CAL POLY

SUSTAINABILITY

2016 SIXTH BIENNIAL PROGRESS REPORT

Developed by Facilities Management & Development (FM&D) in cooperation with the Sustainability Advisory Committee and the Academic Senate Sustainability Committee.

www.sustainability.calpoly.edu

A Letter from Our President

Climate change poses challenges to society unseen in human history. We are at a crossroads in which the disciplines of business, politics, public policy and technology must collaborate to drive innovation and implement real solutions. As a comprehensive polytechnic university, Cal Poly is uniquely positioned to educate and inspire the next generation of leaders, innovators, and decision makers who will confront this challenge. That is why I chose to commit Cal Poly to achieve net zero greenhouse gas emissions by 2050 and integrate these efforts into curriculum, research, and student experience through Learn by Doing. Our children and grandchildren deserve no less.

Jeffrey D. Armstrong
President
Cal Poly
San Luis Obispo, California

Cal Poly defines sustainability as the ability of the natural and social systems to survive and thrive together to meet current and future needs. This requires that development consider and balance protection of the natural environment, sound economics, and social justice.

Table of Contents

ONE | Policy, Planning, and Leadership 4
2014 CSU Sustainability Policy
Second Nature Climate Leadership Commitment
AASHE STARS
White House Pledge—American Campuses Act on Climate Change

TWO | Sustainability in Facilities and Higher Education 6
Cal Poly Sustainability Indicators

THREE | Sustainability Highlights and Awards 8
Campuswide Sustainability Charrette
Energy, Utilities, and Sustainability Department
Awards and Accolades

FOUR | Energy 12
Renewable Energy
Energy Efficiency

FIVE | Transportation 14
Sustainable Transportation Programs

SIX | Water 16
Water Conservation
Water Quality

SEVEN | Solid Waste and Recycling 20
Zero Waste Pilot

EIGHT | Climate Action Planning 22
Second Nature Climate Leadership Commitment
PolyCAP
Central Coast Climate Collaborative
National Resilence Initiative Network

NINE | Land Use and Development 26
Master Plan Update
Major Capital Projects

TEN | A More Sustainable Cal Poly 28
Curriculum
Research
Student Experience
Operations Sustainability Plan 31

ONE | Policy, Planning, and Leadership

2014 CSU SUSTAINABILITY POLICY

In May 2014, the CSU Board of Trustees, with Governor Brown in attendance, adopted the first CSU systemwide Sustainability Policy. The policy aims to further reduce the environmental impact of construction and operation of buildings and to integrate sustainability across the curriculum. Our polytechnic, hands-on, Learn by Doing approach uniquely qualifies Cal Poly to educate the future leaders, problem solvers, and decision makers who will battle the effects of climate change.

The CSU Sustainability Policy established goals to:

- Reduce greenhouse gas emissions to 1990 levels by 2020
- Reduce greenhouse gas emissions 80 percent below 1990 levels by 2040
- Procure 33 percent of energy supply from renewable sources by 2020
- Increase on-site energy generation from 44 to 80 MW by 2020
- Reduce per-capita landfill waste 50 percent by 2016 and 80 percent by 2020
- Reduce water use 10 percent by 2016 and 20 percent by 2020
- Promote use of alternative fuels and transportation programs
- Procure goods that are recycled, recyclable, or reusable
- Procure 20 percent local/organic/free trade food by 2020
- Integrate sustainability across the curriculum

Cal Poly has already reduced GHG emissions from energy use to below 1990 levels, has made significant progress on reducing emissions from commuting, and has reduced its water use by 31 percent since 2013, five years ahead of the CSU mandate. Initiatives are underway to make progress toward all other goals of the CSU policy.

SECOND NATURE CLIMATE LEADERSHIP COMMITMENT

For Earth Day 2016, President Armstrong signed the Second Nature Climate Leadership Commitment, making Cal Poly a Charter Signatory to the largest climate change initiative in higher education. Participating campuses must create Climate Action Plans to achieve carbon neutrality and climate resilience as soon as possible and infuse these topics into curriculum, research, and student experience.

Cal Poly has established a goal of net zero emissions by 2050 and is working with regional partners to ensure campus resiliency to impacts from climate change. To achieve these goals, Facilities Management and Development and the City and Regional Planning Department collaborated to create Cal Poly's first Climate Action Plan (CAP). The CAP included a comprehensive greenhouse gas inventory, which shows Cal Poly has already reduced emissions to within ten percent of 1990 levels, despite a 100 percent increase in building square footage and on-campus residency.

AASHE STARS

In March 2016, Cal Poly adopted the AASHE (Association for the Advancement of Sustainability in Higher Education) STARS (Sustainability Tracking, Assessment, and Rating System) as a framework for implementation, measurement, and improvement of sustainable practices across the entire university. The voluntary point-based rating system measures sustainability performance in the categories of Curriculum and Research, Campus and Community Engagement, Operations, and Planning and Administration. The data collection and certification process will take place over the 2016-17 academic year, with a goal of achieving STARS Gold.

WHITE HOUSE PLEDGE—AMERICAN CAMPUSES ACT ON CLIMATE CHANGE

In November 2015 Cal Poly, the CSU, and more than 300 other universities signed the White House pledge "American Campuses Act on Climate Change" to amplify the voice of the higher education community in advance of the United Nations 2015 Paris Climate Conference and inspire world leaders to commit to action on climate change. In addition to supporting the Paris conference, the CSU remains committed to reducing carbon emissions from energy use and transportation, increasing on-site generation of clean renewable energy, and utilizing campuses as living laboratories to educate the climate change leaders of the future.

Using manure from animal science programs and greenwaste from landscape operations, Cal Poly produces over 3,500 cubic yards of finished compost annually.

TWO | Sustainability in Facilities and Higher Education

Sustainability has been a driving force in higher education facilities management for decades, arising from the need to reduce operating costs and conserve limited natural resources. Since 2006, Cal Poly has been tracking key performance indicators to measure progress toward campus and CSU goals for the management of energy, water, waste, greenhouse gas, transportation programs, and design and construction of buildings.

In higher education today, as well as in local, state, and federal government, the sustainability conversation has evolved to address the emergent realities of climate change. Energy, water, waste, transportation, and green building programs fall under the broader umbrella of Climate Action Planning – a comprehensive methodology to quantify, assess, and manage all sources of greenhouse gas emissions toward the ultimate goal of climate neutrality. In addition to these mitigation efforts, successful climate action planning incorporates climate adaptation and climate resilience – strategies to prepare both environmental and socio-political systems to withstand the inevitable impacts of climate change.

An emerging space for sustainability professionals is the overlap between environmental protection and climate change work with the broader topics of social justice, social equity, diversity, inclusivity, and public health. It is well established that the negative effects of resource extraction, power generation, industrial activity, and waste disposal disproportionately impact disadvantaged and underrepresented peoples and communities. The Energy, Utilities, and Sustainability Department within Facilities Management and Development is actively engaging these stakeholders on campus to identify opportunities for collaboration. Cal Poly's sustainability indicators will continue to evolve to represent this ever changing landscape. This is Cal Poly's sixth biennial report of progress toward these goals.

Food service for major campus events such as Open House, summer Student Life Orientation (SLO) Days, and Week of Welcome strive toward zero waste to landfill.

CAL POLY SUSTAINABILITY INDICATORS

Energy Use

- BTUs per square foot of building
- Percentage of electricity from renewable resources

Transportation

- Commuter parking permits sold per student
- Public transit ridership
- Percentage of student population living on campus
- Van pool participation
- Percentage of fleet vehicles using alternative fuel

Water Resources

- Total water by source
- Total water by use
- Fecal coliform in Stenner Creek
- Nitrates in groundwater monitoring wells
- Pollutants in wastewater

Land Use and Development

- Percentage of campus square footage in LEED-certified buildings

Greenhouse Gases

- Percentage below 1990 baseline
- Percentage of electricity from non-GHG emitting sources

Solid Waste and Recycling

- Percentage of solid waste diverted from landfills
- Per capita landfill disposal

Procurement

- Percentage of sustainable office supplies

Curriculum

- Number of sustainability courses, majors, and minors

THREE | Sustainability Highlights and Awards

CAMPUSWIDE SUSTAINABILITY CHARRETTE

Just after Earth Day 2016, Cal Poly convened a campuswide Sustainability Charrette to shape Cal Poly's role in sustainability and climate change. With President Jeffrey D. Armstrong, Provost Kathleen Enz Finken, and Vice President Cynthia Vizcaíno Villa in attendance, the all-day event brought together more than 100 faculty, staff, students, administrators, industry partners, and community leaders. The charrette brainstormed ideas to further infuse sustainability and climate change into curriculum, research, and student experience, resulting in a number of proposed initiatives that build on Cal Poly's strengths and ongoing efforts.

