Climate
Commitment
CAL POLY POMONA

California State Polytechnic University, Pomona

Climate Action Plan

Pathway to Climate Neutrality

Prepared on behalf of the
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Acknowledgments

In spring, 2007, President Ortiz convened a task force of administrators, faculty, staff and students to develop an institutional response to the climate commitment. Since that time, numerous other individuals have volunteered or worked as research assistants to aide the task force on sub-committees and participated in the development of this plan. Members of the Climate Commitment Task Force are:

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1.0 Purpose

The Cal Poly Pomona Climate Action Plan (CAP) guides the university's efforts to reach carbon neutrality. It provides targets for achieving climate neutrality by 2030 through a combination of local and off-site actions and specifies a process for making progress toward that goal.

The CAP is the key policy element of the university's response to the American College and University Presidents Climate Commitment (the Commitment)[1]. It builds on longstanding efforts among faculty, staff, students, and alumni to enhance environmental sustainability. When President Michael J. Ortiz signed the Commitment as a charter signatory in February, 2007, it accelerated and focused multiple greenhouse gas reduction efforts already underway across the campus. The CAP is informed by a greenhouse gas inventory[2] and the work of the Presidents Climate Task Force and its subcommittees, which have been working on emissions reduction strategies since May 2007.

Carbon neutrality is a vital goal because the analysis of the Intergovernmental Panel on Climate Change is so stark: climate change is unequivocal; human caused emissions are the cause; and severe impacts on human beings and natural systems are expected.[3] The IPCC provides a very narrow window for concerted actions that can reduce the extent of impacts.

1.1 Context for the CAP

Cal Poly Pomona (CPP) is a 1,400-acre public university located 25 miles east of downtown Los Angeles, California, at the confluence of three major freeways. The land use context is suburban housing, light industrial uses, and undeveloped hillsides. The campus contains extensive agricultural

[1] See http://www.presidentsclimatecommitment.org/

[2] See http://www.csupomona.edu/~climate/pdf/Cal_Poly_Pomona_GHG_Inventory_Report.pdf

[3] See http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

lands, but is situated within the suburban milieu. In 2007, CPP had over 21,000 full and part-time students, and over 2,000 faculty and staff.

Cal Poly Pomona's mission is to advance learning and knowledge by linking theory and practice in all disciplines, and to prepare students for lifelong learning, leadership and careers in a changing multicultural world. The development of the CAP mirrors that mission: students have been involved in all aspects of the inventory and plan development process. In addition, the CAP was developed through an interdisciplinary collaboration of faculty and staff.

The CAP acknowledges the reality that many aspects of the CPP's GHG emissions are outside of the university's direct control. For example, electrical energy is purchased from utilities for which CPP is one of many customers and constituents. Similarly, the role of the university as a primarily commuter campus in an automobile-oriented urban environment is one that cannot be changed by a campus plan. Nonetheless, the analysis finds that the opportunities for greenhouse gas reductions at CPP are substantial and that many practical measures are possible.

The CAP responds to the requirements of the Climate Commitment, but it also supports the policy context of the State of California and the California State University System. As an entity of the State of California, Cal Poly Pomona is operating under the requirements of California State Assembly Bill 32 - California Global Warming Solutions Acts of 2006 (AB 32). AB 32 requires cutting the state's GHG emissions to 1990 levels by 2020. The most recent guidance for reductions is contained in the Climate Change Proposed Scoping Plan, approved December 2008.

The University's actions are also shaped by other state initiatives such as Title 24, The Energy Efficiency Standards for Residential and Nonresidential Buildings and Executive Order S-20-04 – State of California Green Building Action Plan, July 2004 (EO S-20-04). EO S-20-04 requires that the state commit to aggressive action to reduce state building electricity usage.

Cal Poly Pomona is part of the California State University (CSU) system, which operates 23 campuses throughout the state. As part of its "Commitment to Sustainability," the CSU seeks to be a wise steward of scarce resources by reducing the use of non-renewable resources and increasing energy efficiency. The CSU is strongly supportive of greenhouse gas reduction efforts, by setting targets for energy efficiency and developing negotiating master contracts for programs such as solar panel installation and building energy efficiency retrofits.

1.2 Relationship to Other Plans

The CAP provides a comprehensive guide to actions to reduce greenhouse gas emissions. It is intended to shape other university policy documents and day-to-day decision making. In particular, two recent planning efforts are essential in supporting the goal of carbon neutrality:

- ***Campus Master Plan***. This plan, currently under preparation, will guide the growth and renovation of the physical plant of the campus, affecting the size of the campus, building energy efficiency, and on-campus housing.
- ***Academic Strategic Plan***. This plan adopted by the University in May, 2009, guides future directions for academic programs within the institution, and potentially affects the integration of climate change issues in the education, research and outreach activities of the university.

The CAP is also intended to shape day-to-day decision making by administrators, the Academic Senate, Associated Students Inc., and the President's Cabinet.

1.3 Early Actions

A host of initiatives for reducing greenhouse gas emissions are underway across the university in advance of the CAP. Table 1.1 provides some examples, organized into measures that affect transportation emissions (carbon intensity of travel and amount of travel), energy use by buildings, and the carbon footprint of energy consumed.

Table 1.1 Greenhouse gas emission strategies underway at Cal Poly Pomona.

Type of Strategy	Capital Investments	Operating Programs
Lower carbon intensity of travel	• Purchased electric fleet vehicles	• Added student carpool spaces • Added shuttle service to Metrolink stations (commuter rail)
Reduce the amount of travel	• Constructing new on-campus residence halls	• Instituted a 4/10 summer work week (2008 – present) • Increased on-line/hybrid instruction to reduce student commuting
Reduce energy use by on-campus buildings	• Adopted higher energy efficiency for the new College of Business building • Added a “cool roof” to the Building 3 renovation • Commissioned energy audits and building retrofits	• Adopted Energy Star purchase policy • Implemented student resident hall energy conservation program • Introduced trayless cafeteria in the Los Olivos dining hall
Reduce the carbon footprint of energy consumed	• Developing 1 megawatt on-site solar array	• Increased share of renewable energy purchased

These actions have been matched by efforts in education, research, outreach, and collaboration. Early actions include hosting a 2007 regional conference on greenhouse gas reduction (in partnership with the National Wildlife Federation), development of a “Going Green” video, and numerous curricular initiatives. These include lab classes in the John T. Lyle Center for Regenerative Studies that evaluated alternative GHG reduction measures, green community plans completed by students in Urban and Regional Planning, and incorporation of climate change material is a wide range of classes.

1.4 GHG Emissions not Included in the Commitment

The CAP uses a definition of GHG emissions that focuses on the primary categories of emissions sources, broadly applicable to all universities. There are, however, certain categories of emissions that are not counted in the inventory but do have some effect on emissions. Although there are not called out in the CAP, the plan supports actions in these related areas, commonly termed "Scope 3" emissions. For CPP, water is a significant Scope 3 emission because substantial energy is used to treat and transport water. Reductions in water consumption, then, have GHG benefits because they reduce energy used to transport water. Other examples include the GHG footprint of products and consumables (affected through procurement policies), or policies regarding food consumption in the dining halls.

1.5 Organization and Preparation of the CAP

The CAP consists of a series of GHG reduction targets, by emission category, and implementation measures to achieve those reductions. It includes a description of the GHG inventory and an explanation of how the 2030 baseline conditions were developed. This baseline refers to the best estimate of emissions if no plan was adopted, considering factors such as campus growth and changing the broader economy.

The CAP presents the 2030 target for GHG emissions by emission source. It then outlines a series of educational and research initiatives intended to support the GHG emissions reduction effort, increase student awareness and knowledge, and support partnerships with the broader community. Finally, it provides guidance on the implementation responsibilities.

The final section of the CAP identifies actions to support 2015 targets. This section is intended to maintain a focus on implementation of near-term strategies while monitoring progress toward the long-term reduction goal.

