MT. SAN ANTONIO COLLEGE
2018 CLIMATE ACTION PLAN

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2018 CLIMATE ACTION PLAN

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TEMPLATE

This *Climate Action Plan* was constructed based on a template in Appendix F of the California Community Colleges Sustainability Plan Guidebook.

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2018 CLIMATE ACTION PLAN

AN IMPERATIVE FOR MT. SAN ANTONIO COLLEGE

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An imperative? That seems like a strikingly strong statement to make for a community college. In fact, there are many reasons that climate action is both an imperative for Mt. SAC and a very appropriate application of the college’s commitment to our mission.

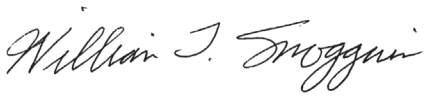
Knowledge, skills, and abilities regarding the environment are essential for student learning across almost every area of our curriculum. Environmental issues are hotly debated in our current race to select the next Governor of California—a topic for political science and economics. Architectural design has moved from environmental sustainability as a best practice to an essential feature both for compliance and for cost effectiveness. Solutions to water and air pollution require both theory and practice of the sciences. Wildfire, floods, and other climate related disasters influence practices from prevention measures to incident response to insurance rates—raising the bar for training everyone from inspectors to first responders to social workers

to insurance agents. Mt. SAC must have not only specific programs in Climate Action but must integrate its impacts throughout our curriculum.

As a community college, Mt. SAC not only must teach sustainability but must be an active demonstration site for its implementation. Our planners, staff, and students are employed daily in water conservation, energy efficiency, sustainable building design, environmentally friendly maintenance practices, and pollution reducing facilities such as electric vehicle charging stations and on-site clean energy generation. By the way, the curriculum reflects these active learning opportunities by employing student interns on almost all the facets of campus sustainability.

The value of education is not just based on providing students with employable skills but also in assuring that our graduates are responsible citizens of society. Weaving this social awareness of the environment into our classrooms and laboratories and into our college operations is our responsibility as well. The future of our planet—and the quality of life we experience—require both an informed and motivated electorate to push public policy and a cadre of citizens who live their day-to-day lives utilizing practices that conserve and protect our environment. "Reduce, Reuse, Recycle" is not just a slogan, it is a way of life.

The urgency of Climate Action cannot be understated—heat waves, fires, floods, hurricanes are in the news daily. Taking action now is imperative. And so is it imperative that Mt. SAC take action in our teaching, in our business practices, and in our social advocacy. This Climate Action Plan is our template and our commitment to do so.



WILLIAM T. SCROGGINS, PH.D.
President and CEO
August 2018

2018 CLIMATE ACTION PLAN

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SECTION 1: EXECUTIVE SUMMARY

INTRODUCTION

Mt. San Antonio College (Mt. SAC) administration and faculty, with support from staff and students, have decided to embrace the critical role and responsibility of higher-education institutions in preparing society for a sustainable future. The campus recognizes the potential environmental, economic, and social benefits of resource efficiency and sustainability. Furthermore, the passage of the California Global Warming Solutions Act (AB-32) and the establishment of a Sustainability Policy by the California Community Colleges (CCC) Board of Governors have made it imperative for all community colleges in California to develop an organized, comprehensive approach that incorporates the elements of sustainability, satisfies State regulations, takes advantage of available resources and complementary programs, and adopts the best practices of other institutions further along this path. Second Nature's Climate Leadership Statement, on the following page, describes the view adopted by Mt. SAC.

SECTION 1: EXECUTIVE SUMMARY

CLIMATE LEADERSHIP STATEMENT

"We… believe firmly in the power, potential, and imperative of higher education's key role in shaping a sustainable society. Not only are we deeply concerned about the increasing pace and intensity of global climate change and the potential for unprecedented detrimental impacts, but we also understand that technology, infrastructure, global interconnectedness, and our greatest asset—engaged, committed, smart students—allow us to explore bold and innovative solutions and to lead in climate action and sustainable solutions.

"We have begun to experience the effects of climate change in our communities and we understand that these effects are projected to become more severe and damaging. We recognize that mitigation and adaptation are complementary strategies for reducing the likelihood of unmanageable change, managing the risks, and taking advantage of new opportunities created by our changing climate.

"We believe colleges and universities must exercise leadership in their communities and throughout society by providing the knowledge, research, practice, and informed graduates to create a positive and sustainable future. Along with other aspects of sustainability, campuses that address the climate challenge by reducing greenhouse gas emissions and by integrating resilience into their curriculum, research, and campus operations will better serve their students and meet their social mandate to help create a vital, ethical, and prosperous civil society.

"We further believe that exerting leadership in addressing climate change will reduce our long-term energy costs and the costs of climate disturbance, increase our quality of life, attract excellent students and faculty, and build the support of alumni and local communities.

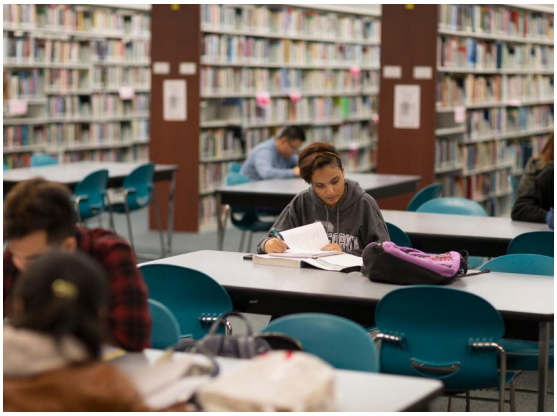
"We believe carbon neutrality and resilience are extremely high priority areas of action for all institutions and we aim to lead the nation in these efforts. We urge others to join us in transforming society towards a sustainable, healthy, and more prosperous future."[1]

[1] Second Nature, "The Climate Leadership Statement," *Second Nature*, http://secondnature.org/wp-content/uploads/Climate-Commitment-2017-Second-Nature.pdf

SECTION 1: EXECUTIVE SUMMARY

PURPOSE

The purpose of this *Climate Action Plan* (CAP) is to prepare Mt. SAC for the coming environmental and regulatory challenges of the 21st century, to guide the campus towards becoming a more sustainable institution, and to prepare students to engage in finding solutions to our environmental challenges. The Plan articulates the vision, goals, and strategies which will move Mt. SAC to become a sustainable campus with net-zero carbon emissions and has been developed in coordination with campus stakeholders to ensure that it meets the various needs of the campus.



SECTION 1: EXECUTIVE SUMMARY

DEFINING TERMS

CARBON NEUTRALITY

Carbon Neutrality is defined as "having no net greenhouse gas (GHG) emissions, to be achieved by either (a) eliminating net GHG emissions, or (b) by minimizing GHG emissions as much as possible, and using carbon offsets or other measures to mitigate the remaining emissions."[2]

RESILIENCE

Resilience is defined as "increasing the ability to survive disruption, and to anticipate, adapt, and flourish in the face of change."[3]

SUSTAINABILITY

Sustainability is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs."[4] The American Association for Sustainability in Higher Education (AASHE) further identifies three elements of sustainability: economic sustainability, social sustainability, and environmental sustainability. The relationships among all these elements must be considered to ensure the long-term viability of our communities and our planet. Throughout the *Climate Action Plan*, the concepts of sustainability, carbon neutrality, and resilience are referred to collectively as "sustainability."

MTCO2E

MTCO2e is an abbreviation for "metric tons of carbon dioxide equivalent."[5] This plan addresses a variety of activities and chemicals, and it is useful to have a single unit to describe and compare relative impacts of these activities and chemicals. For example, once everything is converted to MTCO2e, it is easy to compare the pollution from a diesel bus with the emissions from generating electricity.

[2] Second Nature, "Climate Resilience: Second Nature's Presidents' Climate Leadership Commitments," *Second Nature: Resilience Summary*, http://secondnature.org/wp-content/uploads/ClimateResilienceHandout-Nov2015.pdf

[3] Second Nature.

[4] World Commission on Environment and Development, "Report of the World Commission on Environment and Development: Our Common Future," *UN Documents*, 1987, http://www.un-documents.net/our-common-future.pdf

[5] "Brander, Matthew, "Greenhouse Gases, CO2, CO23, and Carbon: What Do All These Terms Mean?" *Ecometrica*. Aug 2012, https://ecometrica.com/white-papers/greenhouse-gases-co2-co2e-and-carbon-what-do-all-these-terms-mean

SECTION 1: EXECUTIVE SUMMARY

POLICY CONTEXT FOR SUSTAINABILITY PLANNING

Since the early 1960s when Charles David Keeling produced the first reliable measurements of the amount of carbon dioxide in the atmosphere, the scientific consensus around climate science has become increasingly robust. The International Panel on Climate Change is the most authoritative international body assessing climate science, and it predicts that if carbon dioxide in the atmosphere reaches over 1000 ppm, the planet will likely warm between 2.6–4.8 degrees Celsius by the year 2100. Only if atmospheric carbon dioxide concentrations are held to 430–480 ppm will we avoid climate-related feedbacks that are disruptive to human civilization.

George H.W. Bush signed the United Nations Framework Convention on Climate Change at the Rio Earth Summit in 1992, which included voluntary agreements to limit greenhouse gas emissions by signatories. After that somewhat hopeful beginning, the Clinton Administration agreed to abide by the Kyoto Protocol, but was unable to get the Senate to ratify the Agreement and increasing partisan polarization resulted in over a decade of inaction. Progress finally came when the Obama Administration announced the Clean Power Plan, committing the United States to a 30 percent reduction in GHG emissions in the power sector of its economy by 2030. As part of his *Presidential Climate Action Plan* Obama also set a goal of reducing GHG emissions in the United States 17 percent below 2005 levels by 2020. These commitments facilitated the bilateral deal that President Obama negotiated with China in 2014, which in turn paved the way for the global climate agreement reached in Paris in December, 2015. For its part the Trump administration has announced that the United States will withdraw from the Paris Agreement and has said that it will repeal the *Clean Power Plan,* preserve subsidies for fossil fuel exploration, and repeal the stricter fuel economy standards that the Obama administration put in place, while preventing California from setting higher fuel economy standards. California has announced its intention to file suit over the issue. Section 2: *Background*, and the *Appendix* of this CAP provide additional details of the policy context at the international, national, and State levels.