Proposed initiatives under consideration include:

- Faculty workshops and stipends for integration of sustainability into curriculum
- A sustainability graduation requirement
- Incorporation of sustainability metrics into the faculty hiring, retention, promotion, and tenure process
- Identification of sustainability courses in the university catalog and online class registration system
- A formal Cal Poly role in the emerging Central Coast Climate Collaborative
- A sustainability guest speaker series
- A Clean Tech prize to recognize climate change innovation by Cal Poly faculty and students
- A new ASI Student Government Executive Cabinet position—Secretary of Sustainability and Transportation
- Implementation of TGIF—The Green Initiative Fund—to finance student-led sustainability projects
- Action teams to collaborate on solar PV and sustainable transportation planning
- Creation of a new office, center, or institute for sustainability to coordinate campuswide efforts

Participants at the 2016 Sustainability Charrette.

ENERGY, UTILITIES, AND SUSTAINABILITY DEPARTMENT

Cal Poly is elevating its focus on sustainability with a growing team consisting entirely of Cal Poly grads. Under Director Dennis Elliot (BS Mechanical Engineering, 1993), two new employees have come on board: Energy and Sustainability Analyst Eric Veium (BS Industrial Engineering, 2008 and former Green Campus intern) and Sustainability Coordinator Kylee Singh (Masters of Public Policy, 2013 and former CAFES Sustainable Steward).

Upon termination of the utility-funded PowerSave Campus intern program in 2015, Facilities Management and Development took the program in-house, hiring five student interns and rebranding the program with its original name—Green Campus Program. With these resources, Cal Poly is better able to implement conservation projects, expand educational outreach and marketing, infuse sustainability into curriculum, and empower student leaders and clubs to be more impactful.

AWARDS AND ACCOLADES

Cal Poly strives to demonstrate leadership in sustainability—both in operations and academics. In 2016, Cal Poly received its 25th Best Practice Award from the UC/CSU/CCC Energy Efficiency Partnership Program, received significant CSU funding and utility incentives for energy conservation, and was again recognized as a Tree Campus USA and Best Workplace for Commuters.

UC/CSU/CCC Energy Efficiency Partnership Program:

2016 HVAC Retrofit – Variable Chilled Water Pumping and Plant Optimization

2015 Water Efficiency and Site Water Quality – Drought Response

2015 Sustainability Innovations – Creative Project Finance

2015 Sustainability in Academics – Sustainable Environments Minor

2014 Sustainability Innovations – Sustainable Infrastructure and Energy Initiative

2014 CSU Sustainability Champion – Margot McDonald

2013 Communicating Sustainability – Sustainability Educational Outreach Program

2012 Sustainability Innovations – Sustainability Mentors Program

2012 Water Efficiency and Site Water Quality – Irrigation Water Conservation and Site Water Quality Program

2012 Student Sustainability Program – PowerSave Green Campus Program

2011 Best Overall Sustainable Design – Poly Canyon Village

Other Grants, Awards, and Recognition:

2016 CSU Campus as Living Lab Grant – Electrical Engineering Microgrid Lab - $31,000

2016 SoCal Gas Savings by Design Incentive for the Warren J. Baker Center for Science - $134,000

2016 College of Architecture named to the National Resilience Initiative Network

2015 CSU Chancellor's Office capital allocation for water conservation - $305,000

2015 CSU Chancellor's Office capital allocation for Energy Information System - $300,000

2015 UC/CSU/CCC Energy Efficiency Partnership Program Rebates - $254,000

2015 National Arbor Day Foundation – Tree Campus USA Certification

2015 Best Workplace for Commuters

2015 US Dept. of Energy Solar Decathlon - 3rd place

Native and drought tolerant plantings using drip irrigation reduce Cal Poly's water footprint.

FOUR | Energy

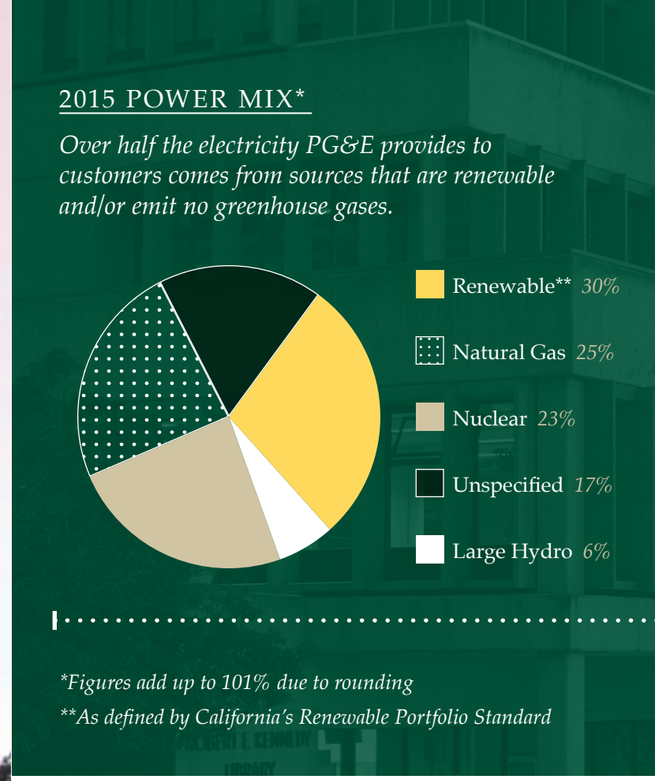
RENEWABLE ENERGY

Committed to leading the transition to a clean-energy future, Cal Poly released a request for proposals (RFP) in July 2016 for a solar farm to be built by a third-party developer under a power purchase agreement. The single-axis tracking array, up to 5 MW in capacity, will be sited on 18.5 acres of Cal Poly sheep pasture bordering Highway 1 and could generate up to 25 percent of Cal Poly's total electricity needs. The RFP specified sophisticated metering and data collection to support teaching and research in the Electrical Engineering Department's Power Program, as well as Animal Science Department access to continue sheep grazing and perform research on solar farm vegetation management practices.

Feasibility studies are under way to evaluate potential wind and biomass power generation on campus. Using historical wind speed data from the Cal Poly Wind Research Center, 3D computer modeling was used to assess wind resources across 6,000 acres of campus land. Four potential locations with the best wind speeds are being evaluated for more detailed study. A dairy digester and cogeneration system are also being evaluated for conversion of animal manure, green waste, and food waste into useful energy.

Using donated equipment, students in BRAE 470 - Solar PV System Engineering designed and constructed a 5 kW solar array on the roof of the BioResource and Ag Engineering Building. Facilities Management and Development (FM&D) took an active role in course curriculum and system design and provided a mini-grant worth five years of the energy the array will produce. Students learned construction and safety fundamentals by participating in a Grid Alternatives installation in a disadvantaged community, then went on to create Cal Poly Project Solar, which received Instructionally Related Activity status and funding, to build more systems on campus.

Cal Poly procures some of the cleanest energy in the nation. PG&E's reported 2015 Power Mix shows that 30 percent came from "qualified renewable" sources (solar, wind, geothermal, biomass, and small hydro). When large hydro and nuclear are factored in, 59 percent of PG&E's electricity is generated by non-carbon emitting technologies. As of June 2016, PG&E has announced plans to shut down Diablo Canyon Nuclear Power Plant and replace it more cost effectively with energy efficiency, renewables, and energy storage. As part of the plan, Cal Poly and Cuesta College will partner with PG&E to develop training programs for the carbon neutral energy careers of the future.