The CAP was drafted by Dr. Kyle Brown, Director of the John T. Lyle Center for Regenerative Studies and Dr. Richard Willson, a professor in the Department of Urban and Regional Planning. They were assisted by three graduate students from the John T. Lyle Center for Regenerative Studies, Anne Pandey, Cristina Halstead and Michelle McFadden. The CAP's preparation was funded by the Division of Administrative Affairs and guided by the CPP Climate Commitment Task Force and subcommittees, and the President's cabinet. Input from campus stakeholders was obtained from 1) the Climate Commitment Task Force and subcommittees, which are comprised of faculty, staff, and students, 2) feedback from the campus community received in open workshops and reviews of three Regenerative Studies graduate projects on the subject, 3) advice from the President's cabinet, 4) peer advice from those at other institutions in Southern California, and 5) technical information from faculty and staff experts. The CAP is based on research and analysis in the following areas:

- Analysis of external trends that affect CPP target and strategy, including factors such as California's climate initiatives, Federal policy, and technological advancement.
- Identification of best practices in GHG inventory, mitigation, planning, and implementation at other academic institutions
- Analysis of interviews conducted with CPP stakeholders concerning measures underway and expectations for the CAP,
- Analysis of campus policy documents, budgetary issues, and university organizational culture.
- Analysis cost-effectiveness for major categories of mitigation strategy, using the CA-CP model and a spreadsheet-based cost tool.

2.0 Greenhouse Gas Emissions Trends and Projections

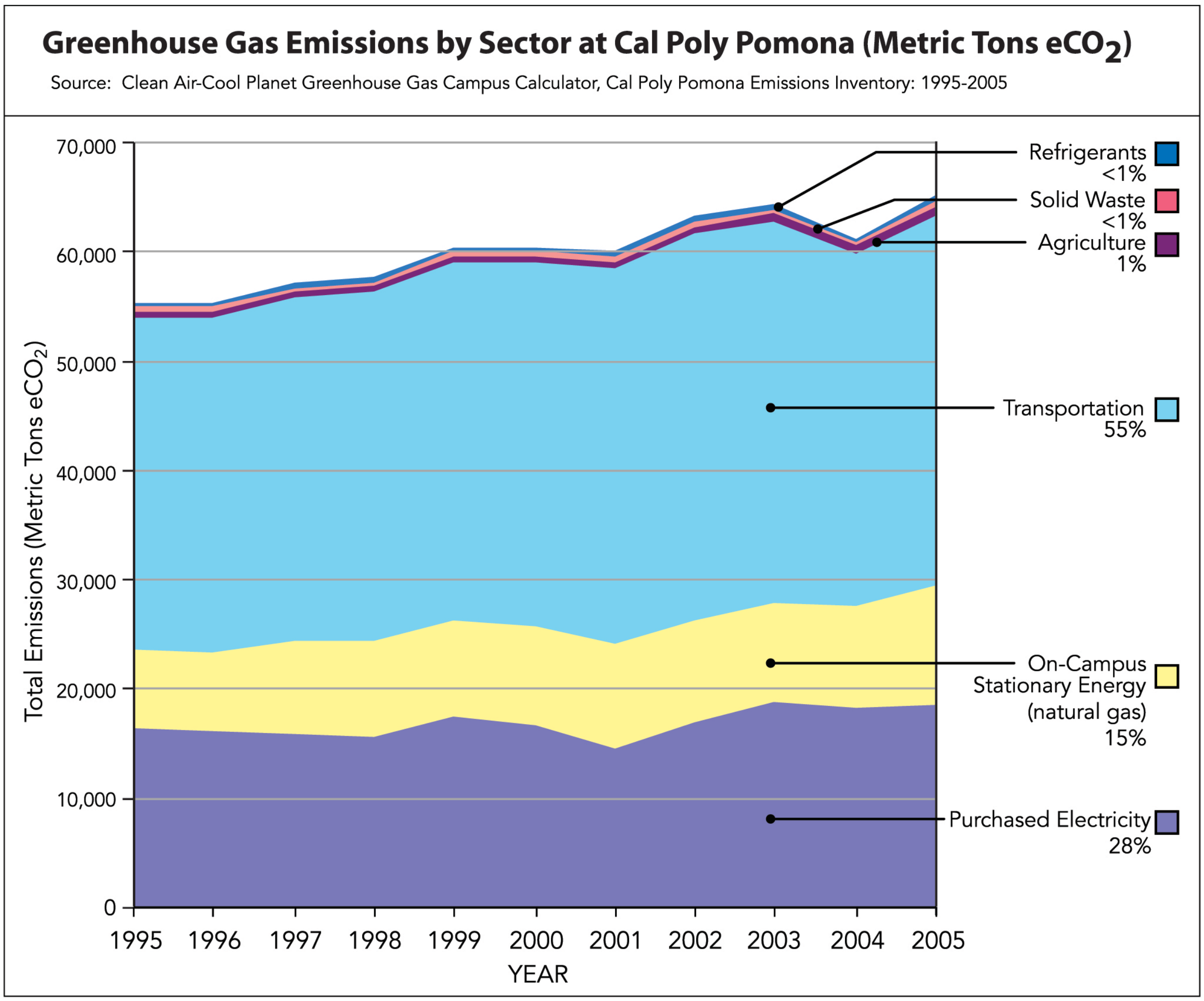
2.1 Previous Trends in Greenhouse Gas Emissions

In 2007, Cal Poly Pomona University published its greenhouse gas emissions inventory report, which documented emissions associated with campus operations from the 1995-96 academic year through 2005-06. The Presidents Climate Commitment delineates the scope of emissions included in the inventory. Figure 2.1 illustrates these inventory results by sector. The inventory includes emissions associated with purchased electricity consumed on campus, natural gas use, refrigerant use, solid waste, agricultural and landscape activities and transportation. Transportation emissions include university fleet and air travel, as well as daily commuting of students, faculty and staff. Refer to the University's inventory report for a complete accounting of these emissions.

In 2005-06, the University was responsible for nearly 65,000 metric tons of carbon dioxide equivalent greenhouse gases. Transportation activities accounted for 55% of emissions, while campus facility operations (emissions from electrical and natural gas use) constituted 43%. Solid waste, agriculture and landscape activities, and refrigerants accounted for only 2% of total emissions.

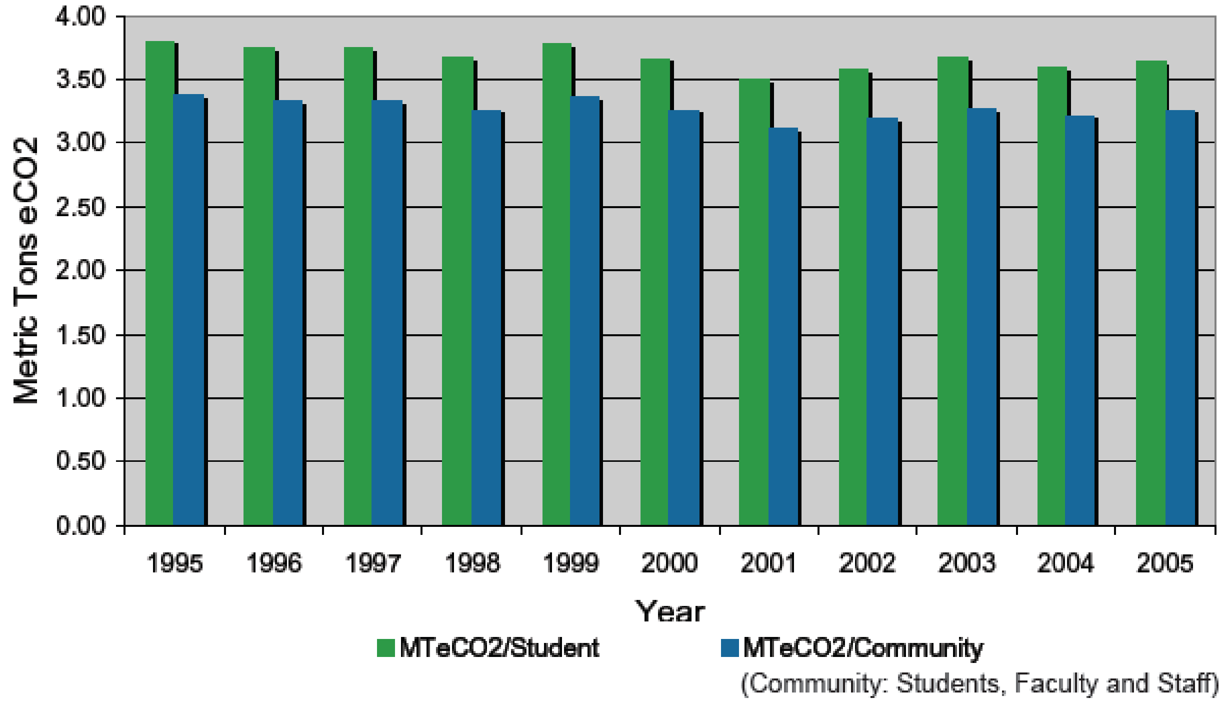
Emissions rose 1.7% annually between 1995-96 and 2005-06, primarily as a result of student population growth increasing commuting activity and building construction. Figure 2.2 illustrates per capita emission trends during this time period, both per student, and per community member (student + faculty + staff) basis. Results demonstrate that per capita emissions declined slightly, suggesting improved efficiency in campus operations, presumably due to technological innovation that increased energy efficiency. However these small increases in efficiency were more than offset by population growth, resulting in increases in overall emissions. This trend is consistent with nationwide greenhouse gas emissions during this same time period, where emissions reduced slightly on a per capita basis, but total emissions increased by nearly 1.0 % annually[4].

