Background Report
Poly Climate Action Plan

Prepared By:
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City & Regional Planning Studio 410/411
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Prepared For:
Cal Poly Facility Management and Development

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CAP

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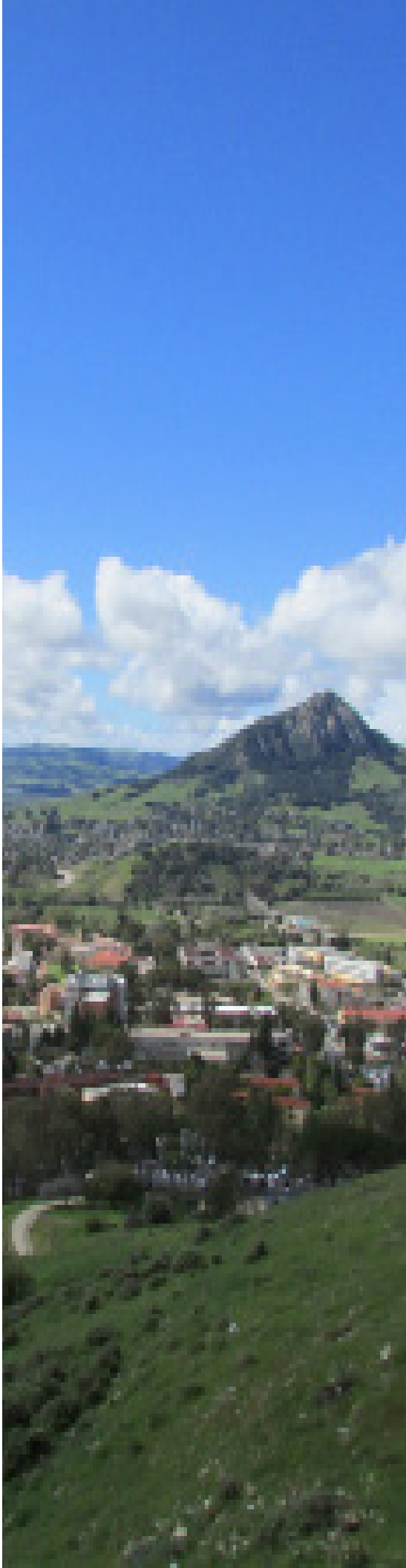


I. Introduction


POLY CLIMATE
ACTION PLAN

Introduction

California Polytechnic State University (Cal Poly) initiated an effort to develop a campus climate action plan (PolyCAP) in Spring 2015. A CAP is a strategic plan that identifies ways to reduce greenhouse gas (GHG) emissions and adapt to the unavoidable consequences of climate change. This Background Report documents current conditions on campus including vulnerability to climate impacts, existing policies, and the results of preliminary outreach events. These data, with an inventory of GHG emissions, serve as the basis for development of an effective CAP for Cal Poly.

Established in 1901, Cal Poly is located on the Central Coast of California, 10 miles from the Pacific ocean and encircled by San Luis Obispo's iconic rolling hills. Cal Poly is one of 23 universities within the California State University system and is comprised of six colleges. It is amongst the largest universities, by land area, in the state of California occupying approximately 6,000 acres of land within San Luis Obispo County and 3,200 acres of land within Santa Cruz County. Cal Poly currently has just under 20,000 students with plans to admit more students in the future. The campus is undergoing a Master Plan Update to guide future campus growth. The development of the PolyCAP will help assure that this planned growth occurs in a climate-friendly manner.

Climate change is caused by GHG emissions and has the potential to affect multiple aspects of any community, including a college campus (IPCC, 2014). Because of the breadth of activities that generate GHG emissions or have the potential to be affected by climate change, the analysis in this report is divided into sectors: Agriculture, Buildings, Campus Life, Renewable Energy, Solid Waste, Transportation, and Water. The report begins with a preliminary vulnerability assessment, which is followed by a policy audit, inventory of best practices, and a summary of outreach activities. A vulnerability assessment determines and defines the potential impacts, sensitivity, adaptive capacity, and exposure to impacts for each sector. The policy audit reviews existing policies at the federal, state, and local level for compatibility with climate goals for campus. The best practices section contains strategies demonstrated to be effective in reducing GHG emissions or addressing potential climate impacts. The outreach summary reflects what was learned from interviews with professionals and faculty with expertise in their respective fields, as well views collected from the broader campus community.

Class Structure

Who We Are

The PolyCAP team is comprised of students in CRP 410/411. CRP 410/411 is a fourth year City and Regional Planning (CRP) studio. The studio consists of 28 CRP students, two professors, and a special advisor. The class efforts are broken into seven sector teams, each integral to addressing climate change: Agriculture, Buildings, Campus Life, Renewable Energy, Solid Waste, Transportation, and Water. In addition to sector teams, each student serves on a task team. These teams pursue a variety of efforts necessary to develop the PolyCAP. The teams include Editorial, GHG Check, Graphics, Logistics, Outreach, Photo and Video, and Web Design.

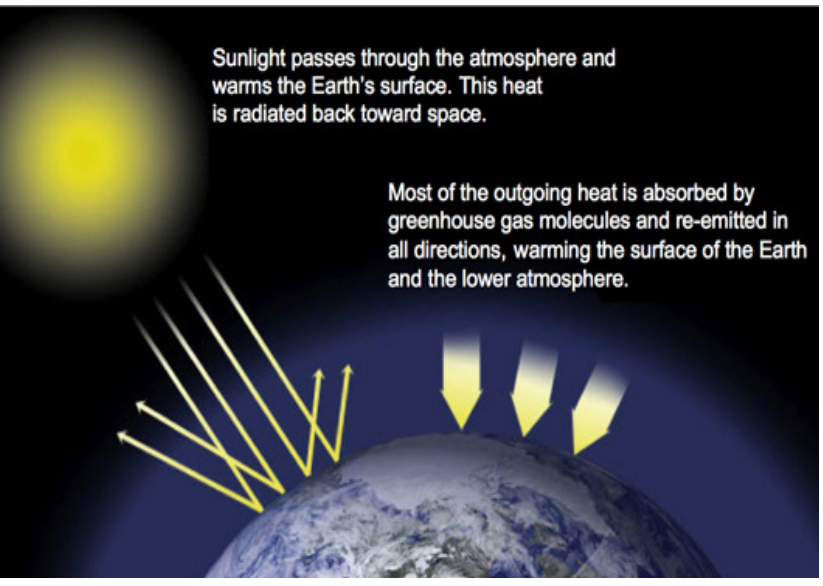
What We Are Doing

Over the course of two quarters the CRP-410/CRP-411 studio is developing the PolyCAP. The first quarter focuses on gathering data to document and understand current conditions on campus. In addition, best practices from other city and campus CAPs and related guidance documents were compiled and reviewed for potential strategies relevant to Cal Poly. The second quarter of the course focuses on PolyCAP development. Throughout the PolyCAP process, outreach efforts assure that the Cal Poly community has the opportunity to share its hopes for the future of Cal Poly and current campus needs. This includes how the university can further reduce greenhouse gas emissions and adapt to climate change.

Climate Change Summary

Climate can be loosely defined as average weather, described by variables such as temperature, precipitation, and wind. Human activities affect components of the climate through activities such as GHG emissions and land use conversion. An increased concentration of GHG emissions results in less heat escaping earth's atmosphere. This is how GHGs result in increased average global temperatures, which in turn affects a variety of climate characteristics. There are five changes often termed "direct" climate impacts: altered temperature and precipitation patterns, sea level rise, ocean acidification, and increased frequency or severity of extreme events (IPCC 2013; CEC & CNRA, 2012). These direct impacts result in a much larger set of secondary outcomes such as increased flooding, more frequent drought, heat wave, human health consequences, reduced ecological health, wildfire, and more.

Carbon dioxide (CO2), the most common and plentiful GHG, remains in the atmosphere for five to 200 years. Other GHGs also persist for varying lengths of time, some much longer (IPCC, 2013). As a result, climate change must be addressed in two ways, reduced GHG emissions and preparation for changes that cannot be avoided. GHG emissions should be reduced to limit the extent of future climate change. Because the emissions currently affecting our climate may have been emitted many decades ago, we must also prepare for consequences that we cannot avoid. The State of California has already experienced a 1.7°F increase in average temperature over the last 100 years. In response to this and other observed impacts, the State has adopted aggressive GHG emissions reduction measures to limit future impacts and adaptation guidelines to prepare for impacts that cannot be avoided (CEC & CNRA, 2012). A CAP for Cal Poly prepares campus for potential impactss and helps campus take part in limiting future climate change.



GHGs create a blanket around the Earth. NASA. (n.d.)., Retrieved from http://climate.nasa.gov/causes/

Climate Action Planning

CAP stands for Climate Action Plan, a strategic plan to reduce greenhouse gas emissions and lowering risk of climate change impacts (Boswell et al.., 2012). Many universities and cities have developed and are implementing CAPs. Not only do these efforts comply with state climate policy, but they also position a community to thrive in the future. A CAP typically addresses two broad goals, GHG emissions reduction and climate change adaptation, and defines how a community can tackle these long-term goals while meeting other local needs.

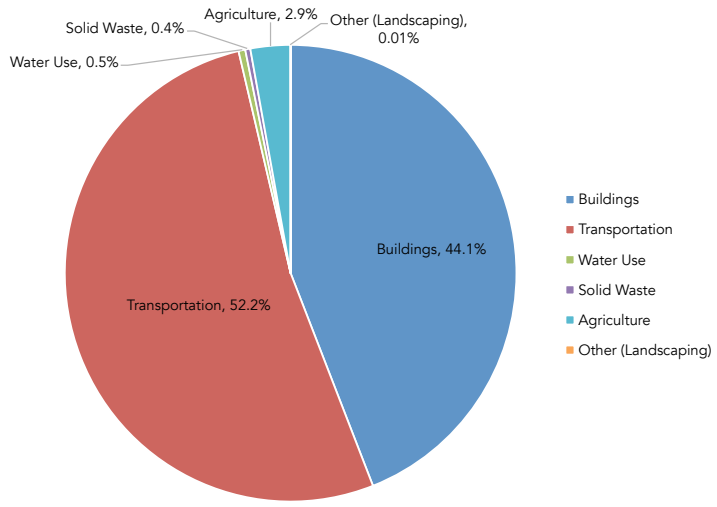
Greenhouse Gas Reduction

The CSU system aims to reduce GHG emissions to 80% below 1990 levels by 2040 (CSU, 2014). The PolyCAP aims to exceed the CSU mandate and achieve Net Zero GHG emissions by 2050, in accordance with Cal Poly's signing of the Second Nature Climate Commitment. GHG emissions reduction strategies alter emitting activities on or associated with campus. These measures include changes such as energy efficiency, altered behaviors (e.g. transportation choices), and modified operational procedures. Two critical components of effective GHG emissions reduction strategies include the calculation of emissions reduced by a given strategy and the identification of the indicator that allows implementation to be evaluated.

Climate Change Adaptation

Regardless of global GHG emissions reduction activities, climate continues to change. Communities must also prepare for the changes that cannot be avoided. Climate change adaptation describes measures intended to reduce climate risk and increase local resilience. These measures are based on a vulnerability assessment. A vulnerability assessment identifies the ways in which climate will affect a particular location and identify who and what will be impacted. With this information, a community is able to identify adaption needs. The final step in a vulnerability assessment is a prioritization of these needs. Strategies are then developed to address adaptation needs and implemented based on local knowledge regarding community values, existing operations and procedures, and fiscal feasibility.

Greenhouse Gas Inventory Summary



GHG emissions percentage by source for Cal Poly

Developing a plan to reduce GHG emissions requires that current emissions be inventoried to serve as an informational basis for policy development. For Cal Poly, transportation and buildings are the largest producers of GHGs on campus. GHG emissions are classified in three ways, or scopes: Scope 1 includes direct GHG emissions. An example of this is how the burning of fossil fuels on campus emits CO_2. Scope 2 includes indirect GHG emissions from consumption of energy, which is most commonly electricity or natural gas. For example, the use of electricity does not generate GHGs, but the generation of electricity by Pacific Gas and Electric (PG&E), the local utility, emits GHGs. Scope 3 includes other indirect emissions not controlled by the university. For example, faculty, staff, and students driving to campus emit GHGs from their cars.