ENERGY EFFICIENCY

Cal Poly continues to invest in energy efficiency as the most cost-effective way to reduce greenhouse gas emissions and operating costs while modernizing aging buildings and infrastructure. Cal Poly also participates in a summer Demand Response program, curtailing up to 1 MW of electrical use during times of peak load on the state grid. Cal Poly was called upon 16 times in the 2015 season, reducing campus load by an average of 720 kW, or 12 percent of peak demand.

FM&D completed a $3 million energy and water conservation project in 2016 which retrofitted lighting in 25 buildings, converted all chilled water buildings to variable flow, optimized chiller plant operation, and installed new boiler combustion controls. The project resulted in savings of over 2 million kWh of electricity, 47,000 therms of natural gas, and $220,000 in utility costs per year, qualifying for over $300,000 in utility incentives. The project received Sustainability Best Practice Awards in the categories of Innovation (Creative Project Finance) and HVAC Retrofit (Chilled Water Flow Optimization) at the California Higher Education Sustainability Conference.

A Monitoring Based Commissioning project on five buildings was completed in 2016, improving the comfort and efficiency of the HVAC systems in Engineering III, Engineering IV, Bonderson Projects Center, Cotchett Education, and the Business Building. The project resulted in savings of 384,000 kWh of electricity, 28,000 therms of natural gas, $52,000 per year in utility savings, and qualified for $160,000 in utility incentives.

Over summer 2016, nearly 500 street and parking lot lights on campus were retrofitted to LED, with motion sensing dimming technology in parking lots. The project greatly improved the appearance and safety of campus at night, resulting in savings of over 300,000 kWh per year in electricity, and qualified for a utility incentive of $70,000.

In 2015, Cal Poly invested $1 million to bring its 30-year-old Building Automation System up to the latest technology and high-speed Ethernet communication, laying the foundation for sophisticated "big data" analytics.

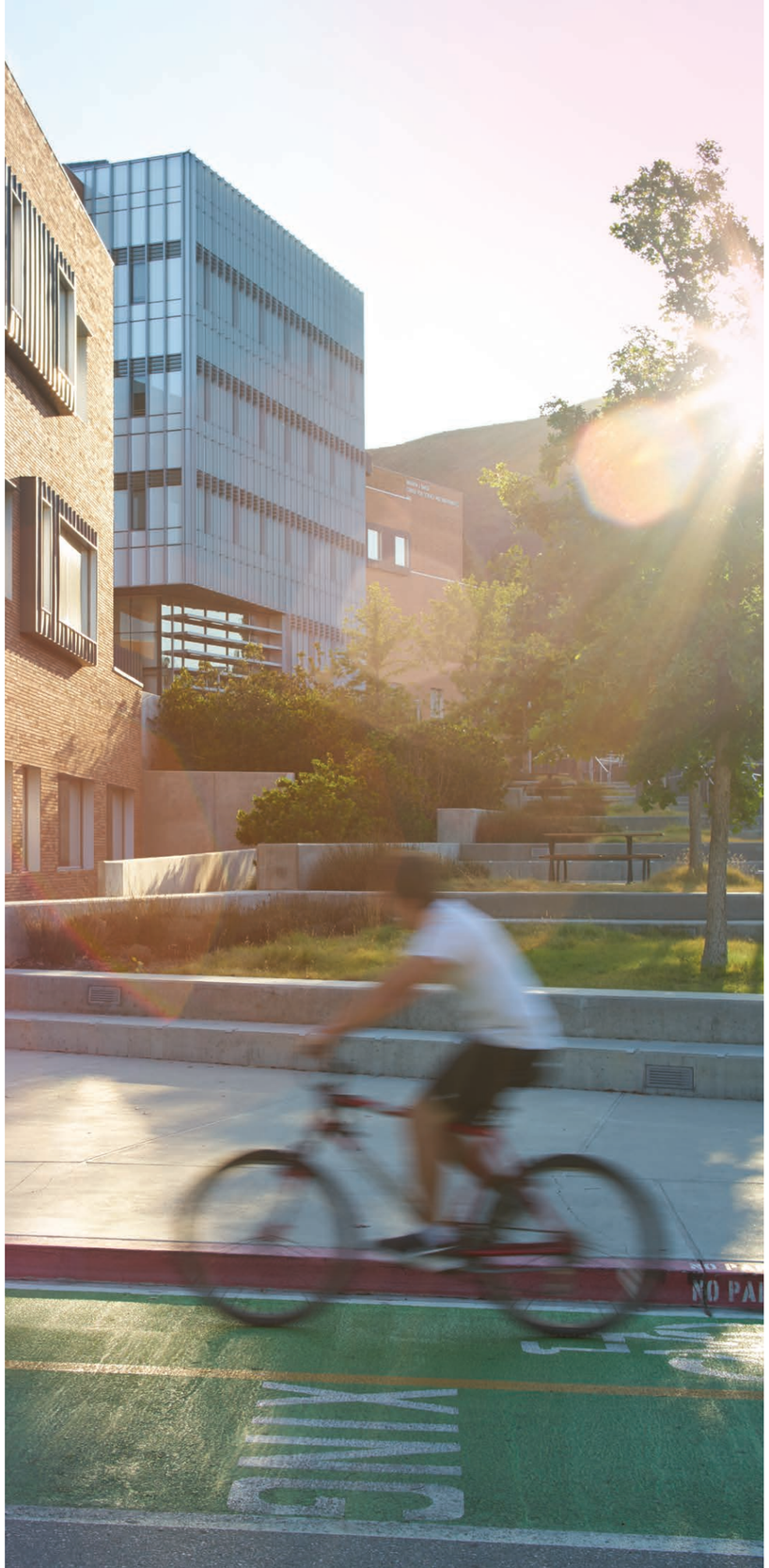
FIVE | Transportation

SUSTAINABLE TRANSPORTATION PROGRAMS

The Cal Poly Climate Action Plan (PolyCAP) transportation survey provided rich data to understand faculty, staff, and student commuting behavior. Nearly 7,400 students currently live on campus, and most of the remainder walk, bicycle, or ride the bus to campus. Most faculty and staff, however, live in surrounding communities because of the cost of housing in San Luis Obispo—commuting an average of 17.4 miles each way. Over half—51 percent—of the greenhouse gas (GHG) emissions associated with the Cal Poly campus result from daily commuting, over 60 percent of which come from cars, either driven alone or as a carpool.

As Cal Poly takes steps toward carbon neutrality by 2050, it will be imperative that the university prioritize strategies for improved commuting options. With this in mind, Cal Poly Parking and Commuter Services contracted a campus parking study and Facilities Planning and Capital Projects is finalizing a feasibility study for an on-campus shuttle service. Cal Poly continues to see an increase in SLO City bus ridership and is working to increase participation in biking, vanpool, carpool, and other sustainable transportation programs.

President Armstrong charges his electric vehicle at one of Cal Poly's 12 public stations.



Bicycle Programs

Out of more than 4,000 campus community members surveyed for the PolyCAP, 15 percent said they commute to campus via bicycle. Cal Poly Commuter Services is working to increase bicycling through outreach programs such as National Bike Month in May, Bike to School Day, and Bike to Work Day.

Vanpool Program

Cal Poly currently has 10 commuter vans which take 147 single-occupant vehicles off the road daily, from Paso Robles to Orcutt. The program, paid for by rider membership fees, saves drivers an average of $1,700 per year and reduces their GHG emissions by almost 90 percent.

Carpool Program

Cal Poly has 12 faculty and staff carpool spaces at prime parking locations throughout campus for registered carpool groups, providing an incentive to those who are willing to organize and register their own personal carpools. There are currently 122 individual carpoolers registered.

Electric Vehicle Charging

Funded by a 2014 California Energy Commission grant, Cal Poly's 12 level 2 electric vehicle charging stations delivered 4,050 charging sessions to 216 EV and plug-in hybrid drivers in 2015-16, reducing their per-mile fuel costs by 70 percent and GHG emissions by 82 percent as compared to gasoline vehicles.