Figure 2.1 Greenhouse gas emissions by sector at Cal Poly Pomona, 1995-2005.



[4] US Department of Energy, (2006) *Emissions of Greenhouse Gases in the United States 2005*. Executive Summary.

Figure 2.2 Per capita greenhouse gas emissions at Cal Poly Pomona, 1995-2005.



2.2 Future Projections in Greenhouse Gas Emissions

In developing an action plan for future climate neutrality, it is essential to predict anticipated emission levels based on "business as usual" practices, in order to determine the extent of reductions necessary through local action. Modeling future emissions requires assumptions about population growth or decline, as well as anticipated changes in society that may alter energy supplies, change energy efficiency and travel behavior. This plan adopts 2030 as the planning horizon, as it is a useful horizon for long-range planning (25 years from last emissions reporting year) and a target identified by the President for climate neutrality.

Population Growth

There are a number of factors that will influence campus population size through 2030: Campus growth policies, CSU enrollment policies, state demographics, economic conditions, technology changes that may increase access or alter student/faculty ratios, and funding. Current forecasting suggests that enrollment will remain steady or decline slightly in the short term. However a number of other factors suggest that the University may experience substantial growth over the long term. Given the uncertainty in prediction population change over the next 20-25 years, it was determined that an aggressive growth scenario, 50% increase in student enrollment as well as faculty/staff population, would be most useful in developing the Climate Action Plan. This is viewed as a "worst-case" scenario from an emissions perspective, allowing us to establish a baseline for anticipated emissions that assumes significant campus growth in student population, as well as corresponding growth in faculty, staff, and building space. Policies which result in slower growth rates can thus be viewed as a greenhouse gas reduction strategy, which aide in achieving established reduction targets. A 50% growth scenario translates to nearly 30,000 students and 4,000 faculty and staff by 2030.

Changes in Electrical Supplies

Energy supplies will change significantly over the next 25 years in response to local, state and federal policy, depleting fossil fuel resources, and market incentives that will favor energy sources that reduce or eliminate greenhouse gas emissions. In our modeling of future emissions under "business as usual" practices, it is assumed that 30% of purchased electricity will come from renewable (greenhouse gas-free) sources, such as solar and wind power, by the year 2030.

Changes in Energy Efficiency

It is expected that new buildings will be significantly more efficient that existing building stock in California in response to state policy, technological innovation, and market incentives the favor energy efficiency. Based on preliminary estimates by Wong (2005), our modeling assumes that new buildings will use 30% less electricity and 5% less natural gas than existing campus building stock.

It is also expected that fuel efficiency of motor vehicles will improve dramatically through 2030, based on recent legislative initiatives and societal concern over energy independence, fuel costs, and climate change. Our modeling assumes that a 1 MPG per year improvement in overall fleet efficiency, up through 2030. This results in fleet fuel efficiency of 43 MPG by 2030. New Federal fuel economy standards issued in 2009 set targets through 2016 that make the 43 MPG assumption reasonable for the 2030 projection. It is also assumed that alternative fuels, such as electric and natural gas will increase, particularly within the University fleet.

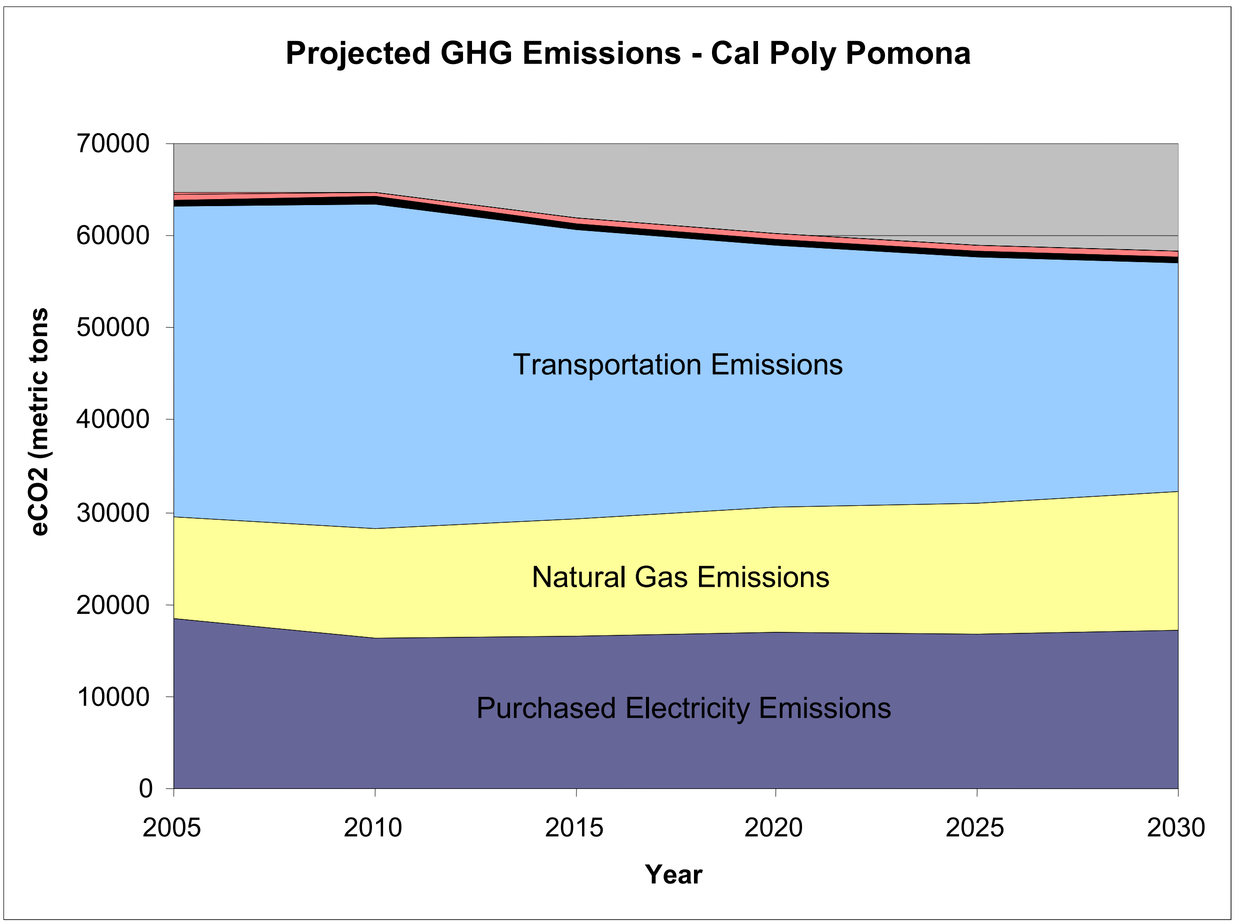
Changes in Travel Behavior

Improvements to regional and local transit systems, rising energy costs, increased awareness, and planned campus improvements will also alter travel behavior through 2030. Our modeling assumes that transit ridership, carpooling, on-campus living increase slightly over current practices. Growth in on-line and other forms of alternative instruction will also reduce the average number of commuting trips by students by 10% during this time period.