In the face of failure to take significant action at the federal level, California has passed a series of laws designed to comprehensively reduce GHG emissions in the State and transition to a clean energy economy. In 2006, the California Assembly passed AB 32, the Global Warming Solutions Act. Since then California has gained over a decade of experience with the Act's cap and trade policies involving the establishment of an emissions cap and the auctioning and trading of emissions permits. These policies have driven growth and have been effective in decreasing per capita GHG emissions. California has established itself as a leader in pioneering green industries, which are likely to become major areas of growth in the 21st century. The Clean Energy and Pollution Reduction Act of 2015, SB 350, substantially ratchets up the State's GHG emissions reduction requirements over the next decade, which has renewed warnings from some economists that the State's climate policies will undermine its economic growth. Yet, there remain optimists who contend that, far from hurting California's economy, the State's early leadership in enacting comprehensive and

POLICY CONTEXT FOR SUSTAINABILITY PLANNING *(cont.)*

ambitious climate legislation will continue to result in a bonanza of green investment and jobs.

CALIFORNIA HIGHER EDUCATION

Consistent with the commitments of California's State government, California's institutions of higher education are taking the lead in addressing the challenge of climate change and preparing students for the opportunities presented by the emergence of green industries. The University of California (UC) system has committed to reducing GHG emissions to 1990 levels by 2020, and in 2014 UC system President Janet Napolitano committed the UC campuses to a goal of achieving carbon neutrality by 2025. The California State University (CSU) system has committed to reducing GHG emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2040. While the California Community College (CCC) system has not made a similar commitment related to GHG emissions, it has made commitments in the areas of energy conservation and water conservation that bear directly on GHG emissions and climate resilience.

CAMPUS CLIMATE CONDITIONS

An important first step toward planning responsibly and sustainably is understanding the climate conditions that exist on Mt. SAC's campus. Working with the natural conditions, and being able to anticipate potential climatic conditions in the microclimate surrounding the campus, will allow the College to respond effectively with more resilient and resource-efficient buildings. This in turn will result in a reduced carbon footprint for the campus as a whole. A thorough climate analysis was conducted for the purposes of this CAP, in order to define this relationship between climate and carbon footprint. This analysis may be found in Section 3: *Campus Climate Conditions*. Mt. SAC is in California Climate Zone 9—situated in the Pomona-Walnut Valley, one of southern California's inland valleys. The analysis, however, uses weather data from the Chino Airport Weather Station, which, although located in Climate Zone 10, is the nearest weather station and experiences the most climatically similar conditions to the Mt. SAC campus.

PREDICTED GHG EMISSION TRENDS AND PHASED EMISSIONS REDUCTIONS

This plan analyzes Mt. SAC's GHG emissions according to Second Nature's carbon calculator, developed by the University of New Hampshire. The GHG emissions inventory addresses emissions from stationary as well as mobile sources (including commutes). The year 2014 is used as a baseline in the analysis. Emission trends are examined through a "business as usual" lens, as well as through an "emissions reduction strategies" lens. The business as usual lens provides a perspective on a future in which the College would experience increasing carbon emissions while the emissions reduction strategies lens provides a perspective on a future in which Mt. SAC's carbon footprint is reduced. By implementing Phase 1 emissions reduction measures by 2020, the College would potentially experience a 20 percent reduction in GHG emissions by 2025. By implementing Phase 2 emissions reduction measures starting in year 2025, the College would potentially experience a 50 percent reduction in GHG emissions by 2035. By implementing Phase 3 emissions reduction measures starting in 2035, the College would

potentially experience a 100 percent reduction in GHG emissions by 2050. GHG emissions and emissions reductions strategies are further described in Sections 5 through 9 of this plan.

OVERALL GHG EMISSIONS

This plan documents the emissions associated with campus operations from 2014 to 2016. The American Colleges and University Presidents' Climate Commitment (ACUPCC) delineated the scopes of emissions included in the inventory. Scope 1 includes direct emissions from owned or controlled sources, such as natural gas combusted on campus, campus fleet, agricultural sources, and refrigerants. Scope 2 includes electricity purchased for the campus from outside sources. Scope 3 includes solid waste as well as all student, faculty, and staff transportation. The majority of Mt. SAC's emissions are contributed by Scope 3, transportation. In 2016, the net greenhouse gas emissions totaled 63,778 metric tonnes of carbon dioxide equivalent (MTCO2e). Scope 1 accounted for 13,227 MTCO2e, Scope 2 accounted for 9,431 MTCo2e, and Scope 3 accounted for 41,220 MTCO2e. Scope 3, therefore, accounted for 61 percent of the total carbon emissions of the campus with 50 percent attributed to transportation alone.

DIRECT EMISSIONS AND PURCHASED ELECTRICITY EMISSIONS

Emissions have risen approximately 40 percent from 2015 to 2016 as the College's cogeneration system experienced failure issues during this time. The failure of the cogeneration system required the campus to purchase more electricity in lieu of on-site production. In addition, the College added roughly 78,379 Gross Square Feet (GSF) in several buildings (5 percent increase). Future new building projects will further increase the campus' GSF and therefore may impact corresponding purchased emissions. The campus has recently upgraded the main central plant and piping distribution system to account for future building loads. These upgrades include a new 840-ton electric centrifugal chiller and 20,000 ton-hour thermal energy storage (TES) tank. The system includes energy-efficient design to reduce the GHG emissions when compared to a traditional electric chilled water plant. Even so, emissions associated with this equipment are not yet captured, because the installation occurred in 2016 and 2017. The new equipment and increase in future building square footage will likely result in increased GHG emissions, unless renewable energy systems are installed for the campus. In 2016, direct emissions on campus (Scope 1) accounted for 18,366 MTCO2e, and purchased electricity (Scope 2) accounted for 11,193 MTCO2e. Section 6: *Purchased Electricity, Stationary Emissions, Building Practices, and Reduction Strategies* of this plan provides further details regarding these emissions and corresponding reduction strategies.

EMISSIONS FROM TRANSPORTATION

Transportation and vehicle emissions represent about half of Mt. SAC's greenhouse gas emissions. These mobile source emissions emanate primarily from employee and student commutes and the operation of campus fleet vehicles. A campus-wide transportation survey collected 2,000 responses from students, faculty, and staff regarding trip frequency, length, carpooling, and fuel economy. Section 7: Tr*ansportation, Commuting, Campus*

POLICY CONTEXT FOR SUSTAINABILITY PLANNING *(cont.)*

Fleet, and Travel of this plan provides further details regarding transportation emissions and corresponding reduction strategies.

EMISSIONS FROM WASTE

In 2016, waste accounted for 13 percent of the total emissions on Mt. SAC's campus, which is equivalent to 8,314 metric tons of annual waste. Per capita, this equates to 0.11 metric tons of solid waste per student, or 242 pounds of solid waste per Mt. SAC student. Section 8: *Solid Waste* of this plan provides further details regarding emissions resulting from solid waste and corresponding reduction strategies.

WATER, WASTEWATER, AND LANDSCAPING

The College's water use includes on-campus domestic uses, landscape irrigation, athletic field irrigation, pasture and range land irrigation, as well as wildlife sanctuary uses. In 2016, the College consumed roughly 104 million gallons of water. The majority of this water is assumed to be consumed by the College's extensive athletics fields, but water use is not metered by building and site, and is instead combined into one main utility reading. Therefore, it is challenging to estimate the amount of water consumed by each part of campus. Looking forward, the College will seek to meter water use at both the site level and the individual building level. The College does not currently practice on-site water reclamation to treat wastewater, but this strategy is being researched for potential future application. Section 9: *Water, Wastewater, and Sustainable Landscaping* of this plan provides further details regarding water, wastewater, landscaping consumption, and conservation strategies.

SECTION 1: EXECUTIVE SUMMARY

INSTITUTIONALIZING SUSTAINABILITY

The success of the *Climate Action Plan* depends upon the institutionalization of the implementation work into Mt. SAC's established organizational structure, planning, and operations. Section 4: *Institutionalization* describes the management and organizational structure necessary to support successful implementation of the CAP. This section also describes policies and procedures to consider for review or adoption. Staffing recommendations to support the necessary activities include both a Sustainability Director and a reassigned faculty position of Sustainability Coordinator. Further recommendations include having each unit/department assess their operations for sustainability, addressing funding considerations, and working with the Student Life Office. A key recommendation from this section calls for the establishment of a Sustainability Center to provide a physical home for these cross-campus academic and operational sustainability efforts. The Center would also work to nurture collaboration with the local community on sustainability activities.

CURRICULUM

Mt. SAC has a long history of educational programming devoted to a range of environmental issues. Faculty across campus are working to incorporate sustainability into their curriculum, as evidenced by initiatives articulated in the *2018 Educational and Facilities Master Plan*. To further the goal of incorporating sustainability into the educational experience of all students, the following recommendations are outlined in Section 11: *Curriculum, Professional Development, and Research* and *Appendix: Leaf Course Designation*.

- Establishing Leaf-designated classes that integrate sustainability into the curriculum, possibly incentivizing students to take Leaf-designated classes
- Developing educational experiences to provide new students an early introduction to sustainability at Mt. SAC
- Encouraging students to initiate their own sustainability-related education through choices of directed learning project topics
- Establishing a voluntary online sustainability pledge

To guide the implementation of these activities and to institutionalize the faculty leadership role, the Academic Senate passed a recommendation calling for the allocation of reassigned time for a faculty member to serve as Sustainability Coordinator. This coordinator will guide the Leaf-designation process, help build professional development in the area of sustainability, and support the implementation of other sustainability-related activities.

PROFESSIONAL DEVELOPMENT

Meeting the goals outlined in this *Climate Action Plan* will require changes across campus. Enacting these changes will require further training, education, and professional development across all units of campus. In general, professional development at Mt. SAC supports programs and services by providing professional learning opportunities for all employees. The desired

outcomes of the professional development components in the CAP are to support the implementation of the CAP and the campus' progress towards becoming both a sustainable and zero-emissions campus.

Professional development opportunities related to sustainability have been available for faculty over the past five years, including Flex Day presentations and support for attendance at State and national conferences. Sustainability has begun to be integrated into the New Faculty Seminar and the adjunct faculty online orientation. Even so, there is an ongoing need for additional professional development. This section of the CAP seeks to further prioritize and integrate sustainability into professional development by enhancing the breadth and depth of offerings to reflect the complexity of this plan. It also recommends that sustainability be included as a broad theme in the next campus Professional Development Plan.

This CAP calls for the dedication of resources to provide and support professional development, including the expansion of existing online resources for faculty, staff, managers, and students; continued offerings at Flex Days for faculty and classified staff; the development of an online POD certificate course for faculty on integrating sustainability into the curriculum; the development of sustainability-related Student Learning Outcomes; and ongoing support for conference and travel resources to support specialized professional development to enhance the sustainability literacy of faculty, staff, and managers. As mentioned above it is recognized that these professional development opportunities must be tailored to the diverse needs of classified staff, faculty, and managers. The plan calls for a collaborative approach to identifying the needs and developing the opportunities through work with the appropriate committees.