Citywide Public Transportation

SLO City buses remain free for faculty, staff, and students, subsidized by campus parking fines. As the campus community continues to grow, so does ridership with an approximate 30 percent increase over the 2015/16 academic school year.

Regional Public Transportation

Cal Poly subsidizes the cost of monthly passes for Regional Transit for the campus community, selling more than 700 monthly passes every year at a discounted rate to faculty, staff, and students.

Incentives for Sustainable Transportation

Working with SLOCOG's Rideshare office, Cal Poly's Commuter Services Coordinator manages the irideshare.org website that matches students and staff interested in carpooling, tracks modes of travel, and provides incentives to staff and faculty who are recording alternative modes of travel to and from campus.

TRANSPORTATION STATISTICS 2015-2016

7,377 students

living on campus (35% of student body)
2005/06: *3,620 (20%)*

7,291 bike racks

on campus at Cal Poly
2005/06: *2,100*

0.18 permits per capita

on-campus parking permits issued to faculty, staff, and students (4,358 total)
2005/06: *0.38 (8,100)*

540 metric tonnes of C02 avoided

because of the 2015 ridership on Cal Poly's Vanpool program

759,102 rides

by Cal Poly faculty, staff and students in the Regional Transit program
2005/06: *559,315 rides*

4,050 charging sessions

by 12 electric vehicle charging stations on campus

149 electric, 5 hybrid

alternative fuel fleet vehicles (28% of fleet)

SIX | Water

WATER CONSERVATION

Acting as good stewards of water resources and eliminating waste are among Cal Poly's most important sustainability efforts. Throughout the years, Cal Poly has implemented hundreds of water conservation measures. Since 2003, total campus water usage has remained nearly flat despite a 60 percent growth in building square footage and 100 percent growth of on-campus residency over the same period. Even with these past accomplishments, ongoing drought, coupled with the governor's mandate to reduce 25 percent of potable water use by February 2016, required accelerated efforts.

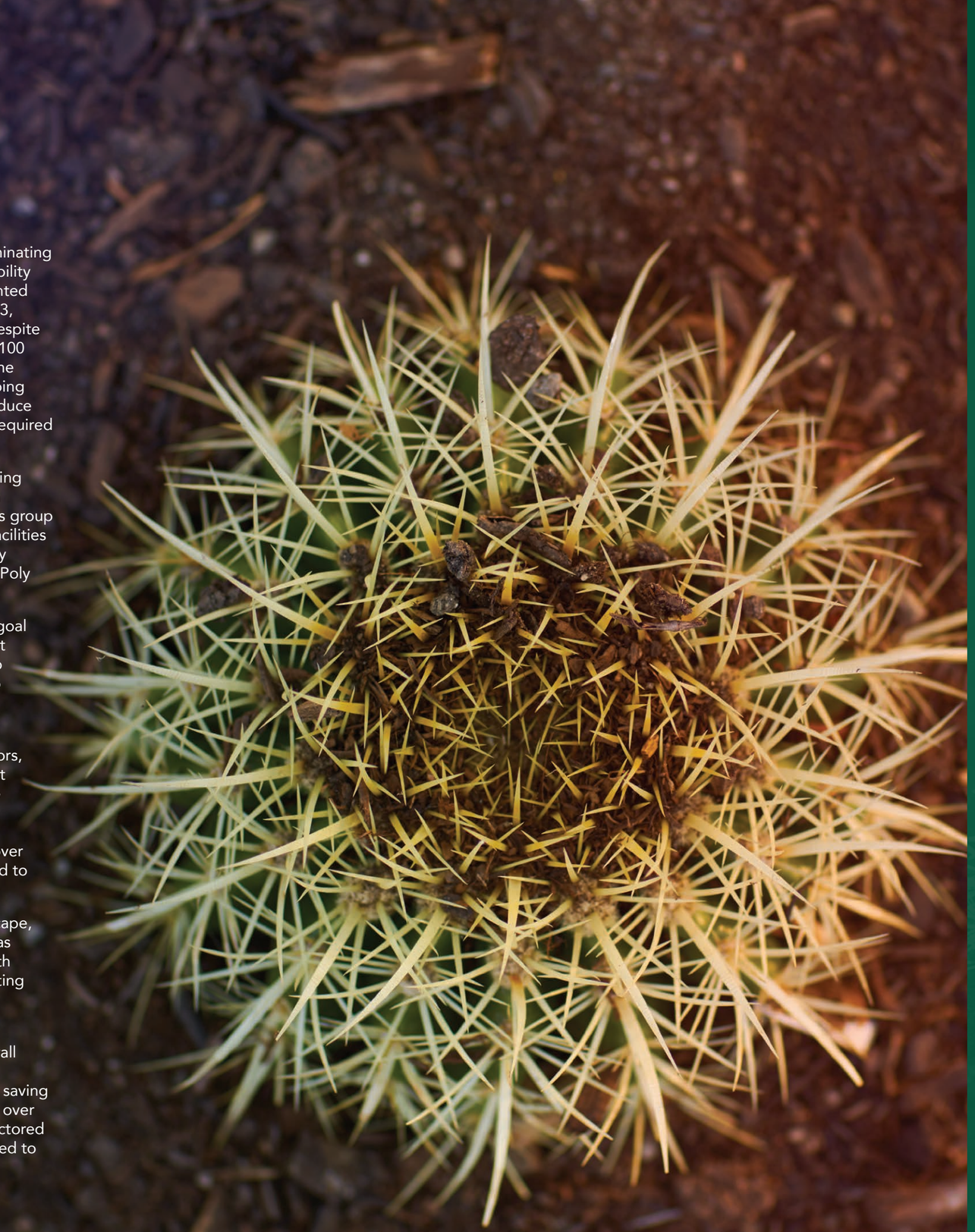
To achieve the reduction mandates, a Drought Planning Group was convened to identify short and long-term conservation measures and operational changes. This group included representatives from Facility Operations, Facilities Planning, Environmental Health and Safety, University Housing, Associated Students Incorporated, the Cal Poly Corporation, and CAFES Ag Operations.

While the governor's 25-percent-by-2016 reduction goal applied to potable water use only, Cal Poly's Drought Planning Group, in order to honor its commitment to resource stewardship, applied the governor's goal to all sources of water—potable, non-potable, and groundwater.

Low-flow retrofits included nearly 1,000 faucet aerators, 300 shower heads, and plumbing fixture replacement in eight buildings. Precision irrigation measures were implemented throughout Ag Operations, and a new wireless irrigation control system was installed for watering campus core landscape. As of June 2016, over 50 percent of irrigated landscape has been converted to the new system.

To continue Cal Poly's transition to water wise landscape, 14 acres of turf—28 percent of the campus total—was eliminated. These spaces are being relandscaped with native and drought tolerant plant species, incorporating ideas from a Landscape Architecture student design competition.

The 2015 Drought Response Plan resulted in an overall reduction in water use of 31 percent, surpassing the governor's 25 percent mandate. These measures are saving over 141 million gallons per year—enough to supply over 1,000 average California homes. With sewer costs factored in, annual savings exceed $500,000 per year compared to the 2013 baseline.



WATER USAGE STATISTICS

2013 (acre ft.) 2015 (acre ft.)

WHALE ROCK WATER

Agriculture
474
362
23.6% reduction $12,200 *savings*

Sports Complex Fields
79
56
29% *reduction* $2,500 *savings*

Campus Landscape
269
186
31% *reduction* $161,300 *savings*

Buildings
263
210
20.1% *reduction* $292,500 *savings*

*Process Use**
20
43
(116.1%) *reduction* ($64,000) *savings*

WHALE ROCK TOTALS
2013: *1,106 acre ft.*
2015: *858 acre ft.*
22.5% *reduction* $404,500 *savings*

GROUND WATER

Agriculture - Well Water
302
117
61.4% *reduction* $11,300 *savings*

CAMPUS TOTALS
2013: *1,408 acre ft.*
2015: *974 acre ft.*
30.8% *reduction* $415,800 *savings*

**Increase caused by multiple drain/fill cycles during Utilidor repairs.*

WATER QUALITY

Cal Poly's Water Quality Management Plan, approved by the Central Coast Regional Water Quality Control Board and implemented by the Environmental Health and Safety Department, is a voluntary and cooperative approach to water quality management and permit compliance. The program seeks to maintain and improve the quality of water passing through the campus by monitoring pollution in surface waters, groundwater, and the wastewater that leaves the campus through the sewer system.