"Business as Usual" Scenario for 2030

Figure 2.3 illustrates projected "business as usual" greenhouse gas emissions for Cal Poly Pomona between 2005 and 2030. These are the emissions levels expected in the future assuming 50% campus growth, changes in electrical supplies, energy efficiency, and travel behavior previously described, and no further emission reduction efforts on the part of Cal Poly Pomona beyond the status quo. Appendix E of this report describes our projection model assumptions and process in greater detail. Our modeling predicts an overall decline in total emissions by 2030, by about 6,500 metric tons, to 58,500 metric tons carbon dioxide equivalent. This signals a shift in emission trends, where efficiencies more than offset population growth on campus, even under an aggressive growth scenario. The results suggest that if Cal Poly Pomona took no significant local action over the next 20-25 years, the university would still see a slight reduction in overall emissions, due to societal changes. This "business as usual" model provides a future benchmark for understanding the impact of local greenhouse gas reduction efforts.

Figure 2.3 Projected "business as usual" greenhouse gas emissions at Cal Poly Pomona.



3.0 2030 Climate Action Plan

3.1 Deadline for Climate Neutrality - 2030

Cal Poly Pomona has developed an approach for achieving climate neutrality that favors local action to improve efficiency and change behavior over offset projects or strategies. In reviewing emission trends, modeling projected emissions, and assessing the impact of various reduction strategies, we concluded that 2030 was an ambitious, but realistic timeline for achieving climate neutrality of campus operations. The vision plan estimates that emissions can be reduced by 65% over our projected "business as usual" level by 2030 through local action. A target emissions level of 20,500 metric tons of carbon dioxide equivalent is established for 2030. This target is well below 1 metric ton per capita and represents a substantial, but achievable, campus-based effort for reducing emissions. However it is recognized that neutrality cannot be achieved through local action alone. Some activities, such as commuting and air travel, are indispensible to campus operations and while they may be able to be greatly reduced, they cannot be completely eliminated. Therefore the 20,500 metric tons of residual emissions projected for 2030 will be offset by campus resources and activities that reduce greenhouse gas emissions elsewhere.

The 2030 Climate Action Plan will reduce campus emissions across all sectors to a target emissions level of 20,500 metric tons: Transportation, Facilities, Energy, Agriculture and Landscape, Solid Waste and Refrigerants. A number of benchmarks in each sector will be used to guide short-term actions aimed at meeting interim targets between 2015 and 2030. Furthermore, it commits the university to reduce emissions to zero, using partnerships and offsets that reduce emissions elsewhere.

3.2 Transportation Benchmarks

Transportation activities account for the majority of greenhouse gas emissions at Cal Poly Pomona. The 2030 Action Plan establishes aggressive benchmarks that seek to reduce the number of trips and/or vehicle miles traveled as well as reducing emissions associated with necessary travel.

Benchmark #1 – Reduce commuting population to 73% of student body. Currently 88% of the Cal Poly Pomona student body commutes to campus. Additional on-campus housing is currently being constructed to respond to demand and campus priorities to increase the residential population. The University should pursue additional housing projects with the aim of further reducing the commuting population to 73% of the student body. Furthermore, the university is altering its recruiting strategy to attract a greater share of students outside its immediate service area, thereby increase the share of students seeking housing on or near campus.

Benchmark #2 – Reduce Vehicle Miles Traveled by Faculty and Staff by 10%. The average commuting distance is longer for faculty and staff than it is for students at Cal Poly Pomona. Faculty/staff housing programs close to campus have been developed in recent years in an effort to provide affordable housing options. If continued and expanded to include other incentives for reducing commuting distances, these programs will have an impact on VMT averages for faculty/staff, thus reducing overall emissions.

Benchmark #3 – Reduce Commuting Trips to Campus by 30%. Alternative instruction technologies, such as online and hybrid curricula, offer the potential to reduce total number of weekly commutes by students. Programs should be initiated to expand such offerings and target specific campus populations to ensure trip reduction. In addition, alternative scheduling, such as 4/10 or 9/80 workweeks during certain periods for campus staff, have demonstrated potential to reduce trips by staff and will be supplemented with programs that allow occasional work at home for those on traditional work schedules.

Benchmark #4 – 40% of campus population uses alternatives to single-occupancy vehicles to commute on a daily basis. Currently less than 25% of the campus population either resides on campus or uses carpooling, mass transit or other alternatives to single-occupancy vehicles on a daily basis. Aggressive carpooling programs focused on incentives and disincentives, as well as strategies for increasing mass transit ridership, walking, and bicycling should be pursued to substantially increase the percentage of campus community using alternative transportation. It is expected that transit transfer operations will return to a core campus location.

Benchmark #5 – Zero Emissions Associated with University Fleet Operations. The University has already initiated a program to replace gasoline vehicles with electric and/or natural gas. In addition, transitional fuels, such as biodiesel are being used to augment petroleum diesel use in the fleet. The University should continue to seek alternatives that work toward a zero emission fleet by 2030. While fleet emissions represent a relatively small percentage of the overall campus emissions, a zero emission fleet program would have the added benefit of being highly visible.

Benchmark #6 – 100% offset of University air travel emissions. Air travel supported through state, Foundation or ASI funds, constitute 11% of all emissions associated with transportation. While technological innovation such as teleconferencing may reduce some of these emissions, they cannot be completely eliminated without significantly impacting the mission of the University. Therefore the Climate Action Plan calls for the purchase of offsets for 100% of these air travel emissions on an annual basis, by the year 2030.

3.3 Facility Benchmarks

Campus facilities constitute about 43% of current campus emissions, through purchased electricity and natural gas use. The 2030 Action Plan seeks to reduce the amount of energy consumed by campus facilities by capital and operation improvements.

Benchmark #7 – 10% reduction in energy demand of 2005 building stock. The existing building stock is a significant resource whose efficiency must be improved if the campus is to achieve climate neutrality. The Climate Action Plan calls for the development of a renovation plan focused on energy conservation, including HVAC upgrades, insulative strategies, building management, and lighting systems, with the target of reducing energy demand in the 2005 building stock by 10%. This can be achieved with the renovation of approximately 50% of this building square footage by 2030.

Benchmark #8 – Net Zero emissions associated with new building construction. Additional buildings are necessary to accommodate anticipated growth, and further the mission of the University. Technology and design expertise exists to develop cost-effective carbon-neutral buildings, through low-energy design as well and energy-producing building components, such as PV panels on rooftops. On-site green energy production or energy reductions in other facilities may also be used to offset emissions from new buildings. The policy of net zero emissions for new buildings will ensure that campus growth does not increase Cal Poly Pomona's greenhouse gas emissions.

Benchmark #9 – 5% reduction in building plug load. A recent presidential order implemented an Energy Star purchasing program on campus, which ensures that new equipment is as efficient as possible. Education programs aimed at behavior to reduce energy consumption, plug load management programs, and other purchasing/use polices will aim to reduce plug load emissions by 5%.

3.4 Energy Supply Benchmarks

The 2030 action plan seeks to alter the energy mix used by campus to further reduce emissions.

Benchmark #10 – zero emissions associated with electricity generated for consumption by campus. Emissions associated with electricity consumption constitute 28% of greenhouse gases contributed by Cal Poly Pomona operations. Conservation strategies discussed in benchmarks #7, #8, and #9, will reduce electrical demand, but it cannot be completely eliminated. The Climate Action Plan calls for 100% of the electricity used by campus to come from renewable, greenhouse gas-free, sources by 2030. This will be achieved by a combination of on-site renewable energy projects, renewable purchase agreements with utility companies, or the purchase of renewable energy credits.

Benchmark #11 – 50% reduction in emissions associated with natural gas consumed on campus. Natural gas has lower greenhouse gas emissions than many other fossil fuels, however emissions associated with gas consumption still constitute 15% of greenhouse gases contributed by Cal Poly Pomona operations, primarily for the purpose of heating space and water. Conservation strategies will reduce demand, but it cannot be completely eliminated. Zero emission alternatives to natural gas need to be explored and implemented by 2030, with the aim of reducing demand by 50%.