RESEARCH

Various groups at Mt. SAC have affirmed the important role of student research in higher education. For example, the Academic Senate passed Resolution 2015–04: Support of Undergraduate Research, calling for the establishment of an undergraduate research office and a faculty coordinator position to support student research activities.[6] Sustainability research goals include analyzing the resilience of social, human, natural, financial, and physical attributes of our campus and community; identifying economic and workforce needs as related to sustainability; seeking opportunities to partner on sustainable research initiatives; establishing a sustainability/climate center as a campus hub for presentation of research activities and informing the community on progress towards our climate goals; encouraging faculty to include sustainability in their sabbatical research; encouraging the use of sustainability issues in student research projects; involving students in research that aids our campus

[6] Rebecca Hatch and the Academic Senate Executive Board, "Resolution 2015 – 04 Support of Undergraduate Research," Academic Senate Resolutions, 2015, http://mtsac.edu/governance/academicsenate/resolutions/15-04%20Support%20of%20Undergraduate%20Research.pdf

INSTITUTIONALIZING SUSTAINABILITY *(cont.)*

sustainability efforts; enabling student participation in the installation of sustainability-related facilities projects on campus; having students perform energy audits of several of the older buildings on campus; and having each of our buildings used as learning/living laboratories, where students, staff, faculty, and community members may see the energy usage and savings taking place.

COMMUNITY OUTREACH

Second Nature's Climate Leadership Statement requires signatory colleges and universities to reach out to community residents and organizations to form partnerships related to climate change and sustainability. Mt. SAC is working with community members on projects related to sustainability through educational programs for students and the community, vocational training and research in support of green businesses and jobs, and partnerships with community organizations to undertake projects related to sustainability.

The creation of a Sustainability Center is recommended to serve as the physical space for bringing together the campus and community. Staffed by a Director of Sustainability and the necessary support staff, the Center will be responsible for helping to coordinate educational tours of the Wildlife Sanctuary, the Farm, campus LEED-certified buildings, drought tolerant landscaping, and other sustainability features on campus, as well as publicizing sustainability-related events such as Earth Day and Debbie Day to the community. Through the Sustainability Center, Mt. SAC will work to build stronger partnerships in the area of sustainability with other local colleges and universities, such as Cal Poly Pomona, as well as with municipal government and community organizations for the purpose of undertaking joint projects in the areas of climate change and sustainability.

The creation of a Sustainability Center on campus and the hiring of a full time Sustainability Director will provide an opportunity to build relationships with municipal government and community partners in the areas of green jobs, support for green businesses, and joint sustainability projects. By defining the Sustainability Director's duties to include sitting on community boards related to sustainability and meeting regularly with Sustainability Directors at other schools with an interest in partnering on sustainability projects, Mt. SAC might begin to develop a future institutional infrastructure that will enable it to play a more robust role in educating the broader community, building the green economy, and working on local sustainability projects with other community partners. By laying the foundation for this institutional infrastructure in the five year period after the completion of its first CAP, Mt. SAC can play the pivotal role in facilitating the transition to the just and sustainable society of the 21st century envisioned for higher education by Second Nature's Climate Leadership Statement.

Area of Sustainability	Established Goal
Greenhouse Gas Reduction	Reduce energy consumption from the 2014 baseline by 20 percent by the end of 2025, 50 percent by 2035, and 100 percent by 2050.
Green Building Standard	Design and construct all new major capital projects (10,000 square feet and above) such that they will outperform Title 24 Standards by at least 15 percent, and all major renovation projects will outperform Title 24 by at least 10 percent.
Water Use Reduction	Reduce water use per student from the 2014 baseline by 50 percent by 2030.
Waste Diversion and Management	Achieve Net-Zero Waste by 2050.
Institutionalization	Hire a full-time Sustainability Director by the end of 2018. Secure faculty release time for a Sustainability Coordinator starting Fall 2019. Establish a Sustainability Center by 2020.
Curriculum Integration	Build sustainability into the educational experience of 50 percent of students by 2025, and 100 percent of students by 2035.
Professional Development	Establish professional development in sustainability for all new faculty and adjunct instructors by 2020. Integrate sustainability into campus Professional Development Plan by 2020. Offer online Sustainability Certificate for faculty by 2020.
Research and Community Outreach	Publicize campus sustainability efforts to surrounding community annually, starting in 2019.

SECTION 2: BACKGROUND

SUSTAINABILITY EFFORTS TO DATE

Mt. SAC has demonstrated robust leadership in the area of sustainability, particularly over the course of the last four years. Moreover, the actions that have been taken by students, faculty, and the administration demonstrate the emergence of a vibrant sustainability community on campus, founded on a strong partnership among major campus stakeholders, that can be expected to support further innovation in the coming years. The emergence of this community has enabled Mt. SAC to take major strides in moving its facilities and campus operations in the direction of greater sustainability and to undertake major initiatives in the area of incorporating sustainability into the College's curriculum.

GRANTS AND AWARDS

Mt. SAC has received multiple grants and awards which have demonstrated the College's commitment to climate action and sustainability. These achievements have laid the groundwork and have provided momentum for the future success of Mt. SAC's sustainability efforts. These include the following.

- The U.S. Department of Labor awarded a $30,000 grant to fund Mt. SAC's innovative building automation system
- The Irwindale Chamber of Commerce honored Mt. SAC with its 2014 Water Preservation Award and its 2015 Energy Preservation Award
- The California Community Colleges Board of Governors honored Mt. SAC for its Central Plant and Thermal Energy Storage (TES) System, which is 20 percent more efficient than conventional systems
- In 2015, President Scroggins instituted the Mt. SAC President's Student Sustainability Awards[7]

[7] Sustainability Committee, *Mt. San Antonio College*, http://www.mtsac.edu/governance/committees/sustainability/sustcommittee.html

SECTION 2: BACKGROUND

CREATION OF THE CLIMATE ACTION PLAN

In August 2014 the President of Mt. San Antonio College, William T. Scroggins, signed the American College and University Presidents' Climate Commitment (ACUPCC). The name of the commitment has since changed, and Mt. SAC is now a signatory of the Carbon Commitment, which states that Mt. SAC will complete a comprehensive Climate Action Plan (CAP). The CAP must include a target date for achieving carbon neutrality, mechanisms for tracking progress, actions to make carbon neutrality and resilience a part of the educational experience of all students, actions to expand research in carbon neutrality and resilience, and initiatives to pursue partnerships with community members and organizations related to climate change and sustainability.

In order to develop a campus vision, goals, and objectives, and to write this *Climate Action Plan*, the campus established the Climate Commitment Implementation Committee (CCIC). This committee is further described in Section 4: *Institutionalization of this Plan*.

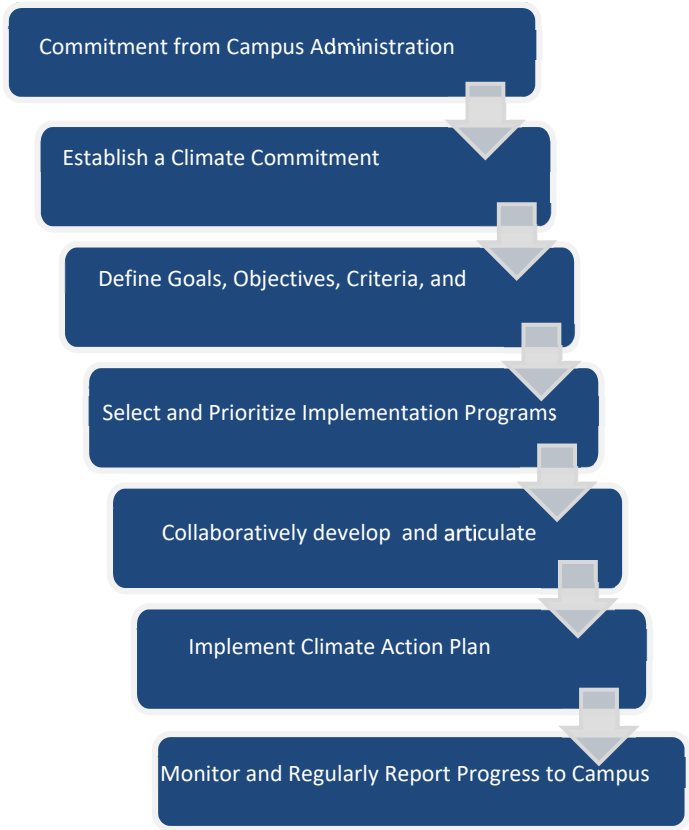


Image Credit: Climate Commitment Implementation Committee. 2017. Mt. San Antonio College.

SECTION 2: BACKGROUND

POLICY CONTEXT OF SUSTAINABILITY PLANNING

THE SCIENTIFIC CASE FOR CLIMATE CHANGE

Since the early 1960s when Charles David Keeling produced the first reliable measurements of the amount of carbon dioxide in the atmosphere and developed the Keeling curve charting the link between rising greenhouse gases and rising temperatures, the scientific consensus around climate science has become increasingly robust. By 1970, the year of the first Earth Day, the U.S. National Oceanic and Atmospheric Administration, the world's leading funder of climate research, was created. By 1979 a U.S. National Academy of Sciences report found it "highly credible" that doubling carbon dioxide (CO_2) will bring 1.5–4.5 degrees Celsius of global warming.[8]

An international scientific consensus developed in the 1980s, (after some debate about whether global temperatures had cooled during the 1960s and 1970s), that global temperatures began steadily rising again in the mid-1970s and that the 1980s contained the warmest three years during the 134 year period when global temperatures were being measured.[9] In 1986 and 1987 American climate scientist James Hansen testified before Congress, stating that he and his group of climate modelers could "confidently state that major greenhouse climate changes are a certainty." Hansen added that "the global warming predicted in the next 20 years will make the earth warmer than it has been in the last 100,000 years."[10]

In 1988 the International Panel on Climate Change (IPCC) was established. It would become the most authoritative international body assessing climate science. In 1990 the first IPCC assessment report stated that "the world has been warming and future warming seems likely."[11] In 1995 the second IPCC assessment report predicted a doubling of carbon dioxide in the Earth's atmosphere by the

KEY DATES

In 2014 the IPCC released its fifth assessment report, which asserted that the atmospheric concentration of key greenhouse gases is "unprecedented in at least the last 800,000 years," therefore, the evidence for global warming is "unequivocal" and it is "highly likely" that most of the warming observed in the last 50 years has been caused by human GHG emissions.