Water in Stenner Creek is tested quarterly for fecal coliform, an indicator of bacterial contamination. After ruling out Cal Poly animal herds as the source by improving grazing practices, the recent spike in bacteria was attributed to increased concentration of wildlife in the creek's riparian corridor during the drought.

Monitoring wells around the campus are used to test the quality of the groundwater, identifying nitrate levels above and below the campus gradient. Historically, water entering the campus has been cleaner than that leaving the campus; however, recent measurements indicate that nitrate levels in water leaving campus are lower than those entering and continue a downward trend. Since summer 2011, when there was a spike in nitrate levels leaving campus, levels have declined significantly and are well under acceptable limits.

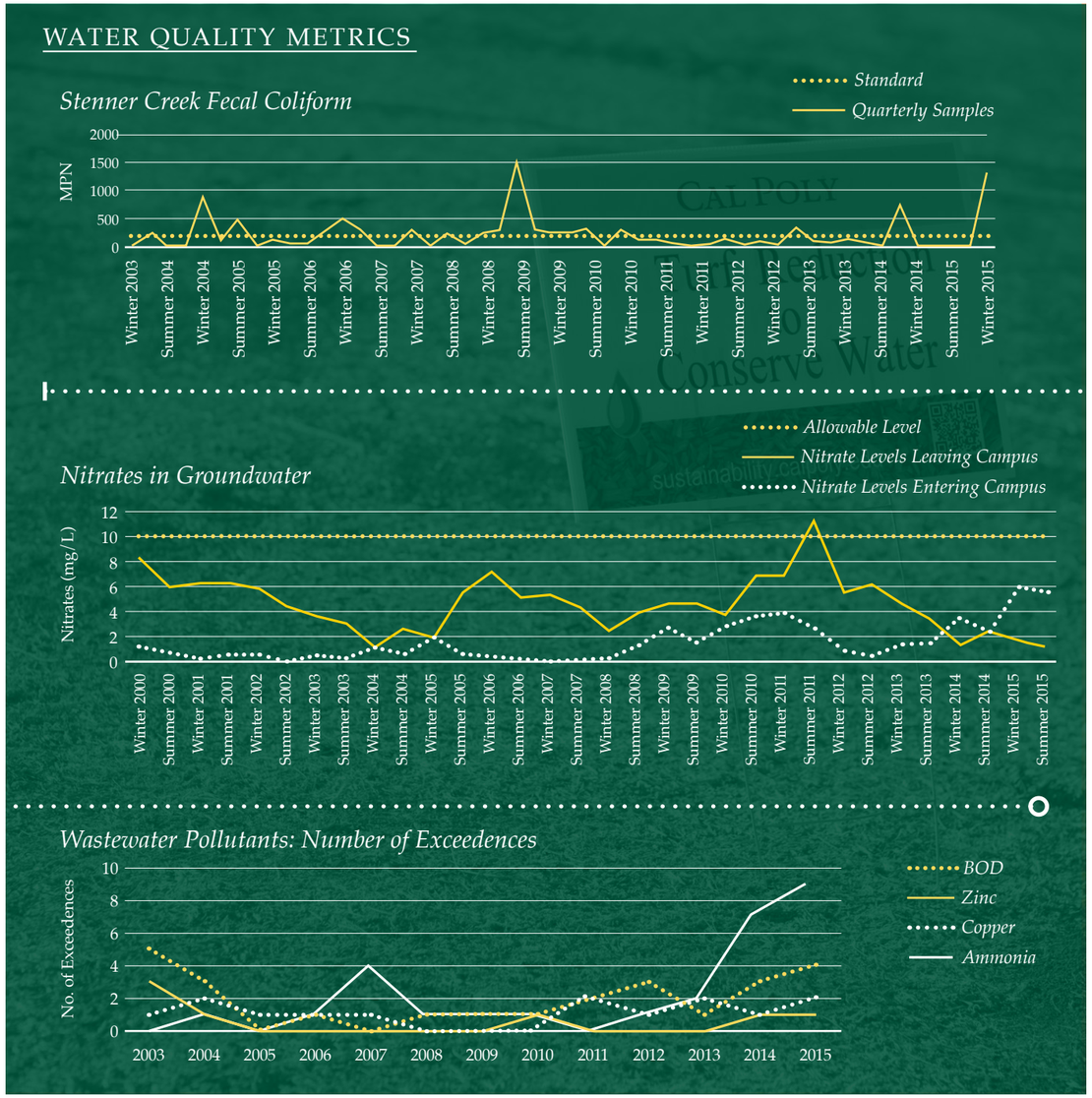
Cal Poly tests for a number of pollutants in sanitary wastewater. Starting in 2012, new standards were adopted for several of these materials. Pursuant to the new standards, some contaminants that the campus had been monitoring are no longer considered significant enough to warrant testing, while others were added to the array. In general, the campus has met applicable standards with no more than nine annual exceedances on any of these metrics in the last four years of monthly testing.

Biochemical oxygen demand (BOD), which had previously been a problem, has greatly improved from peak years, and zinc has essentially been eliminated from the waste stream, largely due to Custodial Services' Green Cleaning program. Increased ammonia concentration in wastewater can be attributed to the transition to low-flow plumbing fixtures.

As part of Cal Poly's drought response, 14 acres of turf are being converted to water-wise landscape.

In recent years, the utilidor hot water distribution system has undergone several changes in order to improve the efficiency and reliability of the system. Improvements include replacement of aging piping and isolation valves to reduce the risk and frequency of leaks. In addition, the hot water system was converted to a silicate-based corrosion control program, eliminating the potential for discharge of more commonly used treatment chemicals—nitrite or molybdenum—should a leak occur.

Cal Poly promotes and participates in the annual countywide Creek Day cleanup events. These events are held across San Luis Obispo County and include cleanup locations at Cal Poly. Each September, before the rainy season begins, volunteers from the campus community come together to pick up litter such as food wrappers, beverage containers, and smoking-related materials.



SEVEN | Solid Waste and Recycling

ZERO WASTE PILOT

Cal Poly recognizes that a comprehensive Zero Waste program is fundamental to advancing campus sustainability. Waste reduction is an area of significant opportunity for student engagement and cultural change. The core messages of campus cultural value and personal responsibility are captured in the program's logo and motto: "Cal Poly Zero Waste, it's in your hands!"

Throughout the years, Cal Poly has excelled in managing waste streams that are under Facilities Management and Development (FM&D) direct control; including animal waste, green waste, pre-consumer food waste, furniture and surplus equipment, construction and demolition waste, and others. In 2015, these programs diverted almost 62 percent of waste from landfill. Also remarkable, the per capita disposal rate to landfill has dropped by more than half over the past decade. In terms of procurement, 33 percent of all office supplies are environmentally preferred products.

The consumer waste stream—the waste placed in trash or recycle bins by individual faculty, staff, and students on a daily basis—has proven to be much more challenging to improve. For decades, Cal Poly has had a basic consumer waste recycling program which has focused on making recycling bins and collection service available across campus. Unfortunately, this generally passive program has resulted in approximately 80 percent of consumer waste going to landfill.

State mandates, CSU policy, and increased awareness by campus leadership have driven a need to develop a comprehensive Zero Waste program with a commitment to flipping the consumer waste diversion rate from 80 percent landfill to 80 percent diversion by 2020.

In early 2015, operations staff from FM&D, University Housing, ASI, Campus Dining, the Green Campus Program, and Zero Waste Club came together and formed a Zero Waste Collaborative to tackle the problem, pursuing two initial strategies:

- A Zero Waste pilot program was designed to quickly implement Zero Waste collection at several locations, representing a major cross section of the campus, including six freshman residence halls, Kennedy Library, the University Union, and The Avenue dining commons. The pilot focused on design and testing of triple-stream collection infrastructure (compost, recycle and landfill), safe materials handling methods, descriptive signage, and educational messaging.
- The collaborative also focused on waste produced in "special streams" from large events, such as commencement and new student orientation programs, engineering labs and architecture studios, housing move-in and move-out, and sporting events. Twice in the last year, senior level environmental engineering students in a pollution prevention class have evaluated these special streams and designed solutions for the campus to implement.