3.5 Agriculture, Landscape, Solid Waste and Refrigerant Benchmarks

Emissions associated with agricultural and landscape activities, solid waste, and refrigerants account for less than 2% of campus emissions, however they represent highly visible activities that also address other critical environmental issues. As such, they are a minimal component of this action plan, yet there are a number of benchmarks established to guide actions.

Benchmark #12 - 25% reduction in emissions associated with agriculture and landscape practices. The use of fertilizers for agricultural and landscape activities, as well as the disturbance of soil carbon through tilling and other practices contribute minimally to Cal Poly Pomona's greenhouse gas emissions. However, they represent an opportunity for the campus to emerge as a leader in addressing these types of emissions which are prevalent in many communities throughout the world. Reductions in the use of synthetic fertilizers, and practices such as conservation tillage should be implemented, with the aim of reducing emissions associated with these activities by 25%.

Benchmark #13 – 50% increase in carbon sequestration through campus landscape plantings. Current carbon sequestration rates in the campus landscape offset only a small percentage of annual greenhouse gas emissions. There is limited opportunity to cost effectively expand this effort while maintaining other campus activities. However a 50% increase in annual carbon sequestration rates will further offset campus emissions, while demonstrating the potential for carbon sequestration in the Southern California landscape.

Benchmark #14 – 50% reduction in solid waste generation. Reductions in solid waste provide numerous environmental and cost benefits, as well as reducing greenhouse gas emissions. Expansion of campus recycling programs to increase diversion rates, expansion of food and green waste composting on campus, and related educational programs to raise awareness by students, faculty, and staff, will aim to reduce the Campus' solid waste by 50%.

Benchmark #15 – Zero emissions associated with refrigerant usage on campus. Refrigerants constitute a very small percentage of emissions associated with campus activity, and many are being phased out or substituted with chemicals that have lower global warming potential. The climate action plan calls for the elimination of all emissions associated with refrigerant usage on campus by 2030.

4.0 2030 Vision for Climate Action Education, Research and Outreach

The American College and University Presidents Climate Commitment requires that Cal Poly Pomona make climate neutrality and sustainability a part of the curriculum and/or other educational experience for all students as well as actions to expand research, and community outreach on climate change and climate action. Cal Poly Pomona faculty and students have been involved in climate change education, research and outreach for a number of years prior to the campus becoming a charter signatory of the climate commitment, which has provided an excellent foundation for developing the 2030 climate action plan and integrating the commitment into the life of the University.

In recent years, the University has undertaken a number of planning activities that inform the 2030 vision for climate action education, research and outreach. In 2007, the *Prioritization and Recovery* initiative identified environmental issues as an area of strength within the University, citing numerous programs on campus committed to sustainability, and environmental concerns. Subsequently in 2008, the President proposed a new set of core values intended to guide planning efforts within the University. Environmental Sustainability was included as one of five core values identified for the University, declaring that Cal Poly Pomona recognizes "our responsibilities to the global community and value the importance of applying and advancing sustainable practices in the classroom and on our campus." In Fall, 2008, Provost denBoer initiated an academic strategic planning effort, aimed at informing strategic planning for the broader University. The plan involved the development of individual College plans as well as the synthesis of an overall plan for academic affairs on campus. This plan, completed in May, 2009, provides an excellent foundation for integrating the 2030 vision for climate action education, research and outreach into the academic planning for the University.

As with the Climate Action Plan for campus operations, a number of benchmarks are used to guide short-term actions aimed at achieving the overall vision for education, research and outreach by 2030.

Benchmark #16 – Every student is aware of climate change, its potential consequences and actions to mitigate and address its impacts. Significant teaching around various aspects of climate change and climate action is already taking place at Cal Poly Pomona, although formal educational requirements have yet to be adopted. An initial step towards achieving this benchmark is to inventory the courses currently offered which integrate climate change learning outcomes into the curricula. This inventory will reveal patterns of exposure to the subject matter, and may offer a framework for formalizing this content into the curricula which builds upon the existing strengths of the University around environmental concerns. Subsequent steps will include the identification and implementation of methods to raise awareness and interest in developing climate change learning outcomes amongst faculty, and curricular as well as co-curricular strategies for ensuring awareness is instilled in all students. Ensuring that all students are effectively exposed to climate change education will require a multi-faceted approach, which addresses the needs of first-time freshman, transfer students, and returning students. Possible educational approaches to be explored include:

- Incorporation of climate change material in new student orientation and first year experience programs.
- The development of an environmental sustainability-themed General Education track. This track would provide the traditional elements of the General Education curriculum in a framework that focuses on the environment, climate change, and human responses.
- Development of a Minor in Climate Change Analysis and Responses as a supplement to the current Minor in Regenerative Studies offered by the John T. Lyle Center.
- Development and adoption of new programs on climate change mitigation and adaptation across the campus. These could take the form of minors, new majors, College of Extended University programs, and/or graduate programs.

Achieving this benchmark requires the development of assessment protocols that establish baseline literacy of incoming students about climate change causes, consequences, mitigation and adaptation strategies, as well as track the development of awareness during their educational experience at Cal Poly Pomona. Recent national surveys by organizations such as the Yale F & ES Project on Climate Change may provide a foundation for establishing preliminary baselines of current student literacy.

Benchmark #17 – Establish the reputation of Cal Poly Pomona as a leader in research on climate change, its potential consequences and actions to mitigate and address its impacts. Cal Poly Pomona's polytechnic, learn-by-doing approach is well suited to advancing basic and applied research in climate change science, mitigation, and adaptation. A particular emphasis is cross disciplinary research projects that can address the wide range of technical and policy issues in climate change. Examples of areas of research already initiated include the bio-fuels research group, solar initiatives, carbon sequestration, and analysis of commuter travel behavior. Possible approaches to achieve this benchmark include:

- Incentive programs for externally-funded research proposals on climate change related topics
- Development of interdisciplinary research groups focused on specific topics
- Targeted faculty hires and endowed research positions to support development of expertise in promising research areas

Achieving this benchmark requires the development of assessment protocols that establish a baseline of current research activity on climate change topics at Cal Poly Pomona. Indicators of activity may include the number or related funding proposals developed, the amount of research funds generated, the number of peer-reviewed publications, invited articles and speeches, contributions of research activity to public policy, and awards or other forms of recognition that indicate expertise in climate change issues.

Benchmark #18 – Establish the reputation of Cal Poly Pomona as a leader in community outreach related to climate change, its potential consequences and actions to mitigate and address its impacts. A core element of Cal Poly Pomona's mission is outreach to local communities and impact at the station, national, and international level. Examples of local outreach related to the climate change challenge include the carbon sequestration gardens outreach project and local community GHG inventory and mitigation planning. At a larger scale the university is participating in SoCalCan climate change network, the Carbon Disclosure Project*, and various public speaking/workshop events.* Possible approaches to achieve this benchmark include:

- Incentive programs for service learning projects on climate change related topics
- Logistical support for interdisciplinary community outreach projects
- Targeted faculty hires and endowed research positions to support development of expertise in promising outreach areas
- Focus on climate change-related community outreach in University publications

Achieving this benchmark requires the development of assessment protocols that establish a baseline of current outreach activity on climate change topics at Cal Poly Pomona. Indicators of activity may include the number or related service learning projects, the number of media stories on Cal Poly Pomona climate change activities, contributions to the development of local, state, federal and international plans and policies to address climate change, and awards or other forms of recognition that indicate impact of outreach efforts on climate change issues.

5.0 Implementation

The previous sections describe the goal of carbon neutrality and path by which that might be achieved. The recommendations represent the best estimate of the plan's authors and campus review committees for that long-term future. It is clear, however, that many conditions will change over the 20-year time period. These conditions may well change mix of strategies utilized.