As a result of climate change, the IPCC predicts that "it is very likely that heat waves will occur with a higher frequency and longer duration" and extreme precipitation events "over most mid-latitude land masses and over wet tropical regions will very likely become more intense and more frequent."[11] Also many plant and animal species will be driven to extinction as they are unable to adapt to the changing climate or move fast enough.

[8] Spencer Weart, "The Discovery of Global Warming," American Institute of Physics, 2017, https://history.aip.org/climate/timeline.htm

[9] Weart, https://history.aip.org/climate/20ctrend.htm#LM017

[10] Weart, https://history.aip.org/climate/public2.htm#LM011

[11] Weart, https://history.aip.org/climate/timeline.htm

middle of the 21st century and a temperature increase of "1.5–4.5, and perhaps as much as 5.5," degrees Celsius by the end of the 21st century.[12]

In 2001 the IPCC issued its third assessment report which held that "the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations" and added that the rate of future warming is "very likely to be without precedent during at least the last 10,000 years." The third IPCC assessment report went on to predict warming by the end of the 21st century of between 1.4–5.8 degrees Celsius. This assessment report effectively ended debate about climate change among all but a few scientists. [13]

In 2007 the IPCC issued its fourth assessment report, which projected a likely temperature increase of three degrees Celsius by the end of the 21st century if greenhouse gas emissions were not substantially curtailed. The projected range of possible temperature increase was from 1.5 to over 6 degrees Celsius with devastating impacts on many animal and plant species, as well as human civilization at the higher end of that range. The report concluded that the costs of avoiding extreme climate change would be much less than the costs climate change would impose if allowed to proceed unchecked.[14]

The fifth IPCC assessment report predicted that if humanity continues on its current path and drives the level of carbon dioxide in the atmosphere to over 1000 parts per million (ppm) the planet will likely warm between 2.6-4.8 degrees Celsius or more by the end of the 21st century. Only if humanity holds carbon dioxide concentrations in the atmosphere to 430 to 480 ppm will it likely be able to limit global temperature increase to two degrees Celsius or less, which is the limit the IPCC has stated that humanity must not transgress if it wants to avoid climate-related feedbacks that will be difficult for civilization to adapt to.[15] In April of 2017 carbon dioxide concentrations in the atmosphere soared above 410 ppm for the first time in millions of years. With 1000 ppm or

KEY DATES

The International Energy Agency said that switching from fossil fuels to low-carbon sources of energy will cost $44 trillion between now and 2050.[15] The IEA predicts, however, that the cost of converting from fossil fuels to low carbon or no carbon fuels will be offset by the savings from energy conservation and not having to rely on fossil fuels.

Against these numbers must, of course, be weighed the cost of doing nothing. The IPCC's fifth assessment report estimated that an increase in temperatures.

[12] Weart, https://history.aip.org/climate/internat.htm#LM063

[13] Weart, https://history.aip.org/climate/internat.htm#LM072

[14] Weart, https://history.aip.org/climate/internat.htm#LM084

[15] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

POLICY CONTEXT OF SUSTAINABILITY PLANNING *(cont.)*

more of carbon dioxide in the atmosphere the IPCC predicts that the Greenland and Antarctic ice sheets will decrease by 35 percent to 85 percent and global mean sea level will rise by as much as 0.82 meters by the end of the century. If humanity limits atmospheric concentrations to no more than 480 ppm, however, sea levels are not likely to rise by more than 0.55 meters by the end of the century.[16] Under the IPCC's best case scenario ocean acidification will likely increase by 15–17 percent by the end of the century, while under the worst case scenario acidification will increase by 100–109 percent, devastating coral reefs and many species of marine life.

Marine life will be impacted by ocean acidification while the "progressive expansion of Oxygen Minimum Zones and anoxic 'dead zones' in the oceans will further constrain fish habitats."[17] The IPCC observes that the social impacts of climate change are likely to be no less devastating. The fifth assessment report states that "climate change impacts are projected to slow down economic growth, make poverty reduction more difficult, further erode food security and... exacerbate poverty in most developing countries and create new poverty pockets in countries with increasing inequality, in both developed and developing countries."[18] Partly as a result, "Climate change can indirectly increase risks of violent conflict by amplifying well-documented drivers of these conflicts, such as poverty and economic shocks."[19]

In its fifth assessment report the IPCC predicted that stabilizing greenhouse gas emissions at a level low enough to keep global temperatures from rising above two degrees Celsius would cost about $13 trillion through 2030.[20] The International Energy Agency (IEA) has said that switching from fossil fuels to low-carbon sources of energy will cost $44 trillion between now and 2050.[21] The IEA predicts, however, that the cost of converting from fossil fuels to low-carbon or no carbon fuels will be offset by the savings from energy conservation and not having to rely on fossil fuels.[22]

The IPCC also predicted in its fifth assessment report that reducing emissions will reduce the rate of global economic growth due primarily to rising energy prices, though growth will, on average,

KEY DATES

According to the Los Angeles Times, between 1998 and 2005 Exxon provided between $16 million and $30 million (estimates from the Union of Concerned Scientists and Greenpeace vary) in funding for at least 43 climate skeptic organizations such as the Heartland Institute and the Global Climate Coalition.

[16] IPCC.
[17] IPCC, p. 67.
[18] IPCC, p. 73.
[19] IPCC.
[20] Kevin Bullis, "How Much Will it Cost to Solve Climate Change," *MIT Technology Review*, May 15, 2014.
[21] Bullis.
[22] Bullis.

be reduced by less than a tenth of a percentage point per year between 2014 and 2100.[23] The IPCC cautioned, however, that the longer humanity postpones the investments needed to curb and reduce greenhouse gas emissions the higher the price tag is likely to climb. For example, in 2012 the International Energy Agency estimated that it would only cost the world $36 trillion to transition to low-carbon energy, which was $8 trillion less than the 2014 estimate of $44 trillion.[24]

The Fourth National Climate Assessment produced by 13 U.S. federal agencies released in November 2017 underscores the IPCC's assessment of the costs of climate change since it estimates that climate change-related weather catastrophes "have cost the United States $1.1 trillion since 1980."[25] An econometric study led by two UC Berkeley scholars provides a more detailed analysis of costs in the United States. It found that for each one degree Fahrenheit increase in temperature, "the U.S. economy stands to lose about 0.7 percent of its Gross Domestic Product, with each degree of warming costing more than the last." Furthermore, these economic impacts will not be distributed evenly, with the least affluent third of counties in the United States losing between 2.0 percent and 19.6 percent of their incomes while regions such as New England and the Pacific Northwest are likely to become more prosperous overall.[26]

THE PUBLIC DEBATE OVER CLIMATE CHANGE

As Naomi Oreskes and Erik M. Conway have documented in their book *Merchants of Doubt*, rather than adapting to the reality of climate change by developing new forms of energy, the fossil fuel industry elected to invest its resources in funding pseudo-science aimed at discrediting legitimate climate science of the sort that informed IPCC assessment reports. In this respect, Oreskes and Conway observe, its behavior was similar to the tobacco industry's response to science which established an empirical link between cigarette smoking and negative health effects ranging from heart disease to cancers and respiratory illnesses. In fact, they document that many of the same scientists and professional contrarians who were involved in defending the tobacco industry have also been involved in the effort to promote doubt about climate science.[27]

A series of articles published in the *Los Angeles Times* in late 2015 documented that Exxon knew that human generated greenhouse gas emissions, particularly carbon dioxide, were likely driving climate change and would have increasing effects in the future as soon as the early 1980s. According to the *Times*, Duane Lavine, Exxon's manager of science and strategy development gave a briefing to the company's board of directors in 1989, that acknowledged the scientific consensus that carbon dioxide emissions from burning fossil

[23] Bullis.
[24] Bullis.
[25] https://nca2014.globalchange.gov/downloads
[26] Solomon Hsiang, Robert Kopp, Amir Jina, et. al., "Estimating Economic Damage from Climate Change in the United States," *Science*, June, 2017.
[27] Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. (New York: Bloomsbury Press, 2011)

POLICY CONTEXT OF SUSTAINABILITY PLANNING *(cont.)*

fuels could raise global temperatures "between 2.7 and 8.1 degrees Fahrenheit" by the middle of the 21st century.[28] Exxon confirmed the accuracy of academic and government sponsored climate science by funding its own scientific research on climate change, but chose to cover up findings by government scientists as well as its own scientists by investing in the pseudo-science chronicled by Oreskes and Conway. Partly in response to the reporting on the issue by the *Los Angeles Times* and *Inside Climate News* State Attorneys General Eric Schneiderman of New York and Maura Healey of Massachusetts launched investigations of Exxon's funding of contrarian climate science. At issue is whether or not Exxon's funding of this pseudo-science, when its own internal records indicate it was convinced of the reality of climate science, constitute "a form of fraud against its shareholders and the public."[29] In January of 2018 New York Mayor Bill De Blasio announced that New York City will divest the $5 billion invested in fossil fuel companies from its $189 billion public pension funds. New York State is also reportedly planning to divest fossil fuel holdings from its public pension funds. To date, countries, states, cities, universities, corporations, and nonprofits have announced plans to divest over $6 trillion in assets from fossil fuel companies. De Blasio also announced that New York City will be suing BP, Exxon Mobil, Chevron, Conoco Phillips, and Shell due to their contributions to climate change and their role in covering it up.[30] San Francisco and Oakland announced similar lawsuits against the same five companies in December of 2017.[31]

THE POLITICS OF CLIMATE CHANGE AND INTERNATIONAL AND U.S. CLIMATE POLICIES

George H.W. Bush signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. This first UNFCCC treaty, which included voluntary agreements to limit greenhouse gas emissions by signatories, was then submitted to the U.S. Senate for ratification. The Senate ratified the treaty, which included only voluntary agreements on greenhouse gas emissions, and it went into effect.

The Clinton Administration subsequently pledged the United States to abide by the requirements of the Kyoto Protocol in 1997, which included mandatory limits on greenhouse gas emissions for developed countries, but not for developing

[28] "How Exxon Went From Leader to Skeptic on Climate Change Research," *Los Angeles Times*, October 23, 2015.
[29] "In Setback for Exxon, Texas Judge Kicks Climate Change Case to New York," *Inside Climate News*, March 30, 2017.
[30] Oliver Milman, "New York City plans to divest $5bn from fossil fuels and sue oil companies." *The Guardian*, 10 Jan 2018, Web, https://www.theguardian.com/us-news/2018/jan/10/new-york-city-plans-to-divest-5bn-from-fossil-fuels-and-sue-oil-companies
[31] Timothy Cama, "San Francisco, Oakland sue oil companies over climate change," *The Hill*, 20 Sept 2017, http://thehill.com/policy/energy-environment/351603-san-francisco-oakland-sue-oil-companies-over-climate-change

countries such as China and India. The rationale for this two-tiered structure was the argument made by developing countries that they were responsible historically for a much lower percentage of the carbon dioxide in the atmosphere than developed countries and also that they were responsible for less carbon dioxide emissions on a per capita basis. Furthermore, they argued that because they are poorer than developed countries they have less ability to pay the costs of greenhouse gas mitigation. Significantly, the Clinton Administration never submitted the Kyoto treaty to the U.S. Senate for ratification. This was largely because the Senate had overwhelmingly passed a resolution prior to the Kyoto conference asserting that the United States should not be a party to any treaty that did not include strict greenhouse gas emissions limits on developing countries as well as developed countries or any treaty which "would result in serious harm to the economy of the United States."[32] In his campaign for the Presidency George W. Bush pledged to cap carbon dioxide emissions and require power plants to reduce greenhouse gas emissions. Once elected Bush appointed Christine Todd Whitman as head of the Environmental Protection Agency. Whitman subsequently affirmed at a meeting on climate change in Italy, that the Bush Administration was planning to cap greenhouse gas emissions and she subsequently reiterated this position on a CNN talk show.[33] When Republican senators sent Bush a letter asking if he intended to place a cap on carbon emissions, however, he reversed the position he took during the campaign and said he would not place a cap on carbon dioxide emissions.[34] In 2001 the Bush Administration formally announced that the United States would not implement the Kyoto Protocol.

Subsequently, in their campaigns for the presidency both Barack Obama and John McCain acknowledged the veracity of climate science and proposed policies to address climate change. After the election, the Obama Administration provided $90 billion as part of its 2009 economic stimulus for investment in renewable energy and "green industries," such as Tesla Motors. Obama later announced the Clean Power Plan, committing

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The fact is that, according to Next Ten's 2017 "California Green Innovation Index," from 2006 when AB 32 was enacted to 2015 California enjoyed GDP per capita growth of almost $5,000 per person, nearly twice the growth experienced by the national economy . During the same period per capita greenhouse gas emissions in California decreased by 12 percent.

Against these numbers must, of course, be weighed the cost of doing nothing. The IPCC's Fifth Assessment report estimated that an increase in temperatures of 2 degrees Celsius would result in a reduction of gross national incomes of between 0.2 and 2 percent.

[32] The Byrd-Hagel Resolution, July 25, 1997, https://www.nationalcenter.org/KyotoSenate.html
[33] A.C. Thompson, "Timeline: The Science and Politics of Global Warming." PBS Frontline, 24 April 2007, http://www.pbs.org/wgbh/pages/frontline/hotpolitics/etc/cron.html
[34] A.C. Thompson.

POLICY CONTEXT OF SUSTAINABILITY PLANNING *(cont.)*

the United States to a 30 percent reduction in greenhouse gas emissions in the power sector of its economy by 2030. As part of its *Presidential Climate Action Plan* the Obama Administration also committed the United States to reducing greenhouse gas emissions 17 percent below 2005 levels by 2020. To achieve this goal it called for the United States to install 100 megawatts of renewable energy in federally subsidized housing units by 2020, permit ten gigawatts of renewable energy projects on public land by 2020, deploy three gigawatts of renewable energy on military installations by 2025, and double wind and solar energy generation in the United States by 2015. The Obama Administration also proposed average fuel economy standards for passenger vehicles of 54.5 miles per gallon by 2025.[35]

Most significantly, on the basis of these commitments President Obama negotiated a bilateral deal with China to reduce greenhouse gas emissions. This bilateral deal removed a long standing obstacle to the development of a global deal at the UNFCCC Conference of Parties (COP) 21 in Paris in December of 2015 (Paris Climate Agreement). This obstacle concerned the disagreement between developed and developing countries over how the costs of addressing climate change would be apportioned that dated back to the Rio Summit in 1992, as discussed previously.

Donald Trump tweeted in 2012, "the concept of Global Warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive."[36] In other tweets Trump referred to climate change as a "hoax."[37] Subsequently in a September 27, 2016 interview with CNN, Trump campaign manager Kellyanne Conway explained that President Trump believed that climate change is happening, but is "naturally occurring."[38] In 2017, when he announced that he would withdraw the United States from the *COP 21 Paris Agreement on Climate Change*, President Trump cited research from the conservative think tank

KEY DATES

From 2010 to 2015 solar installations in the Golden State increased 1,783.3 percent due to State policies and there was a 48 percent reduction in the cost of solar PV systems between 2010 and 2014.

Additionally, California accounts for 50 percent of all zero emissions vehicle sales in the United States, while around the world sales of electric cars has risen tenfold. Driving the spike in sales is the fact that the cost of a battery used in an electric car has dropped by half in the last five years and is expected to drop by half again in the next five years without any redical technological breakthroughs.

[35] Obama Administration White House Archives, "Climate Change," 2015, https://obamawhitehouse.archives.gov/energy/climate-change

[36] @realDonaldTrump, "The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive." *Twitter*, 6 Nov. 2012, Tweet, 11:15 a.m., https://twitter.com/realdonaldtrump/status/265895292191248385?lang=en

[37] Snopes, "Did Donald Trump Claim Global Warming is a Hoax?" 31 May 2017, http://www.snopes.com/donald-trump-global-warming-hoax/

[38] Snopes.

National Economic Research Associates claiming that complying with the terms of the Paris climate agreement would cost the United States as much as $3 trillion in lost GDP and 6.5 million industrial jobs by 2040.[39] (Withdrawal from COP 21 will not formally happen until 2020). Soon after, the Trump Administration announced its intention to repeal the Obama Administration's Clean Power Plan. These statements and actions drive home an important point about the American party system made by Jonathan Chait in a 2015 New York Magazine article: "Of all the major conservative parties in the democratic world, the Republican Party stands alone in its denial of the legitimacy of climate science."[40]

CALIFORNIA CLIMATE POLICIES

In the absence of significant action by the federal government to effectively address the threat of climate change, California State government has passed a series of laws designed to comprehensively reduce greenhouse gas emissions in the State and transition it to a clean energy economy. Executive Order 5-3-05 and Assembly Bill 32 set a goal of reducing net greenhouse gas emissions in California to 1990 levels by 2020 and cutting net greenhouse gas emissions 80 percent below 1990 levels by 2050. To achieve the 2020 targets there is a goal of achieving reductions of 15 percent in the building sector of the State's economy, 15 percent in the energy production sector, and 33 percent in the transportation sector. The remaining reductions are supposed to come from a cap and trade system involving the sale of emissions permits to large industries in the State and use of the revenue raised from the sale of the permits to fund investments in measures designed to achieve further reductions in greenhouse gas emissions, as well as the planting of forests.[41] Significantly, Assembly Bill 398, which was passed in 2017, continued California's cap and trade program until 2030. It was passed by a two-thirds bipartisan vote in the State Assembly and the Senate, protecting it from legal challenges for the foreseeable future.

Executive Order 13-30-15 and Senate Bill 350 were intended to augment Executive Order 5-3-05 and Assembly Bill 32 by setting interim targets for greenhouse gas reductions between 2020 and 2050. They require a 40 percent reduction of greenhouse gas emissions below 1990 levels by 2030. In addition, SB 350 raises the California renewable portfolio standard to 50 percent and creates a regulatory mandate that all houses, businesses, and factories must be 50 percent more energy efficient by 2030.

During the negotiations that led to the Paris Climate Agreement, California Governor Jerry Brown also promoted the Under2 MOU (Memorandum of Understanding). This agreement

[39] Donald Trump, "Statement by President Trump on the Paris Climate Accord." *The White House*, The United States Government, 1 Jun 2017, Web, https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/

[40] Jonathan Chait, "Why Are Republicans the Only Climate-Science-Denying Party in the World?" New York Magazine, 27 Sept. 2015.

[41] Klein, Larry, *The Big Energy Gamble*, Nova: WGBH Educational Foundation, 20 Jan. 2009, http://www.pbs.org/wgbh/nova/tech/big-energy-gamble.html

POLICY CONTEXT OF SUSTAINABILITY PLANNING *(cont.)*

involves a voluntary pledge by regional and local government signatories to achieve 85–95 percent reductions in greenhouse gas emissions below 1990 levels by 2050. As of July 2017 there were 176 regional and local government signatories to the agreement.[42]

The California Air Resources Board (ARB) adopted the California Advanced Clean Cars Program in 2012. The Clean Cars Program requires automobile manufacturers to produce an increasing number of zero-emissions vehicles (ZEVs) so that 1.5 million ZEVs (or 15.4 percent of all new cars sold in California) will be on the road by 2025. Section 177 of the Advanced Clean Cars Program also allows other states to adopt California's automotive emissions standards.[43] Pursuant to the passage of Senate Bill 605 and Senate Bill 1383, the California Air Resources Board developed a Short-Lived Climate Pollutant (SLCP) Reduction Plan which sets a goal of reducing methane emissions and hydrofluorocarbons 40 percent below 2013 levels by 2030 and reducing anthropogenic black carbon 50 percent below 2013 levels by 2030. Since the California Air Resources Board estimates that these Short-Lived Climate Pollutants are responsible for 40 percent of current net climate forcing, it labels them "super pollutants" and places a high priority on achieving immediate reductions. Since more than half of California's methane is emitted by the dairy and livestock industries, the State aims to reduce emissions from dairy manure by 75 percent by 2030 via an investment of $100 million for waste diversion and $35 million for dairy digester development to produce biofuel. Furthermore, Assembly Bill 1613 and Senate Bill 859 specify a spending plan for cap and trade revenues which provides $5 million for black carbon wood smoke reductions and $7.5 million for the State's Healthy Soils Program.[44]

ECONOMIC IMPACTS OF CALIFORNIA'S CLIMATE CHANGE POLICIES

According to Naomi Oreskes and Erik M. Conway, one of the pivotal arguments which the fossil fuel industry was advised to make by Exxon Manager of Science and Strategy Development Duane Lavine as well as leaders at organizations such as the Heartland Institute and the Global Climate Coalition was that a hasty imposition of climate legislation to reduce greenhouse gas emissions would burden consumers and businesses with rising costs. In fact, they argued that rising costs associated with taxing fossil fuels and energy would threaten the health of the U.S. economy itself. Similarly there were politicians and economists in California who predicted a mass exodus of manufacturing businesses from the State due to rising energy costs precipitated by its landmark climate legislation, the Global Warming Solutions Act.[45] Because the California Assembly passed AB 32, the Global Warming Solutions Act,

[42] Under 2°, "Our Members," 22 July 2017, https://www.under2coalition.org/members
[43] Governor's Interagency Working Group on Zero-Emissions Vehicles, *2016 ZEV Action Plan*, Oct. 2016, https://www.gov.ca.gov/wp-content/uploads/2017/09/2016_ZEV_Action_Plan.pdf
[44] California Environmental Protection Agency: Air Resources Board, *Short-Lived Climate Pollution Reduction Strategy*, November, 2016, https://www.arb.ca.gov/cc/shortlived/meetings/11282016/revisedproposedslcp.pdf
[45] Larry Klein, *The Big Energy Gamble*, Nova: WGBH Educational Foundation, 20 Jan. 2009, http://www.pbs.org/wgbh/nova/tech/big-energy-gamble.html

in 2006 California has now had about a decade of experience with the cap and trade policies that are integral to it, therefore, it serves as a good laboratory for assessing the economic impacts of climate change policies. The fact is that, according to Next Ten's 2017 "California Green Innovation Index," from 2006 when AB 32 was enacted to 2015 California enjoyed GDP per capita growth of almost $5,000 per person, nearly twice the growth experienced by the national economy. During the same period per capita greenhouse gas emissions in California decreased by 12 percent.[46]

Additionally, from 2012 through 2016, "California averaged 2.7 percent job growth per year, compared to 1.8 percent nationwide."[47] Finally, California's cost of electricity was 1.63 percent of GDP in 2015, the second lowest in the United States and much lower than its 1990 cost of electricity, which was 2.4 percent of GDP.[48] Partly as a result, "California had among the lowest inflation-adjusted average electricity bills in 2015 for the residential and industrial sectors." To date these savings have mostly come from California's ability to conserve energy rather than from lower energy costs; however, as the costs of renewable energy continue to fall relative to the costs of fossil fuels and nuclear energy there are good reasons to believe that this trend will continue.[49]

There continue to be critics who warn that, despite the fact that AB 32 has not yet resulted in the loss of significant numbers of jobs and businesses to states with less regulation and lower energy costs, more recent legislation that substantially ratchets up the State's greenhouse gas emissions reduction requirements will surely have that effect.[50] The flip side of this pessimistic view, however, is the perspective of those such as former governor Arnold Schwarzenegger, who maintain that investments in clean technology and clean industry in the Golden State could emerge as significant new centers of growth. While it is too early to know for certain if the ambition of California's climate policies is exceeding the ability of its economy to adapt, there is clear evidence that California has established itself as a leader in pioneering green industries, which are likely to become major areas of growth in the 21st century. As a result of this explosive growth, while there are roughly 2.5 jobs in renewable energy generation for each job in fossil fuel generation in the United

KEY DATES

A recent study by ICF International for NextGen Climate America concluded that deep decarbonization of the U.S. economy could add more than 1 million jobs by 2030 and up to 2 million jobs by 2050.

[46] Christopher Thornberg, Adam Fowler, and Hoyu Chong, "2017 California Green Innovation Index," 9th ed., Beacon Economics for Next Ten, 2017, p. 40.
[47] Thronberg, Fowler, and Chong, p. 41.
[48] Thronberg, Fowler, and Chong, p. 32.
[49] Thronberg, Fowler, and Chong, p. 33.
[50] Gabriel Kahn, "Dreamers of the Golden Dream," Mother Jones, March/April 2016, pp. 42-43.

POLICY CONTEXT OF SUSTAINABILITY PLANNING *(cont.)*

States as a whole, in California there are 8.5 jobs in renewable energy generation for each job in fossil fuel generation.[51]

Additionally, California accounts for 50 percent of all zero emissions vehicle (ZEV) sales in the United States, while around the world sales of electric cars has risen tenfold. Driving the spike in sales is the fact that the cost of a battery used in an electric car has dropped by half in the last five years and is expected to drop by half again in the next five years without any radical technological breakthroughs.[52] This means, according to industry analysts, that electric cars will likely be broadly competitive with fossil fuel powered cars by 2025. In fact, Tesla CEO Elon Musk's unveiling in November of 2017 of an EV semi truck that he claims will have a range of 500 miles per charge and a second-generation roadster with a range of 620 miles makes these projections by industry analysts seem excessively conservative.[53] (Musk has said that the semi truck will be available for purchase by 2019 and the roadster will be available by 2020.) Furthermore, Electrify America, a Volkswagen subsidiary, has earmarked $800 million for installing high capacity 350 kilowatt electric vehicle charging stations (EVCS) throughout California (as a result of its settlement of the case against the company involving the illegal installation of software on its vehicles designed to create the appearance of lower smog emissions than were actually being discharged) that will slash the time it takes to fully charge an EV from 4–12 hours down to 10–15 minutes, depending on the vehicle's range.[54] Taken together these developments promise to dramatically accelerate the shift away from fossil fuel powered transportation.

Looking at investment in the green economy, all told California had 5,119 clean technology patents in 2016, while the rest of the United States together had 18,839. California clean tech companies alone received more than two-thirds of total U.S. venture capital investment in 2016.[55] The rapid growth of California's clean energy and green technology sectors helps to explain why a study by ICF International for Next Gen Climate showed the transition away from fossil fuels could add "up to 1 million net jobs by 2030" and as many as 2 million

[51] Christopher Thornberg, Adam Fowler, and Hoyu Chong, "2017 California Green Innovation Index," 9th ed., Beacon Economics for Next Ten, 2017, p. 42.
[52] Charles Ferguson, director, *Time to Choose*, Abramorama, 2016.
[53] Zac Estrada, Everything we learned from the Tesla Semi and Roadster event," *The Verge*, 17 Nov 2017, https://www.theverge.com/2017/11/17/16655800/tesla-electric-semi-truck-roadster-recap-elon-musk
[54] Eric Taub, "For Electric Car Owners, 'Range Anxiety' Gives Way to 'Charging Time Trauma,'" *The New York Times*, 5 Oct. 2017, https://www.nytimes.com/2017/10/05/automobiles/wheels/electric-cars-charging.html
[55] Christopher Thornberg, Adam Fowler, and Hoyu Chong, "2017 California Green Innovation Index," 9th ed., Beacon Economics for Next Ten, 2017, pp. 46-50.

net new jobs by 2050 if greenhouse gas emissions are reduced by 80 percent.[56] It is worth noting that this is almost the polar opposite of the findings of the National Economic Research Associates study cited by President Trump. While both studies may be seen as politically motivated to some extent, a new study from the International Renewable Energy Agency says that "wind and solar power will be on par with—or even cheaper than—the cost of fossil fuel-generated electricity by 2020," lending credibility to the ICF International study.[57]

CLIMATE POLICIES OF CALIFORNIA COLLEGES AND UNIVERSITIES

Consistent with the commitments California State government is making, its institutions of higher education are taking the lead in addressing the challenge of climate change and preparing students for the opportunities presented by the emergence of green industries. The University of California (UC) system has committed to reducing greenhouse gas emissions to 1990 levels by 2020 and in 2014 UC system President Janet Napolitano committed the UC campuses to a goal of achieving carbon neutrality by 2025.[58]

The California State University (CSU) system has committed to reducing greenhouse gas emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2040.[59]

While the California Community College (CCC) system has not made a similar commitment related to GHG emissions, it has made commitments in the areas of energy conservation and water conservation that bear directly on GHG emissions and climate resilience. In 2006 the California Community College/Investor-Owned Utilities Institutional Partnership (CCC/IOU) was created to encourage best practices and to promote energy efficient technologies.[60]

The CCC Board of Governors approved an Energy and Sustainability Policy in 2008 that provides goals and guidance to community college districts for energy conservation, sustainable building practices, and physical plant management to maximize reductions in energy consumption. This policy tasks community college districts with reducing energy consumption by a minimum of 15 percent and outperforming statewide

[56] Kent Hoover, "1 Million Jobs Could be Created by Cutting Carbon Emissions, Tom Steyer Says," *The Business Journals*, 9 Nov 2015, https://www.bizjournals.com/bizjournals/washingtonbureau/2015/11/1-million-jobs-could-be-created-by-cutting-carbon.html

[57] Dominic Dudley, "Renewable energy will be consistently cheaper than fossil fuels by 2020, report claims," *Forbes*, 13 Jan 2018, https://www.forbes.com/sites/dominicdudley/2018/01/13/renewable-energy-cost-effective-fossil-fuels-2020/#2403cd524ff2

[58] UC Office of the President, "UC Announces New Approaches to Combat Climate Change," *University of California: Press Room*, 10 Sept 2014, https://www.universityofcalifornia.edu/press-room/uc-combat-climate-change

[59] The California State University, *Sustainability Report 2014*, http://www.calstate.edu/cpdc/sustainability/policies-reports/documents/csusustainabilityreport2014.pdf

[60] California Community Colleges Investor Owned Utilities (CCC/IOU) Statewide Energy Efficiency Partnership Program, 2016, http://cccutilitypartnership.com/

POLICY CONTEXT OF SUSTAINABILITY PLANNING *(cont.)*

energy standards on construction projects, and it encourages districts to develop strategies for energy procurement and production that reduce capacity loads on the State's electricity grid. To aid in meeting these goals, the California Community College Chancellor's Office (CCCCO) provides incentives of 2–3 percent of construction costs to districts whose State-funded construction projects outperform Title 24 Energy Standards by 10 percent for modernization and 15 percent for new construction projects.[61]

In addition, the California Clean Energy Jobs Act (Proposition 39) has provided funding for community college districts to implement 525 energy projects to date across the State that provide for cost savings and energy savings while creating "green" jobs that allow on-the-job training to prepare a workforce with much needed skills and technology. The California Clean Energy Jobs Act (Proposition 39-SB 73, de Leon) allocated revenue to California's General Fund and the Clean Energy Job Creation Fund, for five fiscal years beginning in fiscal year 2013–14. Under the initiative, funds are available annually for appropriation by the Legislature for eligible projects to improve energy efficiency and expand clean energy generation in schools.[62]

Proposition 39 funds have also been used for workforce development.[63] The Workforce and Economic Development Division of the California Community Colleges Chancellor's Office is committed to incentivizing the development of educational and apprenticeship or training programs in the State's 114 colleges. Through grant funding, the plan's key elements are the following.

- Smart Growth
- Adaptation to fast-changing and existing environmental challenges
- Sustainable development, including resource efficiency (energy, water, and renewables)

Mt. SAC received a grant for a Heating, Ventilating, and Air-Conditioning (HVAC) collaborative involving industry, community colleges and other community based organizations which aims to bridge the gap between workforce supply and demand across Los Angeles, Orange, Riverside, and San Bernardino Counties.

At the request of the Chancellor's Office, the 2015–16 Budget Act included a provision in the Physical Plant and Instructional Support item allowing districts to go beyond scheduled maintenance and instructional equipment to fund water conservation projects. The types of water conservation projects eligible for funding include the following.

[61] California Community Colleges Board of Governors Energy and Sustainability Policy, Jan 2008, http://extranet.cccco.edu/Portals/1/CFFP/Sustainability/BOG_Energy_Sustainability_Policy_FINAL.pdf
[62] California Energy Commission, *The California Clean Energy Jobs Act*, State of California, http://www.energy.ca.gov/efficiency/proposition39/
[63] California Department of Education, *California Clean Energy Jobs Act (Proposition 39)*, 2018, https://www.cde.ca.gov/ls/fa/ce/

- Replacement of water intensive landscaping with drought tolerant landscaping, synthetic turf in non-athletic areas, and other non-plant materials
- Drip or low-flow irrigation systems
- Building improvements to reduce water usage
- Installation of meters for wells to allow for monitoring of water usage[64]

In addition to securing the districts' ability to fund water conservation projects with local assistance funding, the Chancellor's Office has worked closely with the Division of the State Architect (DSA) on landscaping and irrigation measures that will result in long-term reductions in water usage on community college campuses. The Division of the State Architect adopted emergency regulations in June 2015 and additional regulations in July, pertaining to requirements for landscaping and irrigation in order to generate long-term water savings. The regulations became effective January 1, 2016. They required districts constructing new buildings or additions on community college campuses to replace existing landscaping, equal to 75 percent of the square footage of the building's footprint, with water conserving landscaping and/or the installation of water meters and other water conservation measures. The regulations will be applicable to both State and locally funded capital outlay projects.[65]

The Board of Governors, through the Chancellor's Office states that it is committed to an environmentally sustainable future and promotes the implementation of energy and resource conservation efforts throughout the CCC system. By helping colleges carry out energy and water conservation efforts, the community college system has put in place several programs that support energy and water savings. Moving forward, the Chancellor's Office states that it will continue in these efforts and continue to implement new ideas and strategies and adopt new technologies as resources become available to promote a more sustainable future for California and its students.[66]

CALIFORNIA STATE CLIMATE REGULATIONS

See Appendix on "California State Climate Regulations."

[64] Susan C. Yeager, *Memorandum*, California Community Colleges Chancellor's Office, 2 July 2015, http://extranet.cccco.edu/Portals/1/CFFP/Fiscal_Services/Budget_Workshop/2015/1516PPISCert.pdf
[65] Division of the State Architect, *Procedure: Compliance with CALGreen Code, Outdoor Water Use Regulations. 15-03*, revised 28 July 2017, https://www.documents.dgs.ca.gov/dsa/pubs/PR_15-03.pdf
[66] California Community Colleges Board of Governors Energy and Sustainability Policy, Jan 2008, http://extranet.cccco.edu/Portals/1/CFFP/Sustainability/BOG_Energy_Sustainability_Policy_FINAL.p

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE

Mt. SAC's commitment to "sustain and improve the institution and the environment" is articulated in its Core Values. The findings of the environmental analysis are intended to inform the selection of sustainable strategies by Mt. SAC. The environmental data used within the analysis reflects campus conditions characteristic of the region in which Mt. SAC resides. Historical weather data has been collected over a number of decades and then assimilated into a database known as a weather station. The resulting environmental analysis of the data was then developed with the input of many stakeholders and its findings were discussed with interested faculty, staff, and students. Furthermore, this same information was included in Chapter 8: *Environmental Analysis* of the *2018 Educational and Facilities Master Plan* (EFMP) and both informed EFMP discussions and influenced the scope of recommended projects.

An important first step toward planning responsively and sustainably is understanding the climate conditions that exist on Mt. SAC's campus. Constructing outdoor spaces and buildings to work in harmony with environmental factors, such as wind and solar exposure, can simplify the effort and reduce the resources needed to maintain a comfortable and welcoming campus for students and employees.

CLIMATIC PROFILE

Mt. SAC's campus is in California Climate Zone 9, situated in the Pomona-Walnut Valley, one of southern California's inland valleys. The terrain is hilly and climate conditions are influenced by the occurance of thermal belts. Hilltops and valley bottoms are colder in the winter and warmer in the summer than the slopes and hillsides from which cold air drains and warm air rises. The ocean's moderating influence is not as strongly felt as it is on the coastal plains to the southwest. The temperature range over the year is more extreme, with hotter summers and colder winters. Days are mostly clear and sunny. Most of the rain falls during winter and early spring in infrequent but high-magnitude storm events that have the potential to erode soils and overwhelm stormwater infrastructure.

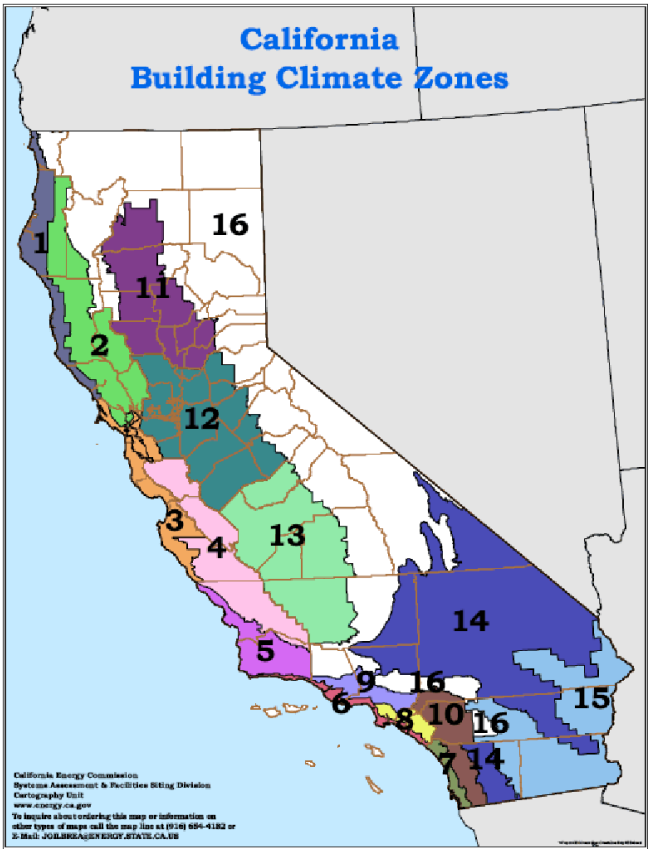


Image Credit: "Energy Maps of California." Accessed 11 March 2019. California Energy Commission. www.energy.ca.gov/maps/renewable/building_climate_zones.html.

SECTION 3: CAMPUS CLIMATE CONDITIONS

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

CLIMATE ANALYSIS METHODOLOGY

This analysis uses weather data from the Chino Airport Weather Station, which, although located in Climate Zone 10, is the nearest weather station and experiences the most climatically similar conditions to Mt. SAC's campus. Weather data was imported into Climate Consultant Version 6.2 software and graphed within a series of charts, shown throughout this section.

Data from the past 20 years has been collected by these weather stations and provides a solid foundation for understanding climatic trends in the area. Anomalies in weather patterns however are not captured by this historical data. In order to reflect these unique conditions, the College's on-campus weather station could be used as a supplement. The College's weather station is currently located near the campus soccer fields. A 12-month recording of data points would need to be retrieved from the existing on-campus weather station and then integrated into Climate Consultant software. This is an action item that could be addressed in future versions of the *Climate Action Plan*. Data derived from the Climate Zone 10 weather station is provided on the following pages.

The following abbreviations for units of measurement are used throughout this section.

- **CO2e:** Carbon Dioxide Equivalent (climate warming potential)
- **Degrees F:** Degrees Fahrenheit (temperature)
- **kBtu:** Thousand British Thermal Units (energy)
- **lbs:** Pounds (weight)
- **mph:** Miles Per Hour (speed)
- **SqFt:** Square Feet (area)
- **Yr:** Year (time)

Thermal Comfort

Thermal comfort is a result of the combined effects of solar radiation, temperature, air movement, and relative humidity. The temperature swing at Mt. SAC's campus over the year is more extreme—with hotter summers and colder winters—than the coastal climates to the southwest of the campus.

Diurnal Temperature

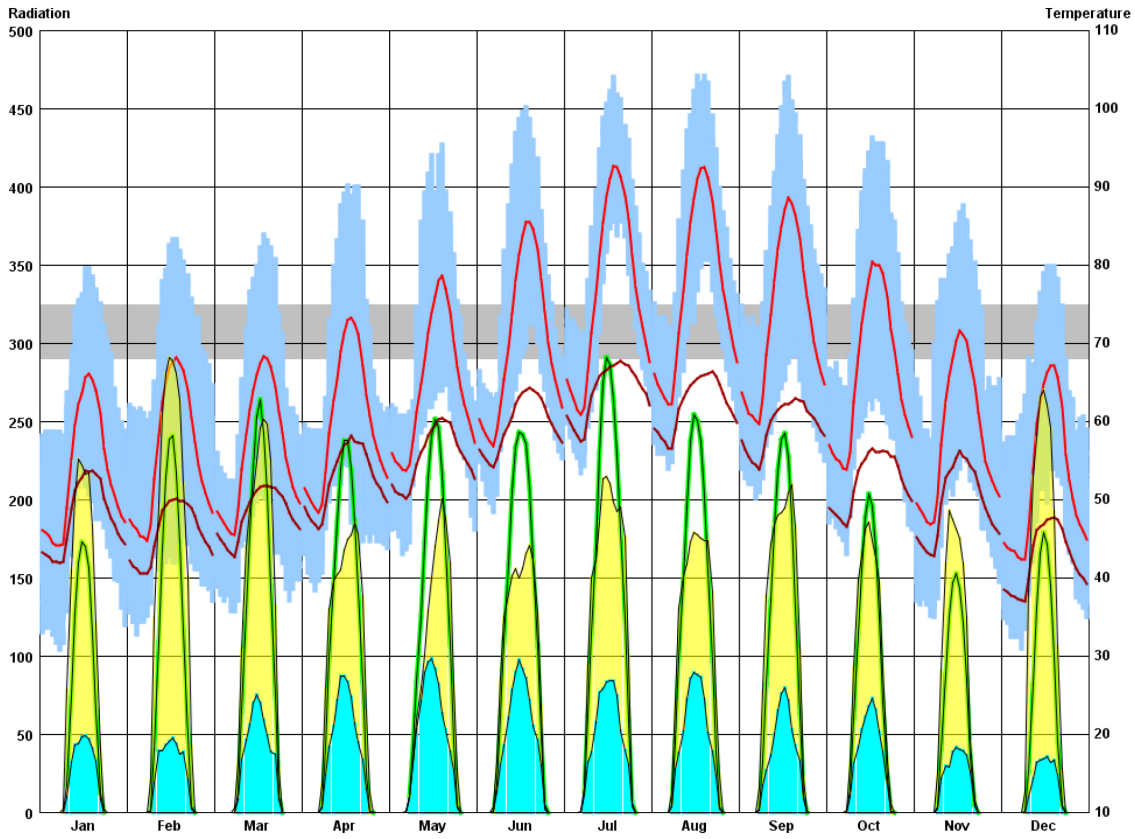
The Diurnal Temperature chart on the opposing page shows that, most of the time, dry bulb temperatures at Mt. SAC are within or close to the thermal comfort range for most people, which is shown by the horizontal grey bar.

Summer and Winter Temperatures

During the summer months, temperatures on Mt. SAC's campus are approximately 10 degrees Fahrenheit higher than the comfort zone.

During the winter, temperatures on Mt. SAC's campus are approximately 10 degrees lower than the comfort zone.

DIURNAL TEMPERATURE



TEMPERATURE (DEGREES F)

- DRY BULB MEAN
- WET BULB MEAN
- DRY BULB (ALL HOURS)
- COMFORT ZONE

RELATIVE HUMIDITY (PERCENT)

- GLOBAL HORIZ
- DIRECT NORMAL
- DIFFUSE

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

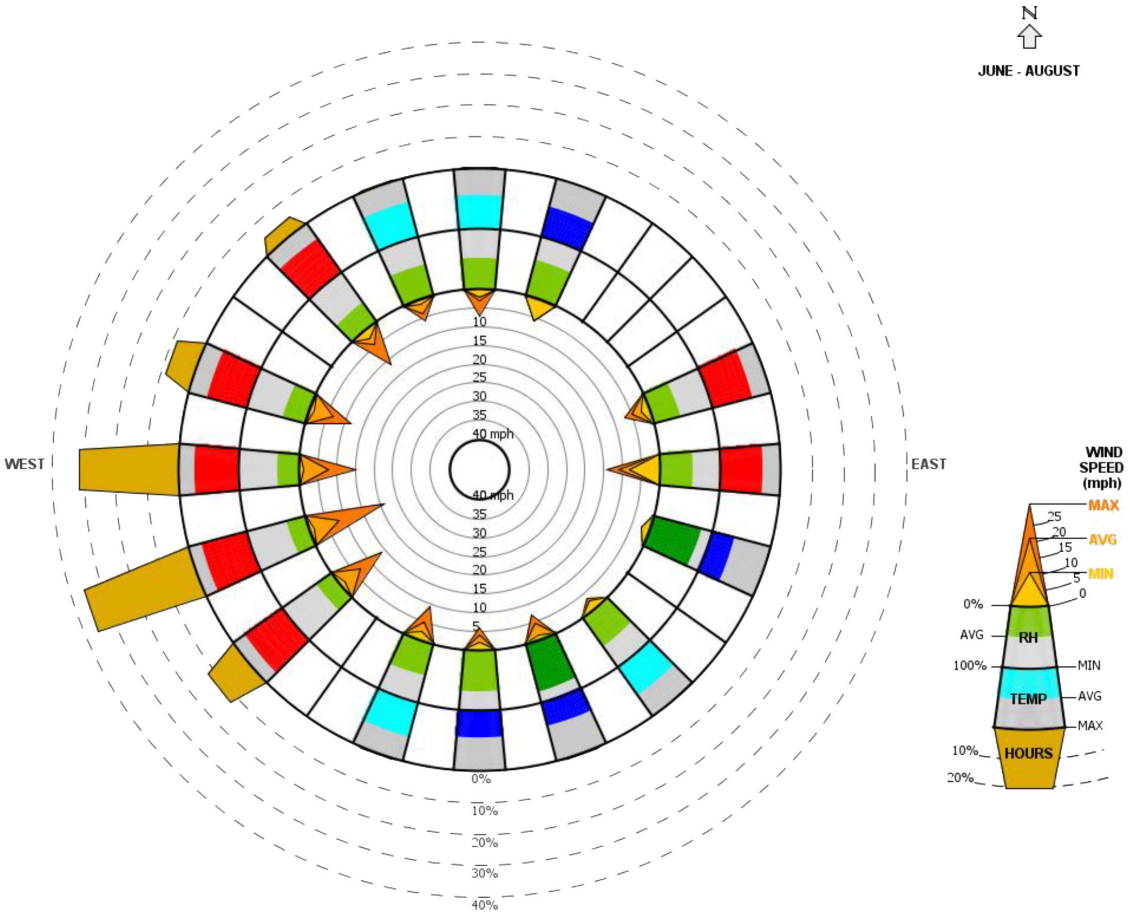
Wind Patterns

The wind rose diagrams illustrate the characteristics of air movement on the campus, including wind direction and frequency, velocity, temperature, and humidity. This information can be used to orient new buildings to optimize the effects of natural ventilation, to determine which outdoor areas would be comfortable for gathering, and to identify where landscaping and vegetation could buffer uncomfortable weather conditions. The cardinal directions are shown along the circumference of the wind roses and indicate wind direction. The frequency of wind from each direction is indicated by the length of the dark yellow trapezoids. Wind speed is indicated by the length of the orange arrows. Temperature and relative humidity are indicated by colors shown on the legend.

Summer Winds

During the summer, between the hours of 8 a.m. and 5 p.m., the prevailing wind comes from the west, as indicated by the Summer Wind Rose Diagram on the opposing page. These winds range between 5–10 miles per hour with gusts that reach 25 miles per hour. These summer winds tend to be hot and dry with a temperature range of 75–100 degrees Fahrenheit, and an average relative humidity range of 30–70 percent. These warm and dry winds are fairly consistent throughout the summer and fall. Since the humidity levels are low, these winds create conditions that favor the use of evaporative cooling, either in conjunction with water elements or an indirect/direct evaporative cooling system.

SUMMER WIND ROSE DIAGRAM



TEMPERATURE (DEG. F)

- < 32
- 32–70
- 70–75
- 75–100
- > 100

RELATIVE HUMIDITY (PERCENT)

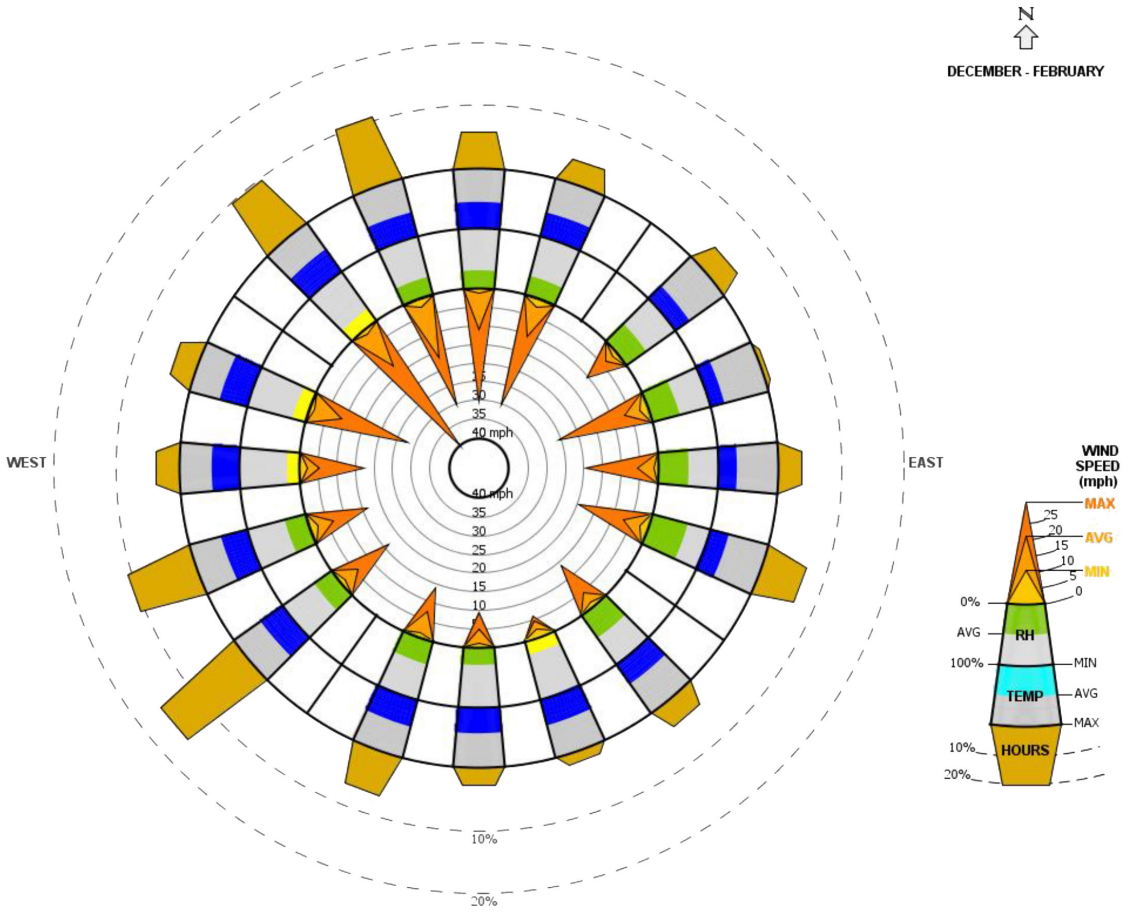
- < 30
- 30–70
- > 70

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

Winter Winds

During the winter, between the hours of 8 a.m. and 5 p.m., the prevailing winds come from the northwest and southwest, as indicated by the Winter Wind Rose Diagram on the opposing page. These winds range between 5–7 miles per hour with gusts that reach 40 miles per hour. The prevailing winds tend to be cool and dry, with a temperature range of 32–70 degrees Fahrenheit and a relative humidity of 30 percent. These cool and dry winds are well suited for naturally ventilating buildings during temperate winter days.

WINTER WIND ROSE DIAGRAM



TEMPERATURE (DEG. F)

- < 32
- 32–70
- 70–75
- 75–100
- > 100

RELATIVE HUMIDITY (PERCENT)