In addition to strategies developed by the Zero Waste Collaborative, the Zero Waste Club and Green Campus team host peer-to-peer educational outreach activities to create behavioral change. Over the past year, club members worked closely with FM&D and Campus Dining, performing regular waste audits at The Avenue to identify the effectiveness of improved 3D signage created and installed by the Zero Waste Club, as well as tabling at events across campus to educate students. Future initiatives include a Material Reuse Depot on campus and a drive to eliminate single-use bottled water and plastic bags from all campus locations.

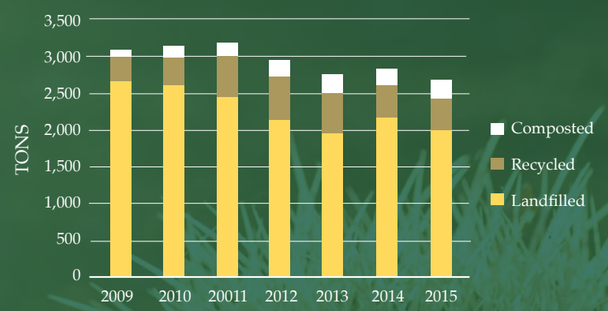
CAL POLY ZERO WASTE IT'S IN YOUR HANDS

Photo by One With Nature

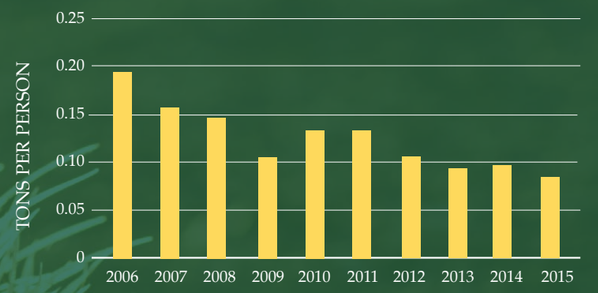
Students participate in various Zero Waste-focused activities at Cal Poly.

CONSUMER WASTE METRICS

Consumer Waste by Destination



Per Capita Disposal to Landfill



EIGHT | Climate Action Planning

SECOND NATURE CLIMATE LEADERSHIP COMMITMENT

California's AB32, the Global Warming Solutions Act of 2006 and subsequent executive orders set groundbreaking goals for the state to reduce greenhouse gas emissions to 1990 levels by 2020, and 80 percent below 1990 levels by 2050. The CSU chose to go beyond state mandates in its 2014 Sustainability Policy, aiming to reduce greenhouse gas emissions (GHG) to 80 percent below 1990 levels by 2040—10 years ahead of the state goal. Greenhouse gas emissions are broken down into three categories:

- Scope 1 – Direct on-site emissions (combustion of fossil fuel, fleet vehicles, ag ops, refrigerants)
- Scope 2 – Emissions from purchased utilities (electricity, water)
- Scope 3 – Emissions not under direct control (commuting, business travel, wastewater, solid waste)

Under CSU Policy, campuses are responsible to quantify and reduce their Scope 1 and 2 emissions to reach the 2020 and 2040 goals. Campuses that have signed the Second Nature Climate Leadership Commitment are also responsible to reduce Scope 3 emissions as part of Climate Action Plans to achieve neutrality as soon as possible. For Earth Day 2016, President Armstrong made Cal Poly a charter signatory to the Second Nature Climate Leadership Commitment, establishing a goal for Cal Poly to achieve net zero emissions from all sources by 2050.

The Climate Commitment also requires Cal Poly to collaborate with local government to achieve climate resilience—preparing not only buildings, grounds and infrastructure but programs and support services to withstand the increasing effects of climate change, such as:

- Sea level rise, extended drought, fire, flood, and extreme temperatures
- Loss of biodiversity, invasive species, and infectious disease
- Disruption of water and energy supply, overloading of community and emergency services

City and Regional Planning students gather input from the campus community on Cal Poly's Climate Action Plan.

POLYCAP

Over the 2015-16 academic year, Facilities Management and Development partnered with the Cal Poly City and Regional Planning Department to create Cal Poly's first Climate Action Plan. A team of 27 students in the CRP 410/411 studio, led by professors Adrienne Greve, Chris Clark, and Billy Riggs performed a comprehensive transportation survey, GHG inventory, vulnerability assessment, and wrote the plan entitled PolyCAP.

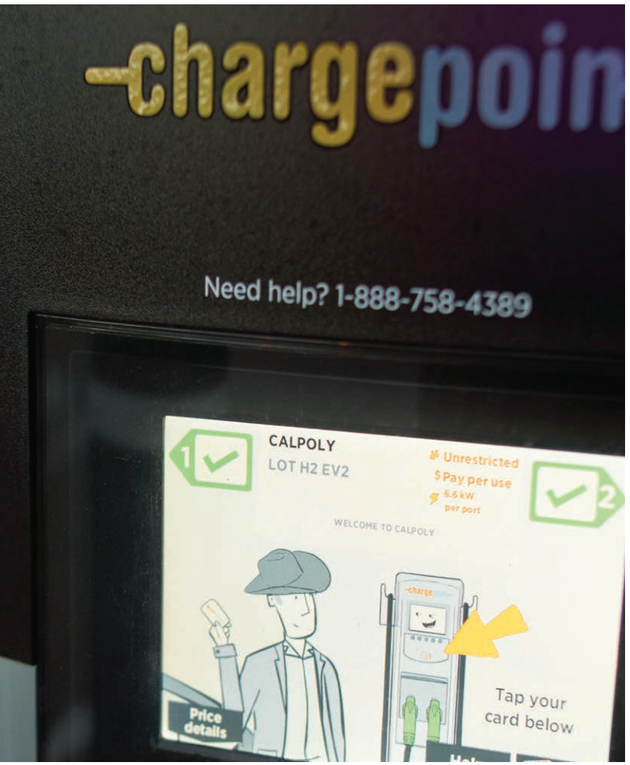
The greenhouse gas inventory shows that Cal Poly has already reduced its Scope 1, 2, and 3 emissions to within ten percent of 1990 levels, despite 100 percent growth in buildings and on-campus housing over that period. The inventory also shows that over 50 percent of Cal Poly's emissions are produced by commuting, reinforcing the need to continue investing in alternative transportation programs and on-campus housing.

The plan quantifies the potential GHG reductions from over 80 proposed policies to achieve the goal of climate neutrality and resilience across all sectors: Buildings, Agriculture, Transportation, Water, Solid Waste, Campus Life, Renewable Energy, and Public Private Partnership driven development. Proposed policies include:

- Design new buildings to exceed Title 24 by 20 percent, Certified LEED Gold
- Improve energy metering, modernize existing buildings to exceed Title 24 by 15 percent, Certified LEED Silver
- Increase on-site generation of renewable energy with rooftop solar PV and energy storage
- Digest animal manure and solid waste to generate energy
- House all freshmen and sophomores on campus and prohibit vehicles
- Expand alternative transportation programs and transition fleet to electric
- Further reduce turf, improve irrigation efficiency, and transition to drought-tolerant landscape
- Expand zero waste programs for composting and recycling
- Sequester carbon via sustainable rangeland management

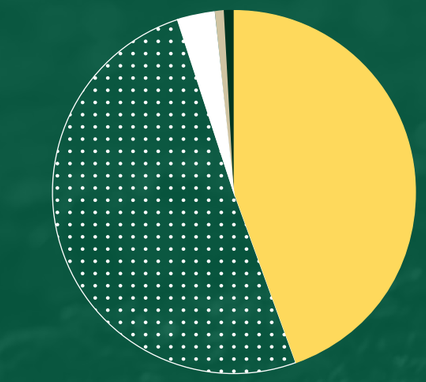
CENTRAL COAST CLIMATE COLLABORATIVE

In order to better coordinate Cal Poly's Climate Action Plan (PolyCAP) with local and regional plans to address climate resilience, Cal Poly and the SLO County Air Pollution Control District are facilitating creation of the emerging Central Coast Climate Collaborative (CCCC), representing Ventura, Santa Barbara, San Luis Obispo, Monterey, San Benito, and Santa Cruz counties. This will establish the sixth such regional climate collaborative in California and provide an opportunity to connect faculty and students on six campuses of the UC and CSU with their regional climate action planners for hands-on, real world problem solving in the communities they serve.



CAL POLY GHG EMISSIONS

Total emissions estimate by sector



Transportation *51%*

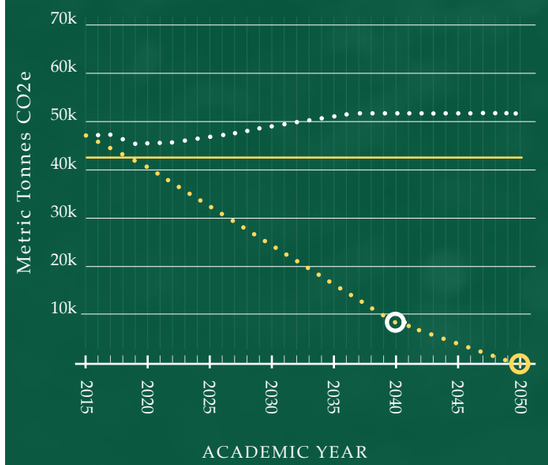
Buildings *45%*

Agriculture *3%*

Solid Waste *<1%*

Water Use *<1%*

GHG EMISSIONS PROJECTIONS



CSU Sustainability Policy Target

Cal Poly Climate Neutrality Target

1990 baseline

Business as usual

Targeted reduction rate

NATIONAL RESILIENCE INITIATIVE NETWORK

In April 2016, Cal Poly's College of Architecture and Environmental Design was chosen to represent the Western Region of the National Resilience Initiative Network. The network is comprised of six resilient design studios under the umbrella of the American Institute of Architects Foundation, dedicated to helping communities better prepare for natural disasters and the effects of climate change.

NINE | Land Use and Development

MASTER PLAN UPDATE

Cal Poly is updating its campus Master Plan—last revised in 2001—to envision the land use, building, infrastructure, and transportation projects needed over the next 20 years to support the academic mission of the university as it continues to grow in enrollment, and as programmatic needs, teaching methods, and technologies evolve.

Guided by President Armstrong's Vision 2022 and Cal Poly's Academic Plan for Enrollment, the new Master Plan lays the foundation to support enrollment growth from the 20,000 envisioned in the 2001 Plan to a capacity of 25,000 students by 2035. The Master Plan team included six advisory subcommittees, focused on the topics of Circulation and Transportation, Recreation and Athletics, Campus Life, Academic and Instructional Space, Campus Character, and Sustainability and Natural Resources. Sustainability is woven throughout all sections of the plan, articulating goals to:

- Create spaces and facilities that support a sustainable lifestyle for on-campus residents
- Be a proactive leader in sustainable land and resource planning, site selection, building design, and operations
- Manage natural resources and design and operate buildings as an integral component of research, education, and living experiences involving daily faculty, staff, and student participation
- Identify locations for solar and other forms of renewable energy, and strive for net zero by investing in renewable energy, prioritizing on-site generation
- Continue retrofit of older buildings for energy and water efficiency, investigate use of reclaimed water and grey water, and limit turf to high-use areas only
- Plan for efficient solid waste management and recycling in all future development
- Integrate sustainability principles into fundraising priorities
- Continue to exceed Title 24 Cal Green energy efficiency requirements

Member of the Master Plan Team gets input from students on future land uses.

MAJOR CAPITAL PROJECTS

Student Housing South

In the ongoing effort to increase on-campus student housing, the new Student Housing South Project broke ground in 2015 and is scheduled for completion for fall 2018. Sited on 12 acres of former surface parking lots along Grand Avenue, the 1,475-bed freshman residence hall will be comprised of seven buildings and a 473-space parking structure. When the project is complete, Cal Poly will be able to house nearly all freshmen and sophomores on campus, which studies have shown significantly improves student success and graduation rates. Building upon the 30 percent of campus already LEED Certified, the project is designed to achieve LEED Gold Certification and includes plans for approximately 1 MW of rooftop and covered parking solar PV, to be delivered via a power purchase agreement.

Artist's rendering of the Student Housing South project, scheduled for occupancy in Fall 2018.

Workforce Housing

Housing costs in San Luis Obispo can be a challenge to recruitment and retention of faculty and staff, and commuting accounts for over 50 percent of Cal Poly's total GHG emissions. Analysis performed as part of Cal Poly's Climate Action Plan showed that reducing commuting by providing additional workforce housing on campus, designed to a LEED Gold standard, would result in a 20 percent reduction in total per capita GHG emissions. Incorporation of rooftop solar PV would result in even greater reductions. Solicitation for the first such workforce housing project at the corner of Slack Street and Grand Avenue, to be delivered by public-private partnership, began in May 2016 with a directive from President Armstrong to achieve LEED Gold Certification and strive toward net zero energy.

Vista Grande Restaurant Replacement

Originally constructed in 1972, Vista Grande Restaurant is being demolished over summer 2016 to make way for a new facility to feed the growing student population. The project is scheduled for completion by fall 2018. The three-story facility will include six micro-restaurants for faculty, staff, and students, with both indoor and outdoor seating areas. The new facility will focus on nutrition and sustainably sourced food, including Cal Poly student-made products. The project is targeting LEED Gold Certification and will incorporate best practices in energy efficiency and food production.

TEN | A More Sustainable Campus Community

CURRICULUM

Over the last two years the Academic Senate Sustainability Committee has been conducting a formal review of the over 5,000 courses offered at Cal Poly to identify those that satisfy the university's Sustainability Learning Objectives. To date, the committee has tagged over 60 such courses, as well as 13 minors and 26 degree programs related to sustainability. These are listed in SusCat—Cal Poly's Sustainability Catalog. In addition, a new Sustainable Built Environments Major is currently under development by the College of Architecture and Environmental Design.

Teaching Sustainability in Any Course

In Spring 2016, the Academic Senate Sustainability Committee and the Center for Teaching, Learning, and Technology (CTLT) hosted an interdisciplinary workshop led by John Farnsworth, Senior Lecturer in Environmental Studies and Sciences at Santa Clara University. The workshop investigated ways to augment existing courses to include a sustainability component as an adjunct learning outcome. The training was so well received that the CTLT is sponsoring a Learning Community that will train and incentivize up to 10 faculty members to incorporate sustainability into existing courses.

Sustainability Filter on PASS

To raise student awareness of, and access to sustainability courses at Cal Poly, the Academic Senate Sustainability Committee (ASSC) proposed a digital filter for the student online course registration system "Plan a Student Schedule" (PASS). The filter will allow students to easily search for courses in the university catalog that satisfy Cal Poly's Sustainability Learning Objectives. Over spring quarter, an interdisciplinary team of Environmental Design 408 students collected student support for the initiative. By the end of spring quarter the PASS sustainability filter was approved by the registrar and placed in the queue for implementation by campus IT staff.

RESEARCH

Wave Energy

Cal Poly's Institute for Advanced Technology and Public Policy received over $2.1 million in US Department of Energy CalWave grants to assess the feasibility of siting the planned National Wave Energy Test Facility off the California coast.

Algae for Fuel

The US Department of Energy has awarded a $1.3 million grant to a multidisciplinary Cal Poly research team, the Algae Technology Group (ATG), for a project aimed at developing processes that turn waste resources (such as those from municipal and agricultural wastewaters) and nutrients recycled from algae biomass processing into sustainable algal biofuels.

Campus as Living Lab (CALL)

The Electric Power Systems and Power Electronics specializations in the Electrical Engineering (EE) department are conducting research on a micro grid system funded in part by a CSU Campus as a Living Lab grant. The micro grid will be developed in the EE department's Advanced Power System Laboratories and will allow students and faculty to conduct research on renewable energy generation, energy storage technologies, and integration with the state power grid.

Green Campus Program interns educating peers about sustainable practices.

STUDENT EXPERIENCE

Green Campus Program

The Green Campus Program was revamped in 2015 with support from Cal Poly Facilities Management and Development (FM&D) to focus on the 2014 CSU Sustainability Policy goals related to energy, water, and Zero Waste.

Having run residence hall energy and water conservation competitions since 2008, the team renamed and expanded the 2016 competition to incorporate waste reduction as well. The annual event is now known as the Annual Conservation and Diversion Challenge (ACDC).

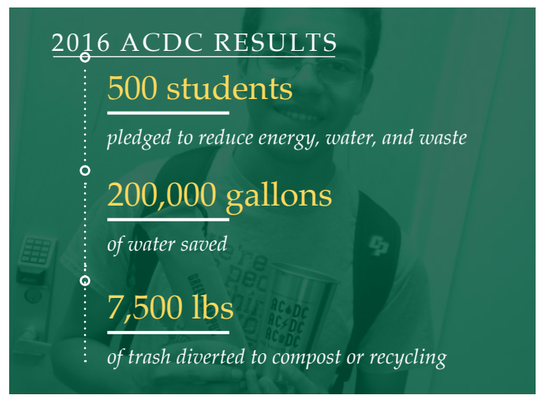
Zero Waste Club

Over 25 active club members are working to bring the campus closer to 2020 Zero Waste policy goals. Plans include creation of a Material Reuse Depot on campus as well as eliminating single use water bottles and plastic bags from campus.

Club President Amara Cairns was commissioned by Campus Dining to develop 3D signage at The Avenue's Zero Waste stations. The club organizes weekly waste audits to measure effectiveness of educational signage.

Real Food Collaborative

The club hosts a weekly food booth on Dexter Lawn and is developing a business plan to reinstate a Community Supported Agriculture program that would source organic produce from the Cal Poly farm and other local farmers.



New Student Programs

In their sixth year of making the annual Campus Showcase a Zero Waste event, New Student Transition Programs is working with Campus Catering and FM&D to ensure all meals served during SLO Days and WOW are Zero Waste, resulting in:

- 400 students trained to sort waste at Campus Showcase
- 70 percent of waste from Campus Showcase diverted from landfill
- Over 20,000 people exposed to Zero Waste stations during Campus Showcase, SLO Days, and WOW meals

University Housing

Donation stations for housing move-out collected over 5,000 pounds of frozen and dry food goods, 6,000 pounds of clothing, and over 6,500 pounds of household supplies for local community members in need.

Residential Life will partner with Green Campus in fall 2016 to kick off the Housing Eco Rep program and Eco Certified program, with a goal of training two Eco Reps in every residence hall and certifying over 325 rooms as Eco Certified.

Sustainability in ASI

2016/17 ASI Student Government President Jana Colombini created an executive cabinet secretary of sustainability and transportation, and a secretary of diversity and inclusivity, marking the first time a Cal Poly ASI president has prioritized these efforts in student government.

TGIF/Green Revolving Fund

In Spring 2016, as part of an Environmental Design 408 class project, students campaigned for The Green Initiative Fund (TGIF) at Cal Poly. TGIF, if passed by student vote, would add a three to five-dollar per student quarterly fee to finance student led sustainability projects on campus. Governing board structure and bylaws have been developed which will ensure alignment of proposals with existing campus and CSU policy and priorities to reduce greenhouse gas emissions.

OPERATIONS SUSTAINABILITY PLAN

Status as of Spring 2016

LEADERSHIP
- Include sustainability in campus Strategic Vision and increase sustainability staffing

GHG
- Establish baseline
- Monitor per CSU guidelines
- Develop Climate Action Plan for neutrality

BUILDING OPERATIONS
- LEED for Campus
- Continue with retro-commissioning of existing buildings
- Implement Energy Information System

WATER
- Continue installing water efficient fixtures
- Meet with City regarding alternate water sources and emergency measures
- Continue to monitor water quality
- Investigate and ameliorate pollution standard exceedances
- Implement Drought Plan for 25 percent reduction
- Install additional metering on wells, ag use and irrigation
- Evaluate potential sources of recycled water

FLEET
- Continue transition to alt fuels
- Right size fleet including vehicle sharing
- Identify next generation of alternative fuel fleet vehicles

CAMPUS DINING
- Continue to convert vegetable oil to bio-diesel fuel
- Compost 1500 lbs/day of food waste
- Eliminate Styrofoam containers
- Perform energy/water audit of all food service facilities
- Offer Zero Waste option for Campus Catering

HOUSING
- Provide on-campus housing
- Design housing with support facilities
- Create a Sustainability-Themed Living Community
- Integrate Sustainability into Orientation and Res Life programs

ENERGY
- Complete energy/water audit
- Contract to implement conservation projects
- Assess feasibility of new solar, wind or other on-site generation projects

NEW CONSTRUCTION
- Require energy goal setting with schematic design
- LEED-certify new buildings

LANDSCAPING
- Install centralized irrigation controls and ET control
- Create water-wise landscape plans for turf reduction areas

RECYCLING
- Continue to improve diversion rate, including auxiliaries
- Improve procedures for data collection from construction and maintenance projects
- Implement Zero Waste for Open House, SLO Days, and WOW

OUTREACH
- Relaunch Green Campus Intern Program
- Employ student assistants
- Provide open access to plans, provide presentations
- Support senior projects
- Maintain and improve public Energy/Water Dashbord
- Offer Sustainability Orientation to Freshmen

PURCHASING
- Require Energy Star for all appliances and office equipment
- Implement Environmentally Preferred Products catalog for office supplies

COMMUTING
- Continue to subsidize transit for all students/faculty/staff
- Continue OPTIONS program
- Continue to convert campus core to bicycle/pedestrian friendly environment
- Continue to provide discount fares to students on Amtrak
- Install charging stations for electric vehicles

- Gold Bullets = Implemented & Ongoing
- White Bullets = In Progress

SUSTAINABILITY

2016 Sixth Biennial Progress Report

THANK YOU TO THE FOLLOWING CONTRIBUTORS:

JEFFREY D. ARMSTRONG
President

CYNTHIA VIZCAÍNO VILLA
Vice President, Administration and Finance

JUANITA HOLLER
Associate Vice President, Facilities Management and Development

DENNIS ELLIOT
Director, Energy, Utilities and Sustainability

DENNIS ELLIOT, **KYLEE SINGH** and **ERIC VEIUM**
Content Development

DENNIS ELLIOT and **KYLEE SINGH**
Project Coordination

OTHER CONTRIBUTORS
Cheryl Andrus, Marlene Cramer, Kim Porter, Kevin Piper, Adrienne Greve, Billy Riggs, Julie Hawkins, David Braun, Molly Barker, Jay Thompson, Matt Lazier

CHRIS LESCHINSKY
Photography

BARNETT COX & ASSOCIATES
Design

Sustainability Advisory Committee

2014/2015: Dennis Elliot (chair), Michael Lucas, Rafael Jimenez-Flores, Patrick Lemieux, Gary Clay, Samantha Kin, Nelson Lin, Mike Thornton, Hunter Francis, Ron Skamfer, Scott Bloom, Joel Neel, Julie Hawkins

2015/2016: Dennis Elliot (chair), Michael Lucas, Rafael Jimenez-Flores, Patrick Lemieux, Gary Clay, Haley Stegall, Kyle Boland, Megan Coats, Hunter Francis, Ron Skamfer, Scott Bloom, Julie Hawkins, Steve Polvi

Academic Senate Sustainability Committee

2014/2015: David Braun (chair), Norm Borin, Jonathan Fernsler, Scott Kelting, Daniel Levi, Jesse Vestermark, Dennis Elliot, Julie Hawkins, Lexie Bonestroo, Lauren Cool, Katie Tool, Christine Theodoropoulos

2015/2016: David Braun (chair), Norm Borin, Jonathan Fernsler, Jonathan Reich, Daniel Levi, Ashraf Tubeileh, Jesse Vestermark, Dennis Elliot, Julie Hawkins, Nelson Lin, Kaelan Sobouti, Katie Tool, Penny Bennett