There is strong momentum in California for GHG emission reduction measures that will help Cal Poly Pomona achieve its goal of carbon neutrality. This, along with Federal, State and regional initiatives in green energy and sustainable transportation, will advance the technical feasibility of strategies in ways that cannot be fully anticipated today. The theme and approach of the plan remains constant, however, achieve carbon neutrality in a manner that is cost effectiveness and fulfills other university goals.

5.1 Implementation Responsibility

The progress achieved to date has been possible by the efforts of a wide range of staff, faculty, and students across the university. This broad based involvement is a key to the success achieve thus far and has avoided compartmentalizing the effort in a single unit. Such broad participation is essential for continued progress; however, the achievement of the ambitious targets in this plan requires that broad participation occur within a defined organizational structure. The following is the allocation of responsibility for CAP implementation:

- Responsibility for *policy choices and prioritization* rests with the Climate Task Force and its subcommittees, as advisors to the President's cabinet, the Academic Senate, the Associated

Students Inc., and other decision making bodies. The Climate Task Force is assembled, meets regularly, and provides an essential coordinating function.

- Responsibility for *GHG mitigation implementation* is distributed broadly across the university, resting with the campus Divisions, the Cal Poly Pomona Foundation, faculty, students, and campus clubs.
- Responsibility *for coordination and monitoring* should eventually be assigned to a full-time sustainability officer. This position is does not currently exist, and because of current budget problems, is unlikely to be create in the next year. In the interim, this function will be handled by the Task Force and participating faculty and staff. As this effort expands, it should be supported by the appointment of a full-time, staff level sustainability coordinator. This coordination should also include participation in the Campus Master Plan, Academic Master Plan, and other planning initiatives.

GHG reduction planning requires a very broad range of knowledge, ranging from energy productions to behavioral questions concerning transportation choices. Because the range of measures is so broad, the design and selection of measures will require on-campus academic and staff resources, outside experts, and consultants.

5.2 Monitoring Implementation and CAP Revisions

An effective and sustained implementation process is the key to achieving carbon neutrality. The basis for monitoring implementation is the GHG inventory. The 2007 inventory is available on line at "www.csupomona.edu/~climate/reports.shtml". It provides the critical baseline measurement, but bi-annual monitoring is the key to understanding if CPP is making progress. The process of conducting the periodic inventories should be integrated into the regular record keeping and reporting of the university. The implementing process envisages includes the following:

- Annual initiatives and work tasks in support of five-year emission reduction targets. An annual report to the campus will be prepared outlining significant initiatives completed.
- Bi-annual emissions inventories to monitor progress, highlight trends, and alert decision makers to risks or problems (prior to Fall 2010, Fall 2012, and Fall 2014).

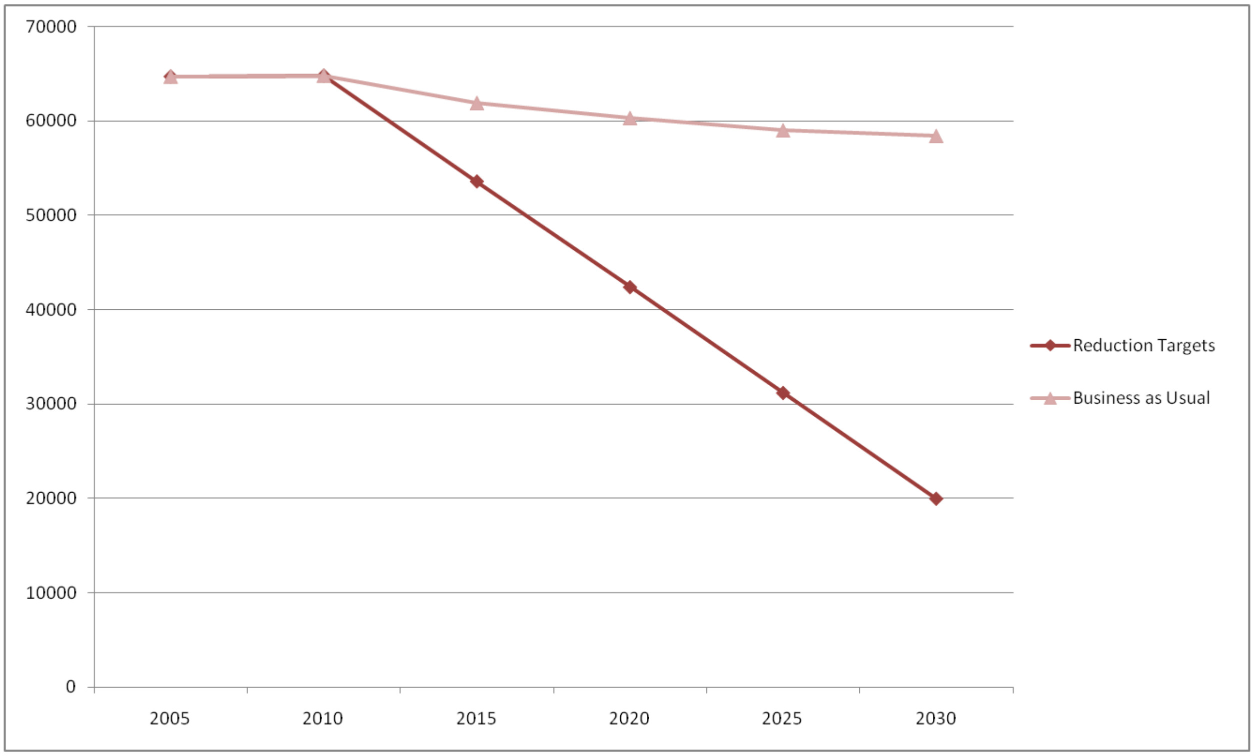
Review, modification, and readopting the CAP every five years (the first review coming in 2015). The process described above is intended to create a circumstance in which the CAP is “alive” in the day-to-day policy and implementation deliberations across the campus.

5.3 2015 and Subsequent Interim Targets

A 2030 emissions target is too far from current events to provide sufficient guide to action. The concept for CAP implementation is to establish a five-year target (i.e., 2015 emissions), monitor progress toward it, and established the next target to stay on track to achieve the 2030 target (i.e., 2020 and 2025 targets).

Figure 5.1 illustrates the interim emissions targets and the pathway toward climate neutrality. The “business as usual” scenario depicts the predicted emissions if Cal Poly Pomona took no direct action to reduce its greenhouse gas emissions. As noted previously, emissions are predicted to decline under this circumstance because actions in renewable electricity generation and increase vehicle fuel economy outweigh the growth in the number of students and the university’s operations. Direct action by Cal Poly Pomona will be needed to further reduce emissions in accordance with established interim targets.

Figure 5.1 Pathway to climate neutrality at Cal Poly Pomona.



The "straight-line reduction" strategy adopted by this plan assumes the university will achieve its goal in equally sized reductions. The justification for this approach is to take advantage of the momentum for climate change reductions that currently exists and to provide maximum support for global reduction targets. The difficulties of changing infrastructure and individual behavior are sufficiently great that this approach focuses implementation in the present. Another justification is that the current budget challenges in the State of California will mean that CPP will not grow as fast as anticipated in the 2009-2011 period, so the 2015 will be easier to achieve than might otherwise occur in normal budget circumstances.

The CAP recommends the “straight-line reduction” as the target. That ”straight-line reduction” approach means that emissions will be reduced from 64,000 metric tons per year to about 54,000 metric tons per year by 2015. The 2010 greenhouse gas emission inventory will provide the first measurement on movement toward that goal. Table 5.1 lists interim reduction targets between 2015 and 2030.

Table 5.1 Interim reduction targets at Cal Poly Pomona, 2015-2030.

Year	Emissions Target (metric tons)	Change from previous target (metric tons)	Change estimated from societal changes beyond CPP action (metric tons)	Change needed from direct CPP action (metric tons)
2015	53,600	11,200	2,900	8,300
2020	42,400	11,200	1,600	9,600
2025	31,200	11,200	1,300	9,900
2030	20,000	11,200	600	10,600

5.4 Implementing Off-Site Emission Reductions

The 2030 carbon free target proposed for CPP relies on approximately 20,000 metric tons of GHG emissions reductions from off-campus activities. This is required because the campus itself cannot change its land use setting, which is a suburban pattern of separate land uses, and cannot become energy independent in that time period. There are a variety of methods for achieving this reduction, including purchasing carbon offsets or implementing CPP project that have the effect of achieving those reductions.

