/fellowship-program. There are currently no fellowships dedicated to climate change.

Relevant Actions:

a. Collaborate with the development office to develop a donor base for climate change fellowships

Goal: Document climate change curriculum and share with other universities globally

Background and Existing Programs: UCSB has extensive plans for expanding upon our climate change curriculum, as is evident from the above goals. It is critical that we not only create these changes within our own campus, but that we encourage other universities to create similar courses through being a model campus.

Relevant Actions:

a. Add links to updated syllabi for all the courses listed on our climate change courses site: http://www.sustainability.ucsb.edu/climate-change-courses/

b. Develop a process for annually updating the syllabi web links

c. When possible, post syllabi to the AASHE website with permission of faculty teaching the courses

Goal: Develop 2-3 new large-scale demonstration projects that would engage campus researchers, link to curriculum, and set UCSB in a leadership position beyond peer institutions.

Background and Existing Programs: UCSB already has two platinum certified buildings within the US Green Building Council LEED Certification system in addition to many other LEED certified buildings at a variety of certification levels, energy efficiency projects, and renewable energy generation sites. Student Affairs is well on its way to developing several zero net energy buildings. There are also six natural reserves where climate change can be witnessed on a daily basis: http://nrs.ucsb.edu/ and many existing research projects that utilize the natural reserves to track climate change.

Relevant Actions:

a. Select two to three new large scale demonstrations projects that UCSB could launch based on their relevancy to curriculum and research, ability to place UCSB in a leadership position globally, and value to the campus operationally.

b. Identify principal investigators who can oversee these projects

c. Identify campus stakeholders to partner on the development of these projects

d. Develop donors to make these projects feasible.

e. Execute demonstration projects

Goal: Develop community-based research projects on climate change issues in the local community that engage multi-disciplinary teams of researchers. See mid-term goals for a detailed explanation.

### 10.4.2 CLIMATE CHANGE COMMUNITY OUTREACH

The Sustainability Communications Committee was established in the spring of 2008. A central goal of the subcommittee is to communicate and collaborate with the Goleta and Santa Barbara communities on a regular basis with regard to sustainability.

Below is a list of some successful community outreach programs the campus has undertaken in the area of the environment and sustainability:

- South Coast Sustainability Summit – On October 13, 2011 our campus hosted the first annual South Coast Sustainability summit, an event which brought together local municipalities and community organizations to share best practices and discuss common issues in energy, transportation, waste, and water management. The South Coast Sustainability Summits aimed to promote local dialogue and pursue regional sustainability partnerships. This event reached over 150 regional administrators and business leaders and brought key players from diverse sustainability backgrounds into conversation for the first time ever. In energy management panels discussed financing mechanisms for renewable energy projects and innovative energy efficiency case studies on implementing new technology.

- The Santa Barbara Summit on Energy Efficiency – Established in 2008 by the Institute for Energy Efficiency, this conference is an annual event which brings together stakeholders in efficiency technologies, facilitating growth and collaboration . The Summit brings together national leaders in industry, academia, and government for two days of in-depth discussions on the latest advancements in the fast-moving sector of energy efficiency. The 2011 summit focused on the current administration's major investments in energy efficiency research and development and will include a session on the Department of Energy's latest program aimed to reduce the cost of solar power to $1/Watt. Sessions were also held on the evolution of the Smart Grid and the related potential for energy efficiency and renewables. Additional areas of focus included supercomputing, UCSB research highlights on silicon photonics, battery storage, and solid-state lighting, and expediting innovation from the lab to market in today's economy.

- Environmental Media Initiative – the Carsey Wolf Center created this program to join UCSB's exceptional strengths in media/communication studies and environmental science to create an interdisciplinary program unique to the UC system and the nation. The EMI brings together environmental scientists with film

and media scholars – drawn from the humanities, arts, and social sciences – to collaborate on teaching, research, and public programming. The EMI explores all of the ways media and the environment influence, structure, and inhabit each other: the environment in media, media in the environment. Interdisciplinary research projects include the creation of Sampling the Sea which enables middle and high school students to monitor, analyze, and share information about the declining global fish population. Environmental Media education includes the BLUE HORIZONS Summer Program and the GreenScreen Program offered Winter quarter, both of which teach students documentary filmmaking focused on local environmental issues. Public programs range from environmental documentary film screenings to panels on the greening of film and television production practices.

- Renewable energy exploration – In order to come closer to carbon neutrality, we will need to explore our renewable energy options, including solar and wind. The Office of Sustainability, along with the Institute for Energy Efficiency, is collaborating with the local Community Environmental Council (CEC) and a local wind power company to explore potential options for the campus' renewable energy needs. The CEC's main campaign right now is Fossil Free by '33, so they are very focused on renewable energy in the Santa Barbara area.