A sector summary that describes how emissions were categorized is included in a subsequent section. The two sectors not do not generate GHGs: renewable energy and campus life. Implementing renewable energy practices on campus reduces campus reliance on outside electricity sources, which will reduce the campus' carbon footprint. Campus life, focusing on behavior, is included within the building emissions for the inventory.

Outreach Summary

Throughout the PolyCAP development process, the PolyCAP team is gathering input from campus to assure the plan meets campus needs. Arranged in phases, outreach efforts initially focused on raising awareness and surveying opinions of Cal Poly students, faculty, staff, and San Luis Obispo community members. In the first outreach efforts, the PolyCAP team gathered input from attendees at the campus' Master Plan events. Posters asking, "Cal Poly is taking climate action. What can we do to reduce greenhouse gases and adapt to climate change?" were displayed in Kennedy Library's atrium and in the San Luis Obispo County Library. Attendees were asked to share their ideas by writing down their views and placing a post-it note on the poster.

The second phase of outreach also targeted the campus community. The PolyCAP team set up in the University Union Plaza for three hours with campus maps and Polly the Polar Bear. While displaying a map of campus, the PolyCAP team asked participants the following questions:

- *What are your favorite and least favorite parts of campus?*
- *Where do you spend time on campus outside of class?*
- *How do you get to campus?*
- *Where do you enter campus?*

This event concentrated on identifying those areas of campus most valuable and highly utilized, versus the areas that need improvement. Polly the Polar Bear was present as the official Cal Poly Sustainability Mascot and helped draw people to the mapping exercise. To reach a larger portion of the campus and to confirm the findings of the UU event, each PolyCAP team member conducted informal, semi-structured interviews throughout campus.

Members of the PolyCAP team also attended the Cal Poly PowerSave Campus Stakeholder Meeting. The PowerSave Campus committee strives for sustainability, specifically through energy efficiency. Due to the similarity of our goals, we plan to work together. The results from these larger, campus-wide events and the outcomes of smaller meetings with individual departments are summarized as part of the subsequent outreach chapter.

Sector Descriptions

Agriculture

Agriculture is unique when considering GHG emissions and potential climate impacts. Instead of looking at buildings or cars, the Agriculture Team reviewed biological processes, animal waste management, and agricultural productivity. At Cal Poly, the majority (77%) of the emissions generated by agricultural practices originate from livestock; specifically, ruminant animals including cow, sheep, and goats. Ruminants digest their food through the process of enteric fermentation. This process releases methane, which is a greenhouse gas with a carbon equivalent of 25 CO2e (FM&D, 2015). Therefore, the global warming potential of methane is 25 times greater than that of carbon dioxide. The second largest producer of agricultural GHG emissions (17%) are the waste lagoons. At the dairy and swine units, water is used to rinse the manure from the animal stalls and drains to the waste lagoons. This water is not treated. Cal Poly uses the lagoon water to irrigate and fertilize silage fields. The Dairy Science Instructional Unit utilizes a two-lagoon system and is permitted to discharge up to 46,000 gallons/day. The Swine Unit is permitted to discharge 6,000 gallons/day and the Beef Cattle Evaluation Center is permitted up to 554,000 (1.7 acre feet)/day. A third contributor to agricultural GHG emissions is composting. As the organic materials decompose, it releases GHG emissions for an overall impact of 70 MTCO2e, or 5% of overall agriculture-related emissions. Finally, fertilizer makes up 1% of the measurable impacts. Cal Poly does not have complete data on fertilizer application due to the lease of campus lands to outside growers. Fertilizer decomposes naturally and through tillage, releases N_2O. This is a part of the normal nitrogen cycle; however, synthetic fertilizers often contain more nitrogen than organic fertilizer and plants cannot sequester the excess.

Many Cal Poly College of Agriculture, Food, and Environmental Sciences (CAFES) faculty and staff are dedicated to sustainable practices and research. Professor Yi Wen Chiu is leading a research project to conduct a life cycle analysis of the waste lagoons to understand GHG production. She acknowledged that without a comprehensive data collection process, it would be difficult for the Agriculture Department to make changes or track progress.

There is also campus interest in expanding the compost program. According to Kevin Piper, Director of Agriculture Operations, Cal Poly has been composting since the 1990's. Campus green waste from eight fields and landscaping is composted; however, no post-consumer waste is composted. The Center for Sustainability teaches a compost class for San Luis Obispo area farmers, but it is not available to students. Currently, the student-run organic farm is not composting. It is dependent on student leadership, which is inconsistent.

Sector Indicators:


Agriculture


Buildings


Campus Life


Renewable Energy


Solid Waste


Transportation


Water

Buildings

The buildings that make up Cal Poly's campus total approximately 5.8 million square feet (Cal Poly Quick Facts, 2015). The campus uses energy sources such as electricity, natural gas, and propane to power facilities on campus including HVAC operation, labs, dining halls, classrooms, and dorms. The generation of electricity delivered by PG&E results in GHG emissions. The 44,710,779 kWh of electricity from PG&E used on campus results in roughly 8,356 MTCO2e annually (Cal Poly GHG Inventory, 2015). As the University strives become more energy efficient, new buildings are built to higher efficiently standards and many older buildings have been retrofitted for improvement. In 2008, Green Campus Interns lobbied Associated Students Incorporated (ASI) to approve LEED certification of the new Recreation Center. The vote prompted Cal Poly to pursue LEED certification for all new construction. Currently, four buildings on campus are LEED certified: Faculty Offices East (silver), the Rec Center (gold), Poly Canyon Village (gold), and the Warren J. Baker Center for Science and Mathematics (gold) (Thompson, 2015).

Cal Poly Rec Center certified LEED Gold (Cal Poly Administration & Finance, 2014)

Internal and external factors influence emissions on campus. One factor is the campus population. Every day, for 9 months, 20,000 people are on campus using energy. Cal Poly's President Armstrong aims to increase the number of students attending Cal Poly, as well as having a larger percentage of students live on campus. This requires more classrooms and more dorms to accommodate students, but may reduce other emissions sources such as transportation. More inhabited spaces results in more energy usage on campus, which increases emissions. The amount of energy depends on how energy efficient the new facilities are and the manner in which the electricity is generated. Another factor is the temperature. Mild temperatures throughout most of the year reduce reliance on artificial heating and cooling. With temperatures projected to increase due to climate change, more on-campus buildings will need cooling systems. An increase in artificial cooling systems, such as air conditioning (AC), requires more energy use and associated GHG emissions. A final factor is design. Buildings that are not designed with environmental factors in mind, such as natural heating, cooling, and lighting, require more artificial systems.

Future construction on campus must consider the environment during the design process in order to keep emissions lower and to meet new energy efficiency standards. Executive order S-3-05, issued by Governor Brown extends the mandate that California to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020 to 80 percent below 1990 levels by 2050. The CSU Board of Trustees adopted a more aggressive goal, 80% below 1990 by 2040 (The California State University, 2014). To meet these goals, future buildings on campus will need to: meet the new Title 24 Energy Code for all new construction or major renovations, establish Zero Net Energy for all new residential buildings by 2020 and new commercial buildings by 2030, and transition from certifying individual buildings under LEED O+M (operations and maintenance) to a campus wide program. Cal Poly also targets LEED Gold Certification for all new housing facilities (FM&D, 2014).

The 2001 Cal Poly Master Plan promotes strategic infill, and redevelopment within the instructional core because it is an area that provides opportunities to create and redevelop. Redeveloping within the instructional core avoids the unnecessary conversion of surrounding agricultural and natural lands to urban uses and will allow new buildings to take advantage of the campus' Utilidor (Cal Poly San Luis Obispo, 2001).

The PolyCAP Buildings Team met with Eric Veium and Dennis Elliot from FM&D; Stacey White, a LEED accredited professional; and Daniel Feuerstein a College of Architecture and Environmental Design Network Analyst to gather information regarding building operation on campus. Eric Veium provided information about the Utilidor on campus and how it is managed. He discussed the central plant and the number of buildings connected to the central cooling and central heating distributors. He also revealed the campus' potential plan to add another central plant to be able to connect future buildings, such as Student Housing South. Both Eric Veium and Dennis Elliot stated that the biggest problem with buildings was the lack of metering. Metering allows campus to understand how much water and energy each building is using. According to Dennis Elliot, installing meters is expensive and is not a priority. Many buildings on campus are inefficient because they are old; however, there are plans to remove or retrofit those buildings (Stacey White, personal communication, October 2015).

Campus Life

The Campus Life sector focuses on campus living and behavior and how these aspects contribute to GHG emissions. Campus life includes elements such as housing, dining, recreation, and health. Analyzing these specific areas help identify ways to reduce emissions caused by student, faculty, and staff behavior, while also learning and understanding the patterns of the Cal Poly community. Among the aspects of Campus Life that influence GHG emissions are student utility usage in the dorms as well as trips off campus using vehicles. Trips off campus can be attributed to a lack of recreational opportunities, dining options, and other facilities that would encourage students to stay on campus. Amenities keeping students on campus reduces the amount of trips off campus, thereby reducing GHG emissions.

To encourage sustainable behavior on campus, Cal Poly has focused on outreach and student education by encouraging students to reduce their "foodprint," to be mindful of water and energy use in student housing, and to utilize on-campus health facilities. An effective program currently pursued by Cal Poly that reduces GHG emissions in student housing is the Red Brick Dorm Energy Competition. Eric Veium (personal communication, October 19, 2015) explained how the competition, run by the PowerSave Campus Program, educates residents on climate-friendly lifestyles. In addition, the competition promotes sustainable habits, with the intent that residents maintain and integrate those behaviors into their daily routine. Although this does not track all student utility usage across campus, it changes student behavior in on-campus housing. Cal Poly aims to expand the competition to other housing complexes (Dennis Elliot, personal communication, November 2, 2015). However, both he and Scott Bloom (personal communication, November 18, 2015) said a major barrier to expanding the competition and implementing additional sustainability programs is a lack of funding.

Campus Dining focuses on reducing the environmental impact of its programs, products and services as well as providing opportunities for students to reduce their "foodprint," or carbon footprint of the food

they consume. Areas that have been the focus of Dining include food sustainability and purchasing locally, as well as Waste Stream Management, which includes recycling, Zero Waste, composting, and re-use. In addition, Campus Dining facilities focus on water and energy conservation, green buildings, and green transportation. Many of Campus Dining's approaches to becoming more sustainable also serve in reducing GHG emissions. Buying food locally helps to reduce GHG emissions by limiting the distance of delivery vehicle trips. Similarly, by considering waste management, Campus Dining can reduce waste transported off campus and into landfills.

Cal Poly offers diverse recreational opportunities for its students. The two most utilized are the newly constructed Recreation Center and various hiking trails on campus. Additionally, Cal Poly offers a variety of events on campus, which are hosted at the University Union and other spaces that attract people to stay on campus. Providing recreational activities encourages students to stay on campus and reduces the number of vehicle trips to and from campus, decreasing GHG emissions. Cal Poly also provides health services and other programs accessible to students that help to reduce trips off campus. There is discussion about expanding the Health Center to include care for faculty and staff, meaning that in the future, they can seek medical attention without travelling off campus. Through the STRIDE program, valuable data on health behavior has been collected, which allows the campus to work on sustainable solutions and health equity.

Renewable Energy

Currently, Cal Poly purchases 92% of the electricity used on campus from PG&E and generates the remaining 8% from photovoltaic installations and cogeneration on campus (Cal Poly, 2014). The PV system installed on the roof of Engineering West building (Bldg. 21) generates approximately 290,000 kWh of electricity per year, eliminating about 56 MTCO2e (Cal Poly, 2014, PG&E 2015). The Facility Service building also has a solar array on the roof to supply six electric vehicles in the Facility Services fleet. According to Dennis Elliot, Director of Energy Utility and the Sustainability Department, Cal Poly is planning to implement a multi-megawatt solar farm near the Cal Poly owned avocado ranch to increase the use of renewable energy. The dollar value of the electricity generated from the solar farm will be transferred as credit to the Mustang Substation (personal Communication, November 2nd, 2015).

Cogeneration (cogen), which generates both heat and electricity from the same fuel source, is currently utilized in only Poly Canyon Village (PCV) after the Sierra Madre system was retired in 2010 (D. Elliot, personal communication, November 2nd, 2015). The PCV cogen system was constructed in 2009 to provide space heating, domestic hot water, and swimming pool heating (Cal Poly, 2014). However, the cogen system cannot run efficiently on yearly basis because space heating is not needed during summer. In addition, cogen makes utility procurement more complicated; it has extremely high repair cost and the engines are oversized for the heat load. Therefore, trigeneration systems are recommended to utilize heat energy to cool the water during summer (D. Elliot, personal communication, November 2nd, 2015).

The use of PG&E electricity is the primary factor influencing Cal Poly GHG emissions. The electricity from PG&E is considered as one of the cleanest energy sources because the energy resources include 47% natural gas, 20% nuclear, 16% large hydroelectric, 15% eligible renewable, 2% coal, and 1% other resources. Eligible renewables include biomass, geothermal, small hydro, PV, and wind power (Cal

Poly, 2014). The current agreement with PG&E limits the amount of campus electricity generation and states that the electricity cannot be delivered outside of campus (E. Veium, personal Communication, October 28th, 2015).

Climate change impacts, such as increased average temperature and heat waves, create higher demand for AC. Therefore, campus will need to increase efficiency and renewable energy generation to meet the rising demands and prevent increased use of conventional energy.

Zero Waste station on Dexter Lawn

Solid Waste

Solid Waste contributes GHG emissions and will continue to be a factor in the foreseeable future. GHGs associated with solid waste are primarily produced through the decay of organic waste after being deposited in a landfill. Under CSU sustainability goals (Committee on Educational Policy and Committee on Campus Planning, 2014), Cal Poly must become a Zero Waste campus by the year 2020. With that goal in mind, Cal Poly has taken steps in reducing contributions to an off-site landfill, Cold Canyon Landfill, while increasing efforts to bolster alternative solid waste management strategies. Cal Poly relies on off-site recycling centers and composting facilities, while supporting an on-campus agricultural composting facility.

Cal Poly initiated a Zero Waste Program, with the primary goal of becoming a Zero Waste campus. After interviews with Eric Veium and Dennis Elliott (personal communication, October 2015), the primary barrier to implementing the Zero Waste Program is cost.

Transportation

Transportation GHG emissions are one of the largest emitters on campus, accounting for over half of campus emissions. The emissions primarily result from single and multiple occupancy cars used by students, staff, faculty and guests to reach campus. Other transportation modes such as bicycling or bus reduce the amount of GHG emissions generated by the campus community. Transportation on campus is currently divided into four modes: car, bus, walking, and biking. According to the survey completed as part of the GHG Emissions Inventory (FM&D, 2015), 38% of the campus community drive alone to campus and 29% walk. The remaining third either carpool, bike or use public transit. The construction of Housing South already has altered campus travel by reducing the number of available parking spaces along Grand Ave. There are fewer people driving to campus as a result.

Parking is one way that campus directly influences transportation behavior. In addition to discouraging vehicle use, the lack of parking is also causing cars to circle and idle more, producing GHG emissions. There was a one thousand space reduction with the elimination of the Grand Street Lot. According to Marlene Cramer, the Business Service Coordinator for Facilities, when the new Housing South complex is completed, there will be a four-hundred-spot parking structure; however, there is still a permanent loss of six hundred spots (personal communication, October 15, 2015). In the future, the new Master Plan may call for additional reduction in parking, placing buildings on the current location of campus parking lots. While this will reduce the GHG emissions by reducing the cars on campus, Cal Poly needs to provide alternative ways for people to get to campus.

The largest public transportation system on campus is SLO Transit. There are five routes that enter campus. In 2013, there were approximately six hundred fifty thousand bus riders counted using their Cal Poly IDs (FM&D, 2014). The campus has an agreement with SLO Transit that allows students to ride free. The transportation department uses the funds from traffic citations to pay for the bus service. There will be a decrease in funds with the decrease in parking on campus. Campus is already feeling the fiscal effects of reduced parking. There is an increase in demand for the bus, but there has not been an increase in service due to lack of funds. The system needs to focus on both the city and the school, without showing preference to the campus (G. Anguiano, personal communication, November 10, 2015).

Another common mode of transportation, both to and on campus, is biking. Over the last several years, there has been an increase in the number of bike lanes. Infrastructure improvements such as the green stripping in major intersections improves safety and may encourage further bicycle ridership.

Water

California Polytechnic State University obtains water for agricultural, landscaping, and domestic uses from local reservoirs, groundwater sources, and surface water diversions. The University's three primary water sources are Whale Rock Reservoir, Santa Margarita Lake (Salinas Reservoir), and six on-campus groundwater wells (Cal Poly Master Plan, 2001). GHG emissions result from the energy used for extraction and transport of water from local sources (reservoirs and groundwater wells) and the water treatment facility in Stenner Canyon, where electricity is used to treat and process water. Additional energy is used for the treatment of wastewater at the San Luis Obispo Water Reclamation Facility. In total, approximately 170 MTCO2e are emitted annually from water related processes on campus (Cal Poly GHG Inventory, 2015).

Currently, the University consumes 465 million gallons of water per year. Approximately 54% of Cal Poly's annual water usage goes towards agricultural uses, 27% is used for landscaping, and 17% serves domestic consumption. The remaining 2% is used by facilities for various operational purposes (FM&D, 2015). In the future, it is likely that agriculture and landscaping will remain the largest water consumers on campus. Climate change may have an impact on temperature and rainfall patterns at the University and in the region.

The University has already taken measures to reduce water. In 2015, a Drought Response Plan was adopted in response to the ongoing, multi-year drought in California. The plan calls for a 25% reduction in water consumption by 2016, beyond the 23% reduction accomplished between 2013 and 2015 (Cal Poly, 2015). The plan focuses on improved systems efficiency and behavior changes to reach the University's water conservation goals. Some of the highlights of this plan are removing underutilized lawns, pursuing drip-irrigation, and planting drought conscious or native landscapes (R. Hostick, personal communication, November 12, 2015).

The University is likely continue water efficiency and use reduction measures in the future. Measures may include further retrofits and infrastructure upgrades, such as the installation of meters and a centralized campus irrigation system in improve efficiency and conserve water (D. Elliot, personal communication, November 11, 2015; R. R. Hostick, personal communication, November 12, 2015). Other more aggressive measures may include the construction of a water treatment facility on campus to treat and allow for reuse of on-campus water, utilization of graywater and rainwater collection technologies, and the construction of dual plumbing or similar systems on campus (K. Busby-Porter, personal communication, November 2, 2015; D. Elliot, personal communication, November 11, 2015).

Policy Audit and Best Practices

The CRP-410/411 studio examined state, local, and campus policies related to reducing greenhouse gas emissions and adapting to climate change. Each sector team identified and analyzed policy relevant to their topic area. Policies supporting climate goals were identified as compatible and those acting counter to climate goals were classified as incompatible. Compatibility reflected whether or not the policies directly affected campus GHG emissions or resilience to climate impacts. The intent of the policy audit is to understand how current conditions were achieved and identify effective current policies that will serve as a foundation for developing new measures.

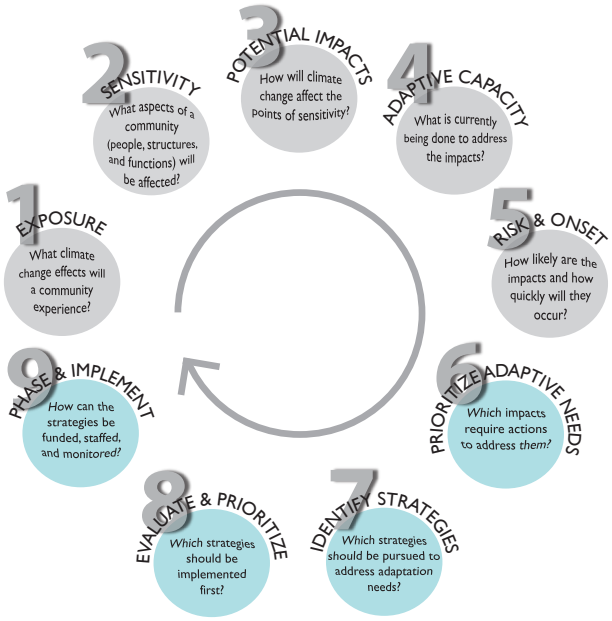
In addition to the policy audits, best practices were evaluated. Best practices from other universities, cities, and communities were identified by each sector team. Strategies were evluated for potential effectiveness on Cal Poly's campus to reduce GHG emissions and adapt to climate change. Criteria were established to identify best practices most relevant and effective for implementation at Cal Poly. The criteria used to select best practices were:

* *Practices campus was not already pursuing*
* *Applicability to Cal Poly*
* *Reducing GHG emissions*
* *Reducting climate risk or increasing resilience to climate impacts*

II. Vulnerability Assessment

Vulnerabiltiy Assessment

GHG reduction limits the severity of future climate change, but does not eliminate projected climate change impacts. Cal Poly must both reduce GHG emissions and address potential impacts. The development of adaptation strategies is based on an assessment of the risk that climate change poses for the Cal Poly. This assessment is termed a vulnerability assessment. A vulnerability assessment begins by reviewing the changes projected for campus (exposure), followed by an evaluation to identify points of sensitivity, potential impacts, and current capacity to address the impacts.



Adaptation planning process (OES & CNRA, 2012)

Exposure

Climate change will have three major impacts on California: sea level rise, increase in average temperatures and extreme heat frequency, and altered annual precipitation including reduced snowpack. Models project temperature increases of up to 5.2 degrees by the year 2080, which may impact campus operations and public health. Total annual rainfall is projected to decline with droughts increasing in both frequency and severity (CEC & CNRA, 2012). Despite a projected decrease in annual rainfall, extreme events may increase resulting in greater flood risk. The risk of increased additional wildfire risk is limited; however, recent drought increases wildfire risk by reducing vegetative moisture and water availability.

Sensitivity

Listed in the following tables are the campus functions, structures, and populations that may be affected by climate change. For each point of sensitivity, potential impact assesses to to what degree they will be affected and adaptive capactiy evaluates how prepared campus us to address the impacts.

Potential Impact

The definitions below indicate manner in which the severity of the potential impacts were assessed:

* *High- The activities of different functions, structures, or populations will be disrupted in a way that requires extensive repair or operational changes.*
* *Medium- The activities of different functions, structures, or populations will be disrupted for a short period of time.*
* *Low- The activities of different functions, structures, or populations will be minimally affected.*

Adaptive Capacity

The definitions were used to assess the level of campus preparedness for climate change impacts:

* *High- The ability of a specific function, structure, or population to maintain most (more than 80%) activities.*
* *Medium- The ability of a specific function, structure, or population to maintain some (about 50%) operations and activities.*
* *Low- The inability of a specific function, structure, or population to maintain (20% or less) operations and activities.*

Agriculture				
Impact	**Sensitivity**	**Rational**	**Potential Impact**	**Adaptive Capacity**
Increasing Average Temperature	Livestock	Increased average temperature can lead to decreased life expectancy and decreased output.	High	Low
	Crops	The expected annual increase in temperature will directly influence growth capacity as well as limit crop production.	Medium/ High	Medium
	Educational Programs	The potential for livestock and crop reduction could lead to a decrease in the feasibility and breadth of educational programs.	Medium	Low
Deceased Annual Precipitation	Livestock	Decreased precipitation will lead to inadequate resources for livestock.	Medium	High
	Crops	Less water may inhibit Cal Poly's ability to grow crops.	Medium	High
	Educational Programs	A reduction in livestock and crops may limit educational programs.	Medium	High

Buildings				
Impact	**Sensitivity**	**Rational**	**Potential Impact**	**Adaptive Capacity**
Temperature, Heat Wave	Energy delivery	Higher temperature affect PV transmission efficiency	Medium	Medium
	Quality of life	Increased temperature will increase AC in buildings	Medium	Medium
	Industrial operation	Increased heat may require additional cooling and ventilation work/lab areas.	Low	Low
	Individuals with chronic disease	Building ventilation and temperature controls may be in higher demand.	Medium	Low
	Students	Adequacy of lecture halls, public areas, campus housing may be limited.	High	Medium
	Commercial	AC in food service kitchens may increase.	High	Medium

Temperature, Heat Wave	Emotional and mental health	Potential need to expand health center services to address heat impacts.	Low	Low
Termperature, Heat Wave, Flooding, Wildfire	Emergency services	EMT vehicle accessibility may be inhibited by fire or flood.	Medium	Low
	Mobiliy / tranportation / access	Location of car / bike parking, adequacy of bus / bike shelters may be affected.	Medium	Medium
	Residential	Campus housing may be vulnerable to public health and safety risks.	High	Low
	Recreational facilities	PAC, gym, sports fields may be less comfortable or safe.	High	Medium
	Children	Daycare facilities may need to be adjusted to protect children.	Medium	Low
Temperature, Heat Wave, Flooding	Quality housing access	Adequacy of housing stock with AC for higher temperatures may need evaluation.	High	Low
Campus Life				
Impact	**Sensitivity**	**Rational**	**Potential Impact**	**Adaptive Capacity**
Temperature Change (Extreme Heat Ride)	Public Health	Students overheating and becoming dehydrated	Medium	Medium
	Parks & Open Space	Decreased use of on-campus green space and open space	Medium	Medium
	Recreation	Decreased use of on-campus recreation areas	Medium	Medium
Increased Natural Disaster Frequency	Public health	Increased demand for campus health facilities	Medium	Low
	Housing	Campus housing affected by natural disasters	High	Medium
	Recreation	Loss of recreation areas / facilities	Medium	Low
Sea Level Rise	Off-campus students	Students live in surrounding communities that could be impacted by sea level rise	Medium	Low
Increased Wildfire Frequency	Recreation	Wildfire may damage recreational spaces	Medium	Medium
	On-campus housing	Wildfire may damage perimeter structures	Medium	Medium

Renewable Energy

Impact	Sensitivity	Rational	Potential Impact	Adaptive Capacity
Temperature Increase, Heat Wave, Wildfire, Flooding	Energy delivery	Utilidor, power lines, central plant may have reduced efficiency or be damaged.	High	High
	Residential	Lights, HVAC, electricity may be disrupted.	Medium	High
	Institutional	Lights, HVAC, electricity may be disrupted.	High	Medium
	Rec facilities	Lights, HVAC, electricity may be disrupted.	Medium	High
	Individuals with disabilities	Elevators or electricity powered vehicles may be disrupted.	Medium	Medium

Solid Waste

Impact	Sensitivity	Rational	Potential Impact	Adaptive Capacity
Temperature/ Heat Wave	Quality of life	Heat may lead to more trash (waterbottles). Increased odor due to heat. Higher temperatures increase decomposition of compost.	Low	Medium

Transportation

Impact	Sensitivity	Rational	Potential Impact	Adaptive Capacity
Temperature Increase	Cycling / pedestrians	Decreased walkability / bikeability due to heat.	Medium	Medium
	Air quality	Heat increases ozone production	Medium	Low
	Vehicles	Decreased fuel efficiency due to AC.	Low	Low
Wildfire / Drought	Vegetation	Fire may damage campus open space.	High	Medium
	Infrastructure	Potential fire damage of infrasturcure	High	Medium
	Air quality	Fire generates pollutants.	Medium	Medium
Changing Weather Patterns	Infrastructure	Flooding may disrupt roads.	Medium	Medium
	Fuel Infrastructure	Damage to supply / transmission lines	Low	Low

Water				
Impact	Sensitivity	Rational	Potential Impact	Adaptive Capacity
Temperature/ Heat Wave	Source water availability	Reduced water supplies for agricultural and personal use	Medium	High
	Teaching continuity	Lack of water or heat causing class cancellation	Medium	Medium
Temperature/ Heat Wave	Quality of life	Reduced educational and other use due to lack of water	Medium	Medium
Temperature/ Heat Wave	Agriculture and ecosystem productivity	Drought may limit agricultural productivity and ecosystems.	Medium	Medium
	Residential	Older residence halls renovation to meet water conservation requirements.	Low	Medium
	Institutional	Older structures may require renovation to meet water conservation requirements.	Low	Medium
	Parks and Open Space	Landscaping and open space will demand more water in order due to heat.	Low	High
	Irrigation infrastucture	Increased water demand may strain infrastucture.	Medium	Low
	Student/faculty	Students and faculty may utilize more water as overall temperatures increase.	Low	Medium
	Public health	Reduced water availability affects public health, especially during heat events.	Medium	Medium
	Public safety	Increased risk of wildfire and flooding on campus may threaten campus safety.	Low	High
Drought/ Volatility of Rainfall	Water treatment	City Water Treatment Plant is located in a wildfire risk area.	Medium	Medium
	Erosion	Increased periods of drought and heavy rainfall increase the frequency of harmful landslides.	Low	Low

III. Policy Audit

Policy Audit

A policy audit reviews relevant local, state, and national policy with aim of understanding how current conditions were produced. This informs PolyCAP strategy development by identifying measures that have proved effective in the past and identify areas where changes should be considered in the future.

Compatible Actions

A compatible action is a policy or stategy that fosters reduced GHG emissions and incrased climate resilience. The following table summarizes the identification of existing compatible actions.

Name of Document	Compatible Action	Justification
Cal Poly Master Plan (2001)	The Mater Plan seeks to protect all remaining Class I prime soils for future agricultural use	By protecting prime agricultural land, Cal Poly provides opportunity for carbon sequestration.
Cal Poly State University SLO 2015 Drought Response Plan (2015)	CAFES Farm Operations composting program	The installation of central control systems, new zone controllers, flow meters, anf higher efficiency heads reduces the amount of irrigation on campus. This reduced GHG by limiting the energy use to get water.
	Since January 2014, the Crops Unit has only used water for irrigation from wells located in fields 25 and 28	The program resulted in a 49% reduction of water use from last year meaning lower water costs and more water efficient use on campus.
	Agricultural Operations replaces all sprinkler nozzles to 1/8 inch	The nozzles provide a 33% reduction in water usage, which limiting the amount of energy used.
	Micro-emitters installed to irrigate all orchard fields	Requires less energy to irrigate the agricultural fields.
2014 Sustainability Report: Cal Poly SLO (2014)	Agricultural water management uses soil moisture tensiometers to determine the timing of irrigation based on soil and crop requirements	This reduces water use and creates a more efficient system.

Name of Document	Compatible Action	Justification
Agricultural Act of 2014 (2014)	Investments in alternative energy technology and production of renewable biomass for biofuels	Agriculture utilizes energy to run facilities. If Cal Poly is able to use renewable biomass or biofuels in these agricultural facilities, GHGs will be reduced
	Conservation Stewardship Program (CSP)	Cal Poly's Agricultural Research Initiative efforts to use Farm Bill funding to develop new technologies and methods to eradicate pests and diseases that risk Central Coast agriculture.
Air Quality Regulation of Animal Agriculture (2012)	Executive Order No. 987 encourages California State Universities to "continue to adopt an integrated design approach that includes sustainable materials and practices, requiring new goals for energy conservation, and the purchase and generation of renewable power," (p.1).	Cal Poly's Campus has implemented measures to strive for energy conservation and sustainable building practices.
Environmental Regulation & Agriculture (June 16, 2014)	Consolidated Appropriations Act 11 states, "to require mandatory reporting of greenhouse gas emissions above appropriate thresholds in all sectors of the economy of the United States," (p. 4).	A mandatory reporting system for how many greenhouse gases are produced by manure will allow Cal Poly to make decisions about manure management.
	Renewable Fuels Standard (RFS2) Rule is a law regarding fuel content to limit greenhouse gas emissions	Campus Agricultural vehicles may have to adjust to meet these fuel standards.

Name of Document	Compatible Action	Justification
Strategic Energy Plan Draft Report (2014)	CSU Executive Order 987: "Each campus will reduce its energy consumption," (Executive Order 987, 2006, p.1).	At Cal Poly, there are currently 72 building energy efficiency projects that have the potential to save 3,688,546 kWh of electricity and 173,672 therms of natural gas (p.17).
	Improve and replace HVAC equipment	Improvements will reduce electricity use.
	Install Daylighting Controls, Occupancy Sensors, and Timer Controls, and Redesign Lighting Systems	Better controls allow monitoring of energy use and prevent lights being on in empty classrooms.
	CSU Executive Order 987: Exceed the goal of procuring 20% of its electricity from renewable sources by 2010 (Executive Order 987, 2006, p. 2)	Throughout campus, 60 buildings with flat roofs were identified for PV installation.
Campus Land Use and Design Guidelines (2010)	Zone A2 states buildings in this zone must accommodate at least two floors above the shops and labs.	Fewer buildings will be needed to accommodate the same needs.
2015 Drought Response Plan (2015)	Retrofit of remaining state buildings with low flow plumbing fixtures—$94,000 budget for the next four years for all educational buildings, $425,000 for all housing.	Retrofit of the remaining state buildings with low flow plumbing fixtures will help reduce GHG emissions by requiring less water.

Name of Document	Compatible Action	Justification
Cal Poly Master Plan & EIR (2001)	Pay for actions such as the extension of the utilidor in order to handle growth on campus.	Extending the utilidor keeps more buildings on an efficient, shared heating and cooling system.
	New buildings should have multiple uses and support diverse user groups.	Mixed-use facilities on campus promote walkability and discourage driving.
	Use design practices, including building orientation, vegetation, building materials, passive solar heating, and natural ventilation to increase energy efficiency.	These measures decrease buildings' energy use, thereby reducing GHG emissions.
	Increase capacity of electricity, heating, and cooling generating devices such as the Mustang Substation, three boilers, and two chillers	Connecting more facilities to existing devices limits the establishment of new facilities.
Facilities Design Considerations (2014)	Evaluate life cycle costs for using economizers on units smaller than 75,000 Btuh, especially on 24/7 loads.	This system promotes energy conservation and cost effectiveness.
	Metering to meet the performance-based LEED™ NC/EB Energy & Atmosphere Credit 5	Energy accounting allows analysis of energy use so as to further enhance efficiency
	Control systems: 100 % Direct Digital Control (DDC). Modular Standalone Direct Digital Control Panel (DDCP) capable of future Building Automation System (BAS)	This system is for energy accounting, efficiency control, and systems future-proofing, allowing analysis of energy use to further enhance efficiency.

Name of Document	Compatible Action	Justification
University Housing Resident Handbook (2015)	Cal Poly instructs students to make efficient use of energy resources provided in on-campus housing. Instructions include recycling bins and thermostats to conserve energy	The handbook educates on-campus residents on sustainable practices.
Update to Appliance and Electronic Device Guidelines (2015)	"Each residence hall will be equipped with a K-cup coffee maker and electric tea kettle for your regular use. Each laundry room will be equipped with ironing boards and irons." (¶2)	Encourages the use of communal electric devices, which reduces the amount of cooking and personal care items in the dorms.
Red Brick Energy Competitions (2008-2013) (2014)	"The Red Brick Energy Competition is an annual competition in which six freshmen residence halls-Tenaya, Fremont, Sequoia, Muir, Santa Lucia, and Trinity- compete to reduce their building's energy and water consumption over a four week period," (¶3).	The competition encourages student participation in sustainable practices in on-campus housing. It also educates students on sustainable practices and reduces water and energy use in the dorms
Campus Operations (Webpage, 2014)	"...all Campus restaurants avoid using polystyrene (foam) and all of the cardboard, plastic, glass, and metal used is properly recycled,"(¶43).	Consumers, being primarily students, are avoiding the use of polystyrene and instead using recyclable materials, cutting back waste going into landfills.

Name of Document	Compatible Action	Justification
Sustainable Dining (Webpage, 2013)	"Campus Dining kicked off an awareness campaign at 19 Metro station, titled 'Clean Plate. Clean Planet,' to remind students to be mindful of uneaten food for dinner or tomorrow's lunch."(¶5)	Campus Dining is doing outreach programs to educate students on cutting back waste
	To limit the number of trays that require washing, Campus Dining has stopped distributing them.	Campus Dining is conserving water by not giving students trays that would need to be washed.
	"Campus Dining has eliminated one-time use plastic bags at all of their operations and replaced them with brown recycled paper bags and vegetable-based "bio" bags at the markets."(¶9)	Students are encouraged to bring their own bags. This reduces the use of plastic bags that reduces the amount of waste.
Sustainability Report (2012)	"Continue to keep annual commuter parking permits to levels at least 25% below that of 2001."(Targets, p.26)	Reducing parking permits suggests increased bike, pedestrian, and bus travel.
Cal Poly Master Plan (2001)	Establishing a network of Major Ecosystems that are representative of the region's most important natural ecosystems and working with government agencies other organizations	Provides on-campus recreation opportunities and promotes ecosystem resilience
SB 350 Clean Energy and Pollution Reduction Act of 2015, (DeLeón, 2015)	Establishes targets to increase retail sales of renewable electricity to 50 percent by 2030 and double the energy efficiency savings in electricity and natural gas end uses by 2030	In conjunction with SB 1078, SB 350 would extend Renewable Portfolio Standards, thus expanding renewable energy

Name of Document	Compatible Action	Justification
SB 97 (Dutton, 2007)	CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions."(pg95)	Guidelines that have to be followed with new development to reduced GHG emissions.
Mandatory Commercial Recycling (Assembly Bill 341)	This regulation addresses recycling requirements for businesses that generate four or more cubic yards of commercial solid waste per week and multifamily residential dwellings with 5 or more units, regardless of the amount of waste generated.	Promotes recycling programs for on campus housing and dining facilities. The more our campus recycles, the less trash that goes into landfills.
SB 25 (Escutia, 1999)	Existing law requires the State Air Resources Board to adopt ambient air quality standards in consideration of specified factors, including public health effects.	Ensures good public health for the campus by monitoring air quality. By monitoring air quality, including GHG emissions, campus can implement policy to reduce GHGs as well as change behavior.
California Health and Safety Code 39606 (1999)	Adopt standards of ambient air quality for each air basin in consideration of the public health, safety, and welfare, including, but not limited to, health, illness, irritation to the senses, aesthetic value, interference with visibility, and effects on the economy.	The code ensures health and wellbeing standards on campus. Also it would help with monitoring air quality on campus. Due to climate change air quality may be affected, especially increased heat. Establishing air quality standards can help control GHG emissions

Name of Document	Compatible Action	Justification
SLOCAP - 3.13.4 Housing Element (2012)	New residential development should be an integral part of an existing neighborhood or should establish a new neighborhood, with pedestrian and bicycle linkages that provide direct, convenient and safe access to adjacent neighborhoods, schools and shopping areas.	Providing pedestrian and bicycle linkages will create a safe environment for students living off campus and reduce travel emissions by making non-motorized travel more feasible
SLOCAP -3.19.2 Housing Element (2012)	Cal Poly State University and Cuesta College should actively work with the City and community organizations to create positive environments around the Cal Poly Campus. Included in the measures were student housing, home ownership for faculty and staff and encouragement and participation in the revitalization of degraded neighborhoods.	Providing housing for students and home ownership for faculty and staff would reduce the number of vehicles driven to campus.
Sustainability Report (2014)	States that new facilities, such as Student Housing South, will be targeted for LEED Gold Certification and should feature PV, cogen, or fuel cells for alternative energy sources.	Installing sources of alternative energy reduces GHG emissions.
Sustainability Report (2014)	One of the Energy Use Sustainability Indicators is the percentage of vehicles in operations fleet using alternative fuels, which emit less GHGs	Alternative fuels result in lower vehicular emissions

Name of Document	Compatible Action	Justification
Cal Poly SEP Draft Report (2014)	Campus is considering development of a large-scale PV installation. The report defines the long-term vision to reach the goals of AB32, 80% reduction by 2040, and eventually Net Zero	Cal Poly PV and other renewable energy systems on campus will lower GHG emissions.
AB 1031: Chapter 380, Statutes of 2009 (CEC, 2009)	California Renewable Energy Overview and Programs: This bill "will allow community college, University of California, and California State University campuses to receive credit on their electric bill for power generated by renewable energy facility by expanding the definition of 'local government' as it relates to the California Solar Initiative" (p. 7)	AB 1031 specifically references college campuses in California. It will combat GHG emissions by offering a clear policy to encourage renewable energy incentives on California campuses.
CSU Executive Order 987 (2006)	The order sets policies to achieve goal of a reduction in energy consumption on CSU campuses by 15% by the end of fiscal year 09/10. Campuses must consider the implementation of load shifting technologies such as thermal energy storage.	This Order, most recently updated in 2006, directly affected all CSU campuses and features policies to reduce energy usage and implement sustainable building practices.
California ISO: Integrating Renewables Reliably (2015)	In support of renewable portfolio standard, California ISO is practicing Smart Planning to analyze the amounts of power demand in order to reduce use of conventionally generated power.	Cal Poly uses California ISO transmission line owned by PG&E. Integration of zero-emission resources and smart planning in grid system may reduce Cal Poly's GHG emissions.

Name of Document	Compatible Action	Justification
CSU Sustainability Policy Proposal (2014)	•"Campuses shall seek to reduce the solid waste disposal rate by 50 percent by 2016, by 80 percent by 2020, and move to Zero Waste." (p. 6) •"To move to Zero Waste, campus practices should: (1) encourage use of products that minimize the volume of trash sent to landfill or incinerators; (2) participate in the CalRecycle Buy-Recycled program or equilvalent; and (3) increased recycled content purchases in all Buy-Recycled program product categories." (p. 6)	These policies are being implemented in all CSU campuses, including Cal Poly. Also these policies are aimed at encouraging campuses to reduce waste produced and source reduction among all vendors.
Nonhazardous Waste Management Regulations (2010)	"Operators shall verify that compost meets the maximum acceptable metal concentration limits specified in section 17868.2, and pathogen reduction requirements specified in section 17868.3. Verification of pathogen reduction requirements shall occur at the point where compost is sold and removed from the site, bagged for sale, given away for beneficial use and removed from the site or otherwise beneficially used." (Chapter 3, Article 8)	Because Cal Poly has a composting program in its Agriculture Department, we must make sure that it does not lead to ground contamination. This facilitates use and formalizes the compost program.
Cal Poly Zero Waste Pilot Program	The Cal Poly Zero Waste Program's primary goal is to become a Zero Waste campus. Through implementation of Zero Waste stations and education policies set on educating the Cal Poly community, the Zero Waste Program helps the campus achieve its Zero Waste goals.	The program moves Cal Poly towards the Zero Waste goal.
AB 341 (2015)	Establishes a goal for reduction of waste sent to the landfill, stating "75% of solid waste generated be source reduced, recycled, or composted by the year 2020." (p. 4)	This state policy requires Cal Poly to reduce solid waste sent to landfills, along with the GHGs produced

Name of Document	Compatible Action	Justification
Hazardous Waste (2012)	Educate campus on how to properly dispose of hazardous waste and E-waste	Protects environmental health as well as safety and health for individuals.
United States EPA Environmental Fact Sheet, Source (2010)	Source Reduction practices include reducing the use of paper throughout the campus, donating textiles, and backyard composting (landscape trimmings).	Source reduction increases CSU efforts to accomplish the goal of diverting landfill waste through alternative means.
Cal Poly Student Housing South Environmental Impact Report (2014)	The plan calls for: providing marked crosswalks and pedestrian easements, promoting car/ride sharing, and modifying parking permit costs.	Pedestrian easements and trip reduction strategies will be implemented with the new development, which cuts vehicle trip generation.
Cal Poly Master Plan and Environmental Impact Report (2001)	The Cal Poly Master Plan includes a shuttle system and faculty/staff incentives for alternative transit.	These policies were included as potentially beneficial policies in the previous master plan but were not entirely implemented; they should be considered for.
SLOCOG Transportation System Performance Measures Report (2013)	This plan has laid the groundwork for expansion of Cal Poly Administration Services Vanpool Program.	The current vanpool program gives staff an alternative to driving onto campus.

Name of Document	Compatible Actions	Justification of Reasoning
Caltrans Complete Streets Implementation Action Plan (2010)	The Complete Streets Implementation Action Plan established a Bike Safety Improvement Program. In addition, this plan calls for improvements in pedestrian striping during routine maintenance	CalTrans has control over a major transportation corridor in San Luis Obispo, Highway 1. By creating a safer environment on Highway 1 for biking and walking, this may result in fewer people using cars to commuting to campus, decreasing GHG emissions.
Short Range Transit Plan, (2009)	The Short Range Transit Plan coordinates SLO Transit with Cal Poly's class schedule, provides free service to Cal Poly students, and provides service every 30-minutes on routes that serve Cal Poly.	The transit systems coordination with Cal Poly allows for more student access of SLO transit, decreasing the number of cars on the road and associated GHGs.
Cal Poly Draft Environmental Impact Report for Student Housing North (2003)	The Student Housing North Draft EIR enhanced pedestrian and cyclist crossings near major areas, which encourages adjacent residences to use alternative transportation.	During construction, Cal Poly created a variety of bike connections including Class II bike lanes throughout Poly Canyon and a Class I bike line connecting Poly Canyon to campus. Additionally several walking paths and crosswalks were added to the Poly Canyon project. This allows for the campus to provide students with alternatives to driving
San Luis Obispo Bicycle Transportation Plan (2013)	The plan proposes additional bike lanes throughout San Luis Obispo to increase the connectivity of the existing bicycle network	The SLO Bike Transportation Plan improves the bicycle network in San Luis Obispo giving the campus community a better commute to campus by bicycle.

Name of Document	Compatible Actions	Justification of Reasoning
Sustainability for Cal Poly Facilities and Operations (2014)	Sustainability for Cal Poly Facilities and Operations outlines a vanpool and rideshare program and the expansion of the Zipcar program.	Replacing single occupancy vehicles with ride share vehicles reduces GHG emissions.
San Luis Obispo Climate Action Plan (2012)	The San Luis Obispo Climate Action Plan aligns the regional housing needs allocation process with regional transportation planning.	Creating a regional transportation system that coincides with housing projects will provide students with housing options with alternative modes of transportation easily accessible
Drought Response Plan (2015)	"Reduce water usage to 25% by 2016. From 2013-2014 the University reduced water consumption by 23%. To reach its 25% goal, the University will implement a variety of policies in conjunction with several previously introduced policies," (p. 3).	Campus has reduced water consumption and is close to reaching its goal. It continues to lower water usage.
	"Expansion of the wireless landscape irrigation system to all zones. The largest zones should be upgraded first, at $100,000 per year," (p.3).	Increased efficiency in irrigation can result in reduction in water consumption
	Cover PCV pools to reduce water evaporation	Covers save approximately 1,000 gallons of water per year from evaporation.
	"Recommended Future Action 4: Elimination of 13.6 acres of irrigated turf areas, approximately 28% of campus turf. These areas will be replanted with natives when rain returns," (p. 3).	The elimination of turf across campus will reduce water consumption.
	"Recommended Future Action 5: Replacement of 8,000 feet of aging and failure prone Ag Operations 12" main," (p. 3).	Eliminating failing pipes increases efficiency and reduces water consumption.

Name of Document	Compatible Actions	Justification of Reasoning
Drought Response Plan (2015)	"Recommended Future Action 7: Evaluate Opportunities for use of recycled or reclaimed water with other Whale Rock Partners," (p. 3).	Utilizing recycled water will reduce the demand from other water sources.
	Composting/Mulching: "Expand the use of Cal Poly compost (as a soil amendment) and mulch to all remaining plant beds. This measure will save approximately 13 acre-feet of water per year, or 1.2%," (p. 12).	Compost and mulch reduce water consumption due to reduced evaporation.
	Install Calsense irrigation controls.	Controls reduce 2.3% of total water usage by maximizing efficiency in irrigation systems.
California State University Sustainable Policy (Committees on Educational Policy, 2014)	Climate Action Plan Policy No. 1: "The CSU will strive to reduce system wide facility greenhouse gas (GHG) emissions to 1990 levels, or below, by 2020 consistent with AB 32, California's Global Warming Solutions Act of 2006," (p. 4).	Reduction in GHG emissions, including those associated with water production and usage
	Energy Conservation and Utility Management Policy No. 5: "Campuses will provide the Chancellor's Office with the necessary energy and utility data, such as water and sewer usage, for the system wide database in a timely manner," (p. 5).	Increased information allows for improvements in efficiency and usage. The policy requires Cal Poly to collect water and sewer usage data including energy needed to run those systems.
	Energy Conservation and Utility Management Policy No. 1 "All CSU buildings and facilities, regardless of the source of funding for their operation, will be operated in the most energy efficient manner without endangering public health and safety and without diminishing the quality of education and the academic program" (p. 5)	The mandate to be as energy efficient as possible will allow CSU campuses to pursue opportunities for energy efficiency whenever feasible.

Name of Document	Compatible Action	Justification
California State University Sustainable Policy (2014)	Water Conservation Policy No. 1 "All CSU campuses will pursue water resource conservation to reduce water consumption by 10 percent by 2016, and 20 percent by 2020," (p. 6).	The University has implemented a Drought Response Plan to reduce water consumption and has set more aggressive standards for water reduction, providing additional guidelines for recycled and reclaimed water.
2001 Cal Poly Master Plan and Environmental Impact Report (2001)	Water Conservation Program: "The University should develop a program designed to reduce overall water consumption on campus," (p.350).	Reduced water consumption and improved energy efficiency in water related systems reduces GHG emissions.
	Drought Contingency Plan: "As part of implementation of the Master Plan, the University will draft a drought contingency plan," (p. 351).	The plan attempts to reduce water consumption, especially in times of drought.
	Additional Water Supply: "The University should investigate the availability of additional water supplies over the next twenty-year horizon" (p. 352).	Increased resilience aims to provide an alternative or back up source of water to ensure campus water supplies during extended dry spells.
Water Quality Management Plan (2005)	IR-1. Irrigation System Tailwater Recovery: This system collects, stores, and transports irrigation tailwater for reuse in the farm distribution system.	The system uses runoff to append irrigation and reduces the amount of water diverted for agricultural uses.
Facilities Sustainability (2012)	Retrofits include the following: ultra-low flow plumbing fixtures, installation of drip irrigation and irrigation controls, as well as use of native and drought tolerant plants.	These measure all serve to reduce water use on campus.

Name of Document	Compatible Action	Justification
County of San Luis Obispo Right to Farm Ordinance (2002)	Promotes a good neighbor policy by advising purchasers of residential property of the inherent potential problems associated with the purchase of such property. Such concerns may include, but are not limited to, the noises, odors, dust, chemicals, smoke and hours of operation that may accompany Agricultural Operations and Agricultural Processing	Farms surrounding Cal Poly could be practicing these operations. Agricultural practices that release chemicals and smoke into the air may affect surrounding farms near Cal Poly's land may be polluting Cal Poly's air. Poor air quality and greenhouse gas emissions kill crops and cause less crop production
Campus Land Use and Design Guidelines (2010)	The north elevations of new buildings should recognize the significant development planned to the north as well as the visual amenities of views to the Brizzolara Creek corridor (pg. 18)	Focused on aesthetic views rather than natural solar heating
Cal Poly Master Plan & EIR (2001)	Build on agricultural land (pg. 276)	Building on open space reduces the amount of open space as well as increases the amount of GHG emissions from the energy used in the new facility

Incompatible Actions

An incompatible action is a policy or strategy that increases or has the potential to increase GHG emissions, prevents reducing action, or reduces campus adaptive capacity. The following actions were identified as incompatible or potentially incompati.

Name of Document	Incompatible Action	Justification
Cal Poly Student Housing South Environmental Impact Report (2014)	Plans include widening the intersection at Foothill/Santa Rosa and improvements at 101/California, Walnut/Santa Rosa, and Highland/Santa Rosa	Increased carrying capacity allows for higher traffic volume. Improving the overall capacity of the roadway may lead to increased trip generation and increased GHG emissions.
Cal Poly Master Plan and Environmental Impact Report (2001)	Increase year round operations especially in the summer quarter	Increasing campus operations increases vehicular trips traveled to campus.
Short Range Transit Plan, San Luis Obispo Transit (2009)	Cal Poly students contribute to overcrowding on bus, the lack of space availability forces students to drive to destinations. Use of public transit is also limited on the weekends due to fewer routes.	Driving a single-rider vehicle contributes more to GHG emissions than taking the bus.
Cal Poly Draft Environmental Impact Report for Student Housing North (2003)	Increased housing means a larger on campus student population	A larger student population may result in larger trip generation increasing GHG emissions (but it may reduce overall travel GHGs).
2001 Cal Poly Master Plan and Environmental Impact Report (Cal Poly, 2001)	Additional Water Supply: "The University should investigate the availability of additional water supplies over the next twenty-year horizon" (p. 352)	This has the potential to increase consumption and GHG emissions. Depending upon the type of source used, this policy could lead to large increases in GHG emissions.

IV. Outreach

Outreach

Three community wide outreach efforts were held in fall 2015: a master plan event the library courtyard on campus, a master plan event at the County Library in downtown San Luis Obipso, and a table for three hours at the Univeristy Union (UU). The focus of these efforts was raising awareness and gathering feedback from the campus community. At the UU, participants were also asked to discuss travel choices and their favorite and least favorite buildings on campus. In addition to these larger community-wide events, all sector teams conducted semi-structured interviews on campus. These interviews served to verify and support the findings at the larger events. More detailed information was gathered through small meetings with staff, faculty, students, and community members with knowledge specific to a particlar sector. The findings from these events are summaried below, organized by sector.

Agriculture

While the Agriculture Team participated in the three communitywide events, few participants volunteered suggestions or comments specific to agriculture. The most the information was gathered through direct contact with specific entities working with the agricultural operations. The Agriculture Team met individually with Kevin Piper, Hunter Francis, Kim Porter-Busby, and Yiwen Chu, Eric Veium, and Dennis Elliot. Kevin Piper is the Director of Agriculture Operations. He also manages wastewater for dairy, and Agriculture water resources. The team spoke to him about composting, water usage in Agriculture, and the beef unit. He provided us with detailed information regarding agricultural operations. Kim Porter-Busby provided information about the waste lagoons and water management on campus. Hunter Francis is the Director for the Center for Sustainability, managing campus and community education programs, professional development, and organizing events and guest lecturers. He was formerly in charge of the campus compost project. He believed that the largest opportunities, in CAFES, is to reduce GHG emissions in tillage, the dairy unit, fertilizer application, and growing more organic crops. Dr. Chu studies GHG emissions from operations, particularly the lagoons, providing important information regarding potential future management options.

Kim Porter-Busby is the Water Quality Management Specialist for the Environmental Health and Safety Department at Cal Poly. Her main concerns with Agriculture lie in the possible removal of the spray fields, which Kevin Piper also mentioned. Removal of these fields would put Cal Poly out of compliance for water treatment, and would require a new area to spray the waste or a new way to treat it. She believes treating the waste is disadvantageous, as it is very valuable as fertilizer for crops.

Yi-Wen Chu is a Natural Resources and Environmental Sciences (NRES) professor. She is also a Life Cycle Analysis specialist interested in applying the techniques in International Standards Organization (ISO) Standard 14040 to Cal Poly campus. She is also very interested in research processes, and had many ideas about how the Agriculture Team should analyze the data and write policy.

Buildings

After assessing the collected outreach data in regards to buildings, it was discovered that many students at the community-wide events were aware that climate change is occurring and were curious to participate in the event. Many suggested that Cal Poly change the way construction is done on campus and want to see more sustainable practices. They also suggested that Cal Poly reach Net Zero with the use of additional PV panels on new buildings. Cal Poly should also retrofit and replace older buildings that are inefficient and contribute to GHG emissions. There was a noticeable theme in the data collected - many people suggested Cal Poly take a look at building efficiency and improve it throughout campus.

The Buildings Team analyzed all of the applicable material from the UU event and found that the favorite buildings on campus included: Baker Science, the Recreation Center, and the University Union. Least favorite buildings included: Math and Science and Alan A. Erhart Agriculture. Students' favorite buildings were the newest and most sustainable while least favorite buildings were the oldest and most inefficient. Overall, some of the suggested practices to take into consideration include new buildings and retrofitting projects to incorporate more sustainable practices and design strategies to move towards Net Zero practices. The push for self-sustaining buildings may include upgrading the HVAC system on campus to provide higher quality heating and cooling, and retrofitting or replacing inefficient buildings on campus to increase overall building efficiency.

For the informal interviews, the team focused questions on buildings and gathered information pertinent understanding the student views that reinforced the findings from the UU event. Staff meetings provided important information regarding facilities and building operations. The staff interviewed includes: Stacey White, Dennis

Campus Life

Campus Life focused on gathering data that indicated those factors that influence student behavior on campus pertaining to campus dining, recreation, health, and housing. Campus Life conducted on-campus surveys to understand what students' value on campus and what they'd like incorporated. The surveys were completed by approaching different individuals at different locations, times, and days. To understand students' preferences, Campus Life focused on asking students five questions that would provide the necessary information to understand how they perceive Cal Poly. The five questions included: 1) What's your major?; 2) Do you live on campus?; 3) What facilities do you like on campus?; 4) What kind of facilities would you like to see more of on campus and why?; and 5) What factors do you consider when purchasing food on campus (price, quality, quantity, proximity, etc.)? Asking students what their major is assessed the role of student majors in how students view campus based on where their class time is spent. By asking if students live on campus it differentiates the views of students living on campus versus those living off campus. Facility preference helped identify those facilities students use most and provided valuable data that can be used when

Social Media:

Website: thepolycap.org
Facebook: The PolyCAP
Instagram: @the_poly_cap
Twitter: @the_poly_cap

incorporating a new facility to be used by students. These questions help idenify facilities the campus should update in order to attract students on campus or to keep them from leaving campus. Asking students about food preferences on campus (price, quality, quantity, proximity, etc.) provided feedback on how they purchase food and allow the team to address what needs are most important for students.

Campus Life has spoken with several individuals that have a great understanding of how the Cal Poly campus operates, including Eric Veium and Dennis Elliot. Meeting with Eric and Dennis helped to point out what the campus is currently doing to address housing, campus dining, health, and recreation, as well as what the goals are for the future. With the information they have provided it will help structure future policies that can be applied to the campus. Campus Life also met with Scott Bloom, Associate Director of Housing. He was able to provide information regarding dorm utility use and student behavior.

Renewable Energy

Reviewing the outreach events through a renewable energy lens allowed the Renewable Energy Team to gain informative takeaways. The team was able to assess usage habits revealed through the mapping activity at the UU. This provided the team information on where student participants typically spent time outside of class, helping the team to better understand where to channel additional energy usage research. After speaking directly with several students in the semi-structured interviews, the team was able to begin to understand personal energy usage habits. When it comes to where a student lives, they are more aware of how much energy is being used; however, when it came to campus buildings, interviewed students typically disregarded energy use. This was due to the fact that the inviewed students felt it was not within their personal authority to control energy use in campus buildings, but rather there was an expectation that an automatic sensor or someone else was tasked to turn off the light. In terms of specific buildings, some students claimed that some buildings were too cold, meaning they had too much AC. These buildings included Baker Science, Construction Management, and the Sierra Madre Dorms. This offers important information as the team refines the understanding of how energy is being used on campus.

The team spoke with two important individuals from facilities: Eric Veium and Dennis Elliot. Both supplied teams with information in where to focus policy as well as how to structure the initial outreach questions. In these discussions, the team tackled the following topics: the plan for a Cal Poly solar farm and the associated opportunities and constraints, the opportunity for a Cal Poly wind farm, the efficiency Cal Poly energy transmission, the renovation of buildings, and identification of buildings with solar potential.

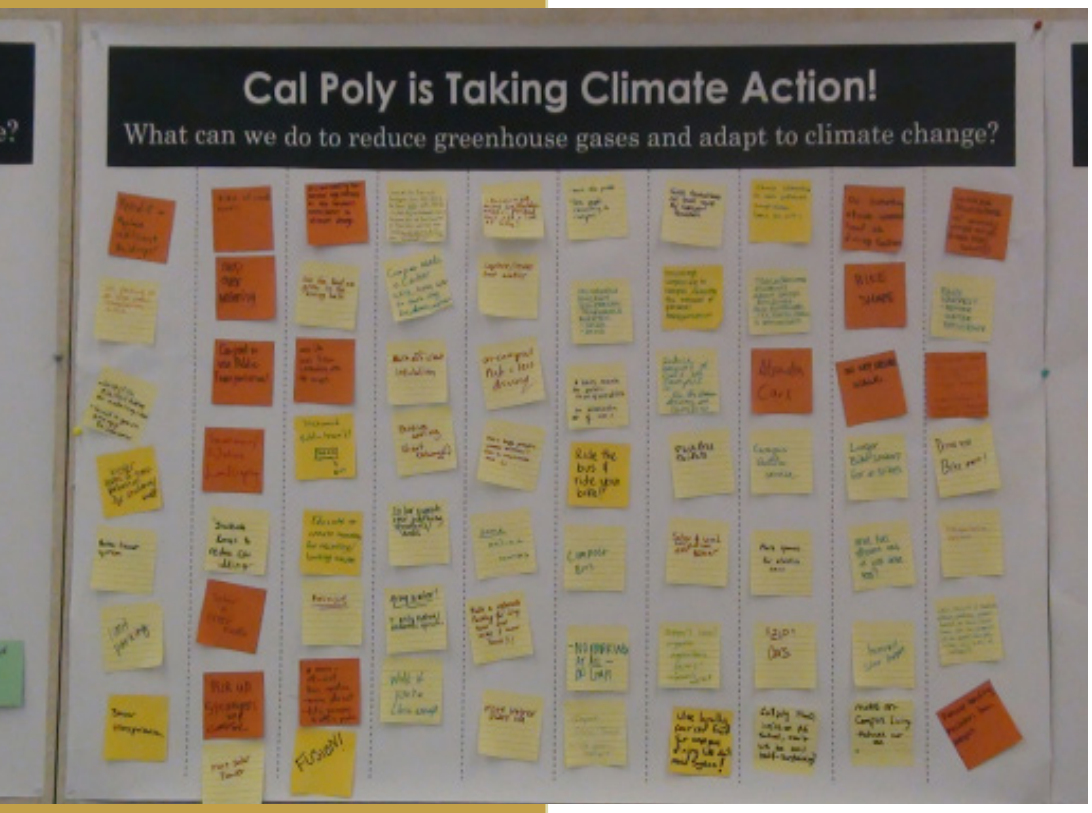
Solid Waste

During the outreach events, the Solid Waste Team focused on learning about how much the Cal Poly community knows about solid waste management. The focus was on what Cal Poly is doing with regards to reaching Zero Waste during our meetings with staff. Since both community wide events were focused on raising awareness regarding PolyCAP development, the solid waste Team sought to discover what individual students and faculty know about Cal Poly's ongoing efforts to achieve Zero Waste.

The Solid Waste Team learned from those who participated in the event that the student body, in particular, is uninformed about Cal Poly's solid waste management systems like composting and source reduction. These findings lead to the determination that education must be included as part of plan development. By creating policies that are focused on education, the PolyCAP can help create a foundation for having the whole community do its part in helping Cal Poly reach its Zero Waste goal.

In meetings with staff and other professionals related to Cal Poly's solid waste programs, the Solid Waste Team gathered data regarding diversion rates from the landfill and effective composting and recycling measures that reduce GHG emissions. The data provided background that will help devise strategies to achieve Zero Waste and further reduce GHG emissions.

The meeting with Eric Veium on October 23rd, 2015 yielded data that allowed the team to evaluate the effectiveness of the Zero Waste Program. The team learned of the observed difference between pre and post Zero Waste Program implementation. The team also met with Dennis Elliott on November 4th, 2015. This meeting added the fiscal reasoning behind some of the decisions for the Zero Waste Program and other facilities that could help Cal Poly achieve Zero Waste in the near future.



Transportation

At the community events held in the library, the majority of responses from attendees regarding transportation related to making a shift away from driving alone to and from campus. Many respondents suggested increasing service to campus by local and regional transit authorities. Others suggested improving bike infrastructure and amenities, while others thought carpooling would help reduce GHG emissions. Over the course of the event, 33 out of 82 responses related to transportation were recorded. At the San Luis Obispo CountyLibrary, most of the responses recorded suggested improvement of bicycle infrastructure and expansion of public transit service. In addition, there was a response suggesting that campus take measures to reduce GHG emissions within its own vehicle fleet by increasing fuel efficiency. Over the course of the event, nine out of 20 responses related to transportation were recorded.

Many of the responses recorded at the UU event related to transportation. Of 50 recorded responses, 19 were related to transportation. Most of the input related to transportation focused on promoting alternative transportation options.

The Transportation Team met with Marlene Cramer, Business Services Coordinator, to discuss parking and public transportation on campus. Among the topics discussed were Cal Poly's parking fee structure and the University's contract with SLO Transit to provide free service to Cal Poly students. Some of the key points from the discussions were the impacts that the new Housing South project will have on parking and permit revenue and how SLO transit service relates to Cal Poly's funding from parking violations.

The team also met with several representatives from the City's Public Works Department to discuss public transportation as it relates to Cal Poly. The group discussed the contract with SLO Transit and how it relates to transit levels of service. The group also discussed how SLO Transit can better serve students and increase student ridership. In addition to looking at ridership, the team met with Officer Rockwood, from the University Police Department (UPD) to get an enforcement perspective on campus transportation and learn more about the UPD's relationship with transportation issues on campus. During the meeting, Officer Rockwood provided input on infrastructure improvements that have potential to make campus transportation safer and more efficient.

Water

Feedback from the attendees at outreach events voiced concerns over how campus consumes water, highlighting landscaped areas and the efficiency of water use within buildings. Individuals proposed new technology for campus, such as grey water systems, that could help Cal Poly conserve water. As part of the larger outreach events, the Water Team received a few notable suggestions from event attendees that focused on water management included implementing more drought and native plant species, tracking on-campus housing water usage, retrofitting inefficient plumbing, and investigating ways to reuse and capture wastewater and rain. At the event held at the UU, revealed the attendees preference of landscaped areas on campus such as the Rose Garden and Dexter Lawn.

Informal surveys and interviews with Cal Poly community members revealed general perceptions from the individuals interviewed of water consumption at the University. Most notably, personal water usage questions revealed that, of the students interviewed, those who live off campus are more likely to make attempts to conserve water. Common personal water saving strategies included showering less, watering plants less, and using a dishwasher. In the future, follow up surveys will aim to identify why students living off campus are more water conscious. A current hypothesis is that students who pay a water bill are incentivized to limit usage at home. The majority of students interviewed identified the turf reduction program as a response to current drought conditions and were largely pleased with the programs' progress. However, the majority also felt that Cal Poly could do more to engage the student body on water conservation.

Over the course of the fall quarter, the Water Team met with Ron Hostick, Dennis Elliot, Kim Porter-Busby, and Eric Veium to discuss water usage on the University campus. These meetings served to inform the team on current policies and practices concerning water on campus.

V. Best Practice

Best Practice

The final component of gathering background information to serve as a basis for PolyCAP development was an examination of best practice. Based on the current context at Cal Poly and the existing policy environment, strategies with demonstrated effectiveness in other settings were identified. The measures included as best practice were drawn not only other CAPs, but also from guidance documents and literature from organizations working on climate-related strategies. The particular focus of each practice is identified in the table below with the sector indicated with its icon.

Name of Document	Best Practice
Campus Sustainability for Best Practices: A Resource for Colleges and University (2008)	Composting: Waste from campus food facilities can be used for animal feed and in compost.
Cal CAN: California Climate and Agriculture Network (2008)	Organic Agricultural Practices: Farming practices should seek to replicate natural ecosystems to maximize sustainability, removing CO_2 by sequestering in soils and woody biomass.
Cornell University College of Ag and Life Sciences: Farm Energy, Carbon, and Greenhouse Gases (2011)	Smart Farming Practices: Strategies include reducing tillage frequency, minimizing synthetic fertilizers, and reducing pesticides and herbicides.
Ohio State University Extensions Fact Sheet (2005)	Soil Carbon Sequestration: Soil carbon sequestration is a way to offset GHG emissions by capturing atmospheric carbon dioxide. Sequestration adds biomass to the soil, conserves water and enhances soil fauna.
Agricultural Sustainability Institute - University of California Davis	Research-Based Farm Management: Collaboration between students and faculty as research partners.

Name of Document	Best Practice
Net Zero And Living Building Challenge Financial Study: A Cost Comparison Report For Buildings In The District Of Columbia (2013)	Energy Dashboard For Residents: A building dashboard that displays day-to-day energy use can help empower tenants in multi-family residences to participate in efficiency strategies.
	Plug Load Management: Wireless monitoring at the circuit breaker level allows for monitoring of troublesome circuits and hospitality style controls that turn equipment down or off when no occupants are present
	Focus on Energy Efficiency: The cost of most energy efficiency strategies is less than the cost of renewables. Maximizing energy efficiency levels allows for cost-effective Net Zero energy performance.
Campus Sustainability Best Practices: A Resource for Colleges and Universities (2008)	Roofing Upgrades: At the University of California at Davis, all dormitories with flat roofs have been upgraded to reflective white roofs, decreasing the solar heat gain of the facility and reducing demand for cooling.
California State University Monterey Bay Climate Action Plan (2013)	Minimum Certification Requirements: CSU Monterey Bay requires that all new or refurbished campus buildings be designed and built as USGBC LEED silver certified at a minimum, preferably at gold or platinum certification levels.
	Implementing Water Saving Fixtures: All fixtures for new or refurbished buildings, or replacement/repair are water saving and consider such things as short-burst automatic sinks and dual-flush toilets and/or waterless urinals.
The University of Tennessee at Chattanooga 2011 Climate Action Plan (2011)	Building Automation Systems: The university is accelerating implementation of campus-wide building automation systems and using the collected data for further energy reduction.
	Sustainability Incentive Program: A campus sustainability incentive program to reduce energy usage is being developed.

Name of Document	Best Practice
2009 Climate Action Plan: Pathway to Climate Neutrality (2009)	Emissions Thresholds: Net Zero emissions associated with new buildings will ensure that campus growth does not increase overall GHG emissions.
	Carbon-Neutral Building Standards: The plan encourages cost effective building standards such as energy-producing building components (PV Panels and cool roofs), onsite green energy production and low energy design.
Los Angeles City College Long Range Facilities Campus Master Plan (2008)	Prioritize Future Development: The plan assesses space needs for current and future academic/community programs and then identifies opportunity areas for expansion into undedicated available space.
	Consolidate Building Uses: The campus identifies compatible uses and departments that can be relocated and consolidated
Tufts Office of Sustainability, Vending Misers (2015)	Install Vending Misers in Vending Machines: Vending misers allow machines to turn lights off and cycle operation when not in use, all while keeping beverages cold. This would save money and reduce CO2 emissions

Name of Document	Best Practice
University of Massachusetts Campus Sustainability Best Practices (2015)	Promote Campus Gardens: Eastern Mennonite University's campus garden program allows students to plant and maintain their own produce.
	Install Building Meters: Building meters should be installed on new buildings and retrofitted into older building stock. Building metering will allow campus to monitor electricity and water use to determine areas of inefficiency.
	Promotion of Cycling Programs: Programs and challenges that urge cyclist to bike to school regardless of weather will encourage students to be more engaged and reduce CO2 emissions.
	Front Loading Washing Machines: Front loading machines save on water use and energy consumption. The Tufts University incorporated these units, which saved $23,000 and 17,000 gallons of water per year and reduced carbon emissions by more than 30 tons annually.
Milwaukee, Wisconsin Journal Sentinel-Ripon College (2008)	Provide Cycling Equipment: This program gives a free bike, helmet, and bike lock to the first 300 incoming freshman who agree to leave behind their cars for the first year. This program promotes healthy lifestyles and reduces GHG emissions by getting students to bike instead of drive
Harvard Gazette, Energy Saving programs (2015)	Student Energy Competitions: The Go Cold Turkey energy competition engages students in energy conservation strategies. This type of program can be incorporated by Cal Poly to reduce energy dependence and save the campus money

Name of Document	Best Practice
Net Energy Metering in California (2015)	Incentivizing Net Energy Metering: Net metering combats GHG emissions by offering a simple, common sense incentive, which allows individual buildings the ability to go Net Zero.
Solar Power and the Electric Grid (2010)	Diversifying Energy Types: This document suggests implementing a mix of renewable energy best practices, including: PV, CSP with energy storage, geothermal, biomass, and wind power.
Renewable Energy Alternatives Best Practices Manual	Assessing Feasibility of Energy Alternatives: The manual defines renewable energy alternatives in terms of cost, efficiency, opportune locations, environmental impacts, and case studies.
City of San Luis Obispo Climate Action Plan (2012)	Regional Incentive Program: Through a regional incentive program, the city makes it more attainable to increase the number and the size of renewable energy projects.
State Clean Energy Policies Analysis (SCEPA) Project: An Analysis of Renewable Energy Feed-in Tariffs in the United States (2009)	Feed-In Tariffs: Feed-In Tariffs are a common incentive to encourage renewable energy development. This document provides information on the incentive and provides campus with the basis for understanding ways to channel this into a policy.
UA Renewable Energy Network (2015)	Renewable Energy Network: The University of Arizona's Renewable Energy Network is an initiative to connect renewable energy research to academics and implementation. It shows what campuses have the power to do when it comes to renewable energy.

Name of Document	Best Practice
EPA, Reduction of Municipal Solid Waste (1999)	Source Reduction Strategies: Source reduction strategies include reducing the use of paper on campus, donating textiles and backyard composting.
Solid Waste Best Practices In The MAG Region (2012)	Recycling and Education Program: This program educates students on effective recycling habits. Such programs limit GHG emissions that come from sending waste to landfills and moves towards a goal of being Zero Waste.
Solid Waste Best Practices In The MAG Region (2012)	City of Chandler's Trash to Treasure Reuse Program: The city collects large household items, toys, clothes, and construction materials. This program can reduce GHG emissions associated with transporting and/or destroying furniture.
SLO County CAP (2012)	Integrated Waste Management Authority: IWMA should be partnered with to develop a public education campaign about composting and green waste. This program should emphasize how students can compost and recycle at an individual level.
Washington University (2008)	Eliminate Disposable Water Bottles: Water bottles should be removed from vending machines and replaced by water bottle filling station with the aim of reducing campus waste.
Stanford Parking and Transportation Services Buddy (2015)	Stanford Commute Buddy: This is a program at Stanford University that matches experienced alternative transportation commuters with beginners to provide tips and expertise to new users.
University of California Berkeley Campus Bicycle Plan (2006)	Regional Partnerships: To improve the efficiency and ease of biking to campus, UC Berkeley collaborated with local and regional agencies such as the City of Berkeley and BART to create direct routes to campus.

Name of Document	Best Practice
California State University Chico Climate Action Plan (2011)	Transit Outreach Events: Chico State University partners with local and regional transit agencies to develop marketing programs for alternative transit. These marketing efforts include campus cycling clubs, recreational facilities, and community events.
California State University Sacramento Master Plan (2015)	Providing On-Campus Amenities: Sacramento State is making an effort to be more responsive to on campus residents by providing retail, childcare, food services, and recreational areas. These efforts make living on campus more attractive for incoming students.
California State University Sacramento Master Plan (2015)	Parking/Carpooling Policies: The campus implements parking policies that incentivize alternative transit. Policies include a proposed bike sharing program, a ride matching service, dynamic permit pricing, and a campus shuttle service
Bearcat Bike Share, Binghamton University (2015)	Bike-Sharing Programs: Binghamton University provides a free bike sharing service to students and faculty as a free alternative to driving around campus. This program helps reduce carbon emissions, alleviate traffic congestion, and promote healthy active lifestyles.
San Luis Obispo Draft Climate Action Plan Policy Audit (2009)	Bike Lane Upgrades: Illumination of all Class I/II bike lanes makes it safer for bikers to get around the city.
	Bike Parking: Creating new short and long term bike parking near all new structures would make cycling more convenient on campus.
Georgetown University Transportation Shuttle (2015)	GUTS transportation shuttle: The GUTS bus transportation shuttle serves the entire campus and offers students an alternative to driving.
CU-Boulder Transportation Master Plan (2011)	Bike Rentals: The plan allows for bike rentals for up to 48 hours as well as semester long rentals, promoting alternative transit.

Name of Document	Best Practice
CU-Boulder Transportation Master Plan (2011)	After Hours Transportation: The university offers transit to residential halls and the outskirts of campus until midnight. This policy cuts down on single car-occupancy trips
Portland State University Bicycle Transportation Plan (2011)	Bike Garages: This plan calls for bike garages, which are secure rooms where people can lock up their bikes. This provides more convince for cyclists on campus.
	Informational Workshops: The university will offer workshops with instructions on maintenance of bikes and provide stations to perform bike repair.
Annual Report Drought Edition: CSU Water Resources Policy Initiatives (2015)	Campus-wide Retrofits: Retrofitting standard-flow toilets, urinals, lavatory faucets, and showerheads with low-flow fixtures reduce water use. By decreasing the amount of water that freely flows from fixtures campus will lower water consumption.
	Drought Tolerant Landscaping: Future campus landscaping should focus on providing native or drought tolerant plants with drip/low-flow irrigation. Retrofitting grassland strips with low-flow, non-potable irrigation system.
	Repair of Damaged Pipes: The replacement and repair of leaking pipes reduces consumption and energy costs by increasing system efficiency.
University of California Santa Cruz Water Action Plan (2015)	Incorporating Dry Farming Practices: Dry farming is when crops are planted after the rainy season once the soil is saturated with residual water. This practice reduces water use and has been used successfully in Mediterranean regions.
University of California Santa Cruz Water Action Plan (2015)	Water Monitoring on Farmlands: Monitoring how much water is being used can be used to track usage and identify opportunities.

Name of Document	Best Practice
University of California Santa Barbara Water Action Plan (2013)	Efficiency Based Retrofits: Implementing and prioritizing retrofits such as aerators, toilets, and urinals reduces water consumption through increased efficiency
	Weather Based Irrigation systems: Weather based irrigation systems should be incorporated in campus landscapes wherever feasible. These systems reduce water consumption and are more energy efficient
University of California Santa Barbara Water Action Plan (2013)	Expanding Recycled Water Infrastructure: Campus wide recycled water infrastructure would alleviate water consumption by using recycled water for non-potable uses. In these systems periodic soil samples should be taken to ensure that recycled water is not experiencing constituent buildup
	Improved Concentration Cycles For Industrial Uses: Increased concentration cycles for cooling towers reduces water consumption and increases operational efficiency
	Regular Performance Reviews: Regular quarterly reviews to assess cooling tower and other industrial infrastructure performance ensure that best practices are employed while running facilities
	Improved Metering: Real-time meters should be incorporated in existing buildings, and all new construction. This provides awareness of water usage on campus
	Water Conservation Education: Water conservation strategies should be incorporated into university academics. Student education has the potential to encourage water conservation and usage reduction
	Implementing Water Saving Incentives: The University of Santa Barbara is beginning a dialogue with state agencies to encourage the implementation of incentives for water conservation in state funded buildings

VI. Conclusion

Conclusion

The PolyCAP background report is another step in Cal Poly's ongoing efforts to actively reduce of GHG emissions and reduce climate risk on campus. The PolyCAP Background Report evaluates policies that govern campus structure and operation. The policy audit allows the PolyCAP team to better understand how current conditions were produced and determine the approaches most likely to be effective on campus. The identification of best practices serves as inspiration for writing innovative policies for Cal Poly. Tailoring these policies for application at Cal Poly, will rely on the continuing outreach efforts to the campus community.

The PolyCAP development process began in Spring 2015 with the distribution of a campus travel survey. This was critical data necessary for completion of the PolyCAP GHG Inventory. In the fall of 2015, this Background Report was completed. Building on these prior steps, the PolyCAP will be developed over the 2016 winter and spring quarters. The PolyCAP will contain strategies to reduce GHG emissions and adapt to climate change on campus. It will be organized using similar sectors to those explored in the Background Report: Agriculture, Buildings, Campus Life, Renewable Energy, Solid Waste, Transportation, and Water. As part of the strategy development process, additional outreach will be conducted to assure the PolyCAP is a community document that is positioned to be effective.

The PolyCAP signifies an opportunity for the Cal Poly campus. By developing a CAP, Cal Poly will unify the strategies already in place and join the growing, global movement to take action to address climate change.

"Climate change is happening, humans are causing it, and I think this is perhaps the most serious environmental issue facing us."
-Bill Nye

"I urge you to consider the needs of the youngest generation, because none of us has the right to assume that for our today they should give up their tomorrow."
- Britain's Prince Charles.

"What greater rejection of those who would tear down our world than marshaling our best efforts to save it?"
— President Barack Obama.

"It is senseless to blame others or your environment for your miseries. Change begins from the moment you muster the courage to act. When you change, the environment will change. The power to change the world is found nowhere but within our own life.
-Buddhist philosopher Daisaku Ikeda

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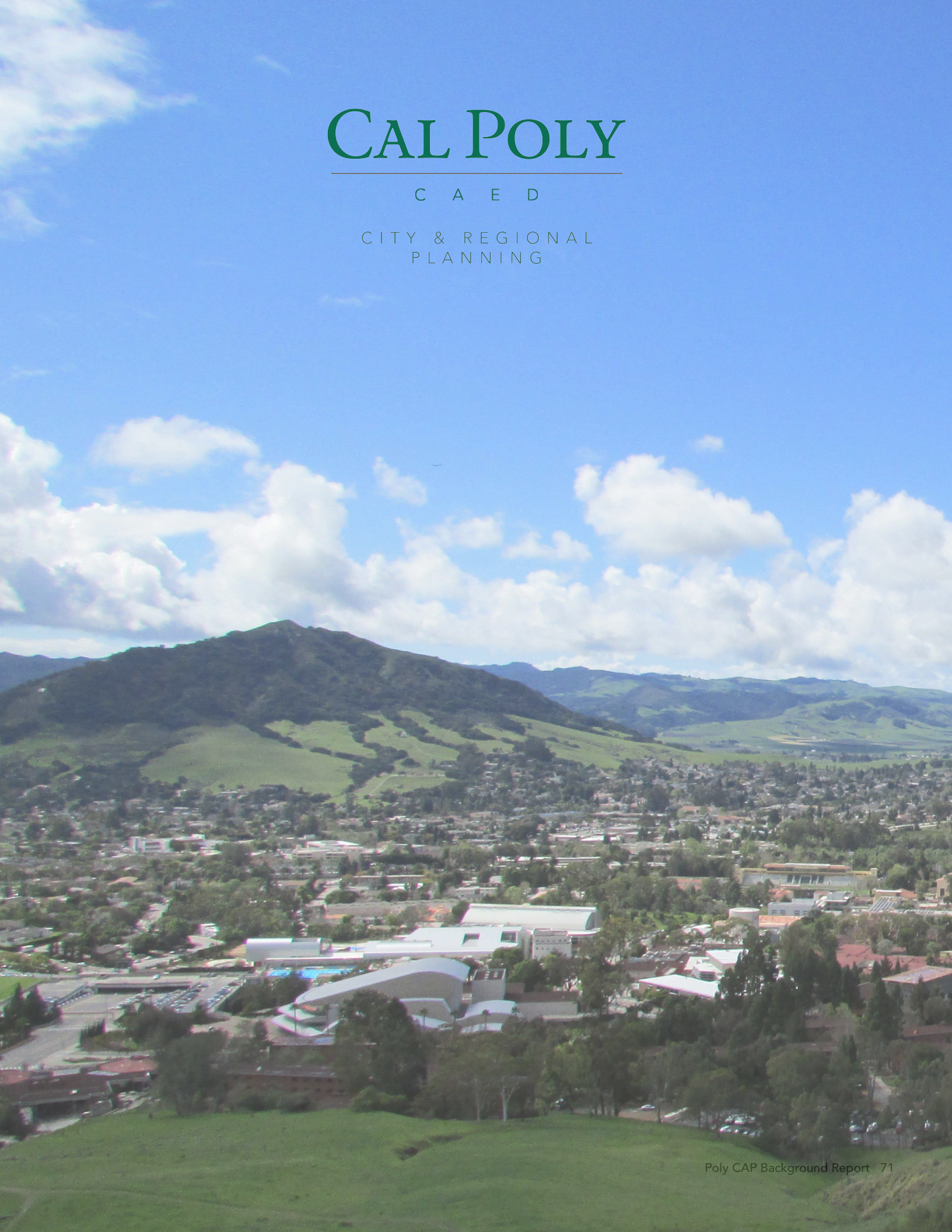
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