The CAP approach for the off-site emissions reductions builds on the notion that CPP has expertise in energy, sustainability, building design, and other areas that are valuable to potential partners. For example, if a CPP college participated in an external effort that reduced or sequestered GHG emissions, the portion of the emissions reductions associated with Cal Poly Pomona’s role could be counted toward CPP becoming carbon neutral. Examples include the following:

- The College of Engineering provides technical expertise in a partnership with the developer of a renewable energy project or an electrical transmission line supporting renewable energy.
- The Colleges of Engineering, Science, or Agriculture participate in the development and implementation of carbon sequestration strategies.
- The College of Education and Integrative Studies produces curriculum materials that changed household energy consumption patterns,
- The College of Environmental Design partners with a real estate developer to reduce the transportation emissions associated with a planned development or finding new ways to implement cool roof programs.

The Cal Poly Pomona Foundation requires carbon emission reductions from consumables that change the market and change the practices of suppliers, vendors, and institutions.
Such as system would, of course, require peer review, independent measurement, and verification. These ideas are long-term in nature and would require time to be proven emissions reductions. Even though the 2030 target is far into the future, the CAP assumes that efforts to create partnerships to reduce external emissions will begin now.

The advantage of such an arrangement over seeking to purchase a GHG offset or renewable energy credits is that it engages faculty, students, alumni, and supporters in the cause of greenhouse gas emissions. Furthermore, it leverages CPP research and technology transfer expertise. This approach is preferred by campus stakeholders to the alternative of “writing a check” for carbon offsets, the costs of which are very difficult to predict.

6.0 2015 Greenhouse Gas Reduction Strategies

The CAP established a five-year time period as the appropriate time frame for incremental progress toward the 2030 target. Five years give sufficient time for necessary capital investments and institutional changes without allowing the issue to slip on the priority list. Section 5 outlined the recommendation for the straight-line reduction, to a total emissions level of 54,000 metric tons by 2015.

The tables that follow show how the 2015 target can be reached in a detailed, sector by sector analysis. These breakdowns are based on the best information available at the time this plan was prepared. As monitoring occurs, implementation teams (organized under the subcommittees of the Climate Task Force) will track whether they are on pace with the particular strategy. It is not essential that each strategy achieve the degree of reduction shown here; what is important is that the sector stays on track to achieve the overall reduction.

6.1 Campus-Related Strategies

Tables 6.1 through 6.3 show GHG reduction targets that will achieve 12,400 metric tons reduction per year from 2005 conditions. All targets are 25% of 2030 target unless otherwise noted. Targets that are less than 25% are shown in italics and targets more than 25% are shown in bold.

Table 6.1 Transportation Strategies (Areas 1 and 2)

1. Reduce GHG Emissions Associated with Travel

Strategy – Increase % of population using alternatives to single occupancy vehicle; zero emissions fleet	**Target reduction in 2015 (1,951 metric tons reduction)**	**Methods for achieving reduction**
a) Aggressive Carpooling Program – increase total % of carpoolers across all sectors	272	Higher student parking price, more ridematching incentives
b) Mass Transit Program – Increase total % of transit riders across all sectors (reductions in drivers taken from SOVs)	139	Metrolink shuttle, move transit back on campus, link with
c) University Fleet Improvements (including Bronco Shuttle operations and all other leased/contract vehicles)– Eliminate Gas-powered and conventional diesel vehicles, in favor of increases in electric, natural gas and biodiesel]	173	New bus purchase, replace delivery fleet with electric vehicles, selective conversion to biodiesel
d) University Air Travel – Offset 25% of University-sponsored faculty/staff/student/administrator air travel	1,367	Policy and executive orders; funding

2. Reduce Trips/Vehicle Miles Traveled (VMT)

Strategy – Reduce student commuting population. Reduce number of trips to/from campus for commuters	**Target reduction in 2015 (1,416 metric tons reduction)**	**Methods for achieving reduction**
a) Increase on-campus residential population	462	Suites expansion (461 beds). If no other projects, use offsets to reach target
b) Increase near-campus housing for faculty/staff – 0% of 2030 target because of time line for implementation	*0*	Prepare for 2015-2020 implementation
c) Increase online/hybrid course offerings and efficient scheduling to reduce student trips to campus – more than one quarter of 2030 goal because tool are available for implementation and stakeholders desire less commuting	**858**	Incentive program for department rescheduling; option of hybrid GE track
d) Faculty/Staff alternative scheduling (e.g. 4/10 or other alternatives) – 50% of 2030 goal could be accomplished with 9/80 workweek	**96**	9/80 work schedule for staff

Table 6.2 Energy Use Strategies (Areas 3 and 4)

3. Reduce Energy Demand on Campus

Strategy – Reduce energy demand in existing buildings through capital improvements; Reduce energy demand of new construction; reduce plug load through behavioral programs	**Target reduction in 2015 (2,724 metric tons reduction)**	**Methods for achieving reduction**
a) Renovate 25% existing campus square footage and/or exterior lighting to reduce energy consumption (1/2 of 2030 target since can be implemented quickly)	**1236**	Build on 7 current pilot projects with outside contractor
b) Increase energy efficiency/mitigation in new buildings (1/8 of 2030 target because of lag time in construction)	*945*	Increase energy performance of business building, library second phase
c) Implement behavioral programs, energy star purchasing and plug load management to reduce electricity demand	215	
d) Space use efficiency program – reducing the need to add new buildings through more efficient space use and building renovation for flexibility (new program)	**328**	Reducing the # of square feet of new buildings added to the campus inventory versus baseline

4. Change Energy Mix to Reduce Greenhouse Gas Emissions

Strategy – Achieve climate neutrality in campus electrical use by producing on-site electricity and purchased GHG free electricity; Reduce natural gas usage by 50% through solar thermal or other strategies.	**Target reduction in 2015 (6,182 metric tons reduction)**	**Methods for achieving reduction**
a) Reduce Natural Gas usage by 6.25% through on-site solar thermal	*471*	Alternative energy space heating
b) GHG Free sources constitute 33% of electricity purchases via on-site production, agreements or RECs	**5,711**	Installation of solar array, purchase of green energy mix

Table 6.3 Agricultural/Landscape Operations and Solid Waste

Strategy – Neutralize de minimis emissions through waste reduction, changes in agricultural practice, and carbon sequestration.	**Target reduction in 2015 (126 metric tons reduction)**	**Methods for achieving reduction**
a) Reduce Solid Waste by 50% through aggressive recycling/awareness programs	77	Aggressive recycling, composting, and waste reduction programs
b) Practice Conservation Tillage on 25% of agricultural land*	2	College of Agriculture pilot projects
c) Reduce synthetic fertilizer usage by 33%; replace with aggressive composting program to increase organic fertilizer by 33%	31	Division of Administrative Affairs procurement and landscape practice programs
d) Increase Carbon Sequestration on campus by 50%*	16	Policies concerning vegetation removal and planning of high carbon intake vegetation

The other element of the commitment is education, research and outreach as described in Chapter 4. These activities do not result in direct emissions reductions, but in longer-term reductions as the result of awareness and innovations. The primary short-term action items in this area include the following:

- Establish baseline parameters for assessing effectiveness of education, research, and outreach strategies.
- Identify, evaluate and implement co-curricular strategies such as orientation programs and club activities, which raise awareness of climate change among targeted student populations.
- Engage the Academic Senate and staff in Academic Affairs in considering the option of hybrid (on-line) GE track,
- Engage the Academic Senate in considering a General Education track that is focused on sustainability
- Support for new programs on climate change research and outreach across the campus.

6.2 Off-Campus Reductions

The 2030 target calls for approximately 20,000 metric tons of reduction to be achieved by actions outside of the campus operations. These include examples such as partnerships with renewable energy providers, as described previously. For example, Cal Poly Pomona might claim reduction credit for a role in supporting technological innovation or discovery that reduces emissions beyond that which would have occurred without the university's involvement. Examples of this could be renewable energy systems, transmission capacity enhancement, building practices, new materials or procedures, and many others.

This level of involvement is called for in the CAP by 2030. For the 2015 time frame, the Division of University Advancement should place high priority on publicizing Cal Poly Pomona's interest in partnerships and undertake cultivation with prospective partners. Cal Poly Pomona should engage in one seed partnership that has the potential to reduce greenhouse gas emissions to test the concept.

7.0 Process for Prioritizing and Selecting Implementation Measures

Achieving the educational mission of Cal Poly Pomona with limited resources requires that GHG reduction actions be effective, economical, and supportive of other campus goals. The enthusiasm with which the campus community has responded to President Ortiz's signing of the Presidents Climate Commitment has brought forth a host of interesting ideas, ranging from converting campus diesel vehicles to biodiesel to alternative class scheduling. This chapter provides a framework for selecting the highest priority measures to achieve the reduction targets shown in the Chapter 7.

The CAP proposes that this method to be used to prioritize the measures in each five-year period of plan implementation. Proposals and initiatives for GHG mitigation are welcomed from faculty, students, staff, alumni, and community stakeholders. The process for considering and recommending those measures is that each proposal is refered to the appropriate CAC subcommittee for technical review. That review is based on the factors described in this section. The CAC subcommittee analyze the proposal and make appropriate consultations and would then provide a recommendation to the full CAC. On review, the CAC would forward the measure to the appropriate implementing department.

7.1 Process for Developing and Evaluating Measures

The first step is to describe the GHG reduction strategy in enough detail so that it can be evaluated, as described in Table 7.1.

Table 7.1 Description of emission reduction strategy

What is the strategy? What entity on campus would lead this effort?	Description of the strategy and explanation of how it works. The entity could be an existing department or departments, or some new entity. If the latter, please describe it.
Who is affected by the strategy, e.g., students, staff, suppliers, etc.?	Examples include student energy use in residence halls, commuters to campus, facilities management, supplier policies, etc. The size of the market affected by the strategy is a key factor in understanding potential impacts.
Are there feasibility issues, e.g., technology, timing, coordination w/ others, etc.?	Is the technology proposed currently available? If not, when will it be available? How long would it take to implement? Are agreements required with other agencies? Is authorization required from the CSU or other bodies?
Is this strategy in use at CPP, other universities, or other settings?	Examples where the strategy is used in some form at CPP, other universities, or other locations. If not used elsewhere, what is the source of the idea?

Estimating the impacts of GHG reduction strategies is a critical step that requires expertise in many disciplines, including transportation planning, architecture, and civil engineering, as well as operational knowledge in areas such as student housing, energy procurement, and classroom scheduling. An iterative process is recommended, in which initial estimates are vetted with disciplinary and operational experts to ensure that the estimates are reasonable and well justified. The sources of information for these estimates include the following:

- Original analytic studies and predictive models;
- Evidence from the literature;
- Application of effectiveness rates from comparable locations; and
- Results of experiments (e.g., building specific plug load management).

Some GHG reduction estimations are direct. For example, installing a solar array directly reduces electricity purchases, which is an input to the CA-CP model. Other estimations require as assessment of the effectiveness of a program in terms of changing human behavior, which is then translated into inputs to the model. For example, the effect of a carpool incentive program must first be estimated in terms of changes in the commuting mode split (drive alone, carpool, transit), which then can be entered into the CA-CP model to be translated into GHG reductions.

Many strategies require multiple impact estimations. For example, on-campus housing reduces student commuting to campus but increases energy consumption for heating and cooling. Similarly, alternative class scheduling regimes reduce commuting and may also reduce energy for heating and cooling and plug loads. Table 7.2 outlines the process for assessing impact on GHG.

Table 7.2 Estimated impact of strategy on greenhouse gas emissions.

How does the strategy impact GHG emissions?	Estimated impacts will be tested using the Cool Air/Clean Planet model. Examples include estimates about the change in the # of kwh of electrical consumption (reduced consumption or renewable supply), tons of fertilizer use, commuter mode choice, miles of faculty/staff air travel. Offset purchases are subtracted from total emissions; no modeling is needed.
What information or estimates are needed to estimate GHG impact?	The impacts must be translated into the inputs to the Cool Air/Cool Planet model Sources of information for estimates include models, results of literature reviews, results from other campuses, results from pilot programs, expert judgment, etc.

Cost effectiveness evaluation is the recommended economic screening criteria for the CAP. This measure puts capital and operating programs on an equal footing. It accounts for ongoing operating costs or savings of some programs and considers the cost of tying up resources in capital improvements. In addition, its simplicity measure allows campus decision makers to compare annual costs per ton with the cost of buying an offset. This enables decision makers to ensure that the most GHG reduction is achieved for a given expenditure.

In some cases, strategies have costs and savings that will vary over time. For example, solar panel installation involves a substantial capital cost, but there are utility rebates and discounted financing available. In addition, the savings on purchased electricity will increase as electrical rates rise in the future. For these types of projects, capital costs should be added into a pro forma analysis of net present value of the stream of costs and revenues to determine whether that project has a positive or negative net present value. This analysis can also determine a break-even point for the project. Table 7.3 discusses the process for determining costs or savings for the GHG reduction strategy.

Table 7.3 Estimated costs or savings of emission reduction strategy.

What is the capital cost or saving?	Capital costs or savings are one-time investments that last a long time, such as a more efficient chiller, a CNG bus, or on-campus housing.
How long will the capital investment last?	How long will the equipment last before it is completely worn out and has to be replaced? The length of the life of the investment is used to convert one-time costs/savings into annualized costs/savings. These are calculated using the length of time the improvement lasts and a discount rate. For example, the annualized cost of a $1 million investment that lasts 20 years, at a 7% discount rate, is $94,392.
What is the annual operating cost or saving?	These are recurring annual costs such as electrical consumption, fertilizer purchase, transit subsidies, etc.
Cost effectiveness calculations	Annual operating costs/savings are combined with annualized capital cost to arrive at an annualized cost or savings. Metric tons of GHGe associated with a strategy are divided by annualized cost to produce a measure of cost per GHGe reduction. NPV analysis used when the stream of operating costs and revenues varies significantly over time.

This economic evaluation does not imply that only measures with the highest cost-effectiveness will be selected for implementation. The qualitative factors noted in Table 7.4 are a vital part of the assessment.

7.2 Summarizing Evaluation Results

Evaluation results should be summarized in a multiobjective matrix format, as shown in Table 7.5. Numeric values appear in the "Modeled GHG reduction" and "Economic evaluation" columns while qualitative ratings are provided for the other categories. Decision-makers weigh the importance of these criteria in selecting strategies; no scoring system is proposed to identify the best strategies, since the importance of a qualitative factor could outweigh economic efficiency. Another way of considering this point is that if a strategy having less favorable economic performance is to be chosen, it should have compensating advantages in terms of supporting other university goals, administrative feasibility, and educational benefits.

Table 7.4 Qualitative factors for evaluating emissions reduction strategies.

Is the strategy supportive of other university goals?	Consideration of positive or negative impacts on other factors articulated in the University mission, Strategic Plan, Campus Master Plan process, College-level plans, university initiatives such as service learning, etc. For example, a highly visible strategy could have educational benefits for students.
What is the administrative feasibility of the strategy? What is the level of certainty about the success of the strategy?	Administrative feasibility considers factors such as the University's authority to implement the measure, organizational challenges in implementation, precedents and experience, etc. Is there a body of research to support accurate prediction of results? Are there possible unintended consequences?
What are the educational/research/ demonstration benefits?	Does the measure provide educational benefits? How? Does it provide research opportunities? Does the measure demonstrate new technology or programs? Is the measure visible to the campus community?
Are there other benefits of the strategy?	Other factors not mentioned above.

Table 7.5 Display of Evaluation Results.

GHG Reduction Strategy	Modeled GHG reduction	Economic evaluation	Support for other university goals	Administrative feasibility and certainty	Educational/ demonstration benefits
Strategy A	_ metric tons reduced, (_% of total)	$_/annual metric tons reduced	✓, ✓✓, or ✓✓✓	✓, ✓✓, or ✓✓✓	✓, ✓✓, or ✓✓✓
Strategy B					
Strategy C					