- Earth Day Celebrations – The past few Earth Day Celebrations in downtown Santa Barbara have been collaborations between the Community Environmental Council and the Bren School of Environmental Science and Management. In addition, several UCSB booths educated the local community on the sustainability programs and student research happening on the UCSB campus.

- Natural Reserves – UCSB manages four natural reserve systems: Carpinteria Salt Marsh, Coal Oil Point, Sedgwick Ranch, and Valentine Eastern Sierra Reserves. All of these natural reserves offer public tours, educational programs, and volunteer opportunities for the community.

- CCBER – The Cheadle Center for Biodiversity and Ecological Restoration provides public tours of their animal, plant, and special collections, and showcases the restored natural areas that the Center manages on campus. The Campus Flora Project was created out of former Chancellor Vernon Cheadle's wish to develop the campus environment into an outdoor classroom. Walking tours and online maps are available for anyone to experience the living collection of hundreds of plant families from six continents.

- Kids in Nature – The CCBER program enriches the learning experiences of underrepresented and underserved youth in the Santa Barbara community by taking them out of the urban setting, introducing them to the natural environment, and teaching them how to preserve our ecosystems.

- OCTOS – The Outreach Center for Teaching Ocean Science within UCSB's Marine Science Institute is an educational program that provides research lesson plans and projects for elementary and secondary school teachers. In addition, OCTOS provides touch tank tours and other opportunities to get up close and personal with marine life. OCTOS will be housed in the new Ocean Science Education Center on campus. The building, which is expected to earn a LEED-NC Gold rating, will be shared with the National Oceanic and Atmospheric Administration and the offices of the Channel Islands National Marine Sanctuary.

### 10.4.3 STUDENT LIFE STRATEGIC PLAN & THE RENEWABLE ENERGY INITIATIVE

Student Affairs at UCSB has been a leading division on climate action and planning. The division has set forth impressive commitments to certify at the LEED Platinum level for all Student Affairs buildings and facilities (approximately 450,000 square feet of administrative buildings and a recreational and aquatics complex) and achieve divisional zero net energy on an annual basis. Student Affairs projects and initiatives which promote sustainable renewable energy and energy conservation are crucial to addressing campus climate change. Student Affairs anticipates exceeding its fixed energy budget cap in 2016, which may require the division to pull resources from other areas, including staff wages and funding for student services.

Many organizations attempt to solve the problems of climate change and rising energy costs through energy efficiency enhancements only. In contrast, the UCSB Student Affairs Zero Net Energy plan addresses energy efficiency enhancements coupled with onsite renewable energy generation. Energy efficiency enhancements include projects such as: dimming electronic ballasts, occupancy and daylighting controls, lighting controls network, tuning lighting with dimmable ballasts, LEDs for floodlights and display lights, ICLS retrofits, office retrofits, elevator retrofits and bi-level corridors, HVAC duct flow

management, occupancy sensor thermostats, condensing boilers, variable speed pool pumps, pool covers and Energy Star rated appliances. Additionally, the division also plans on installing one megawatt of online generation through solar power and a thermal water pre-heat array for the planned aquatics complex. By investing in energy efficiency and onsite renewable energy generation, UCSB Student Affairs will reduce its net energy costs to zero and eventually produce an energy surplus. This will result in a significant decrease in overall campus GHG emissions.

Outside of installing new hardware and software to support carbon reduction, the Student Affairs energy plan also highlights the importance of community commitment through behavioral changes. Educating students and staff about responsible energy consumption habits is an on-going divisional effort. For example, to help create an energy use feedback loop for staff, UCSB Student Affairs has partnered with the Institute for Energy Efficiency and The Green Initiative Fund (TGIF) to create a desk top application for building occupants which displays energy inefficiencies at the departmental and individual office level. Further ongoing education efforts include provided information to new students on campus sustainability via the Orientation process. Divisional Managers are made aware of sustainability initiatives via quarterly meetings and individual departments are kept informed via regular business officer meetings.

As a division, Student Affairs hopes to provide a template for other organizations who strive to reduce green house gas emissions while eliminating ongoing utility costs. Zero Net Energy will enable UCSB's Division of Student Affairs to redirect its annual $1 million utility bill to services and programs that promote student success. As such, Zero Net Energy responds to students' demands that today's institutions be educationally, fiscally, and environmentally responsible. Funding for the Student Affairs Zero Net Energy plan is made possible through student fees, particularly The Renewable Energy initiative (discussed further in the Section IX Financing). Through the Renewable Energy Initiative the campus will: 1) become a leading promoter in the use of ZNE to address significant environmental and economic challenges, 2) significantly reduce use of fossil fuels and carbon emissions, 3) gain greater energy independence, 4) help meet UCSB Climate Action Plan goals for a carbon neutral campus by 2050, and 5) direct a significant proportion of savings generated from this initiative to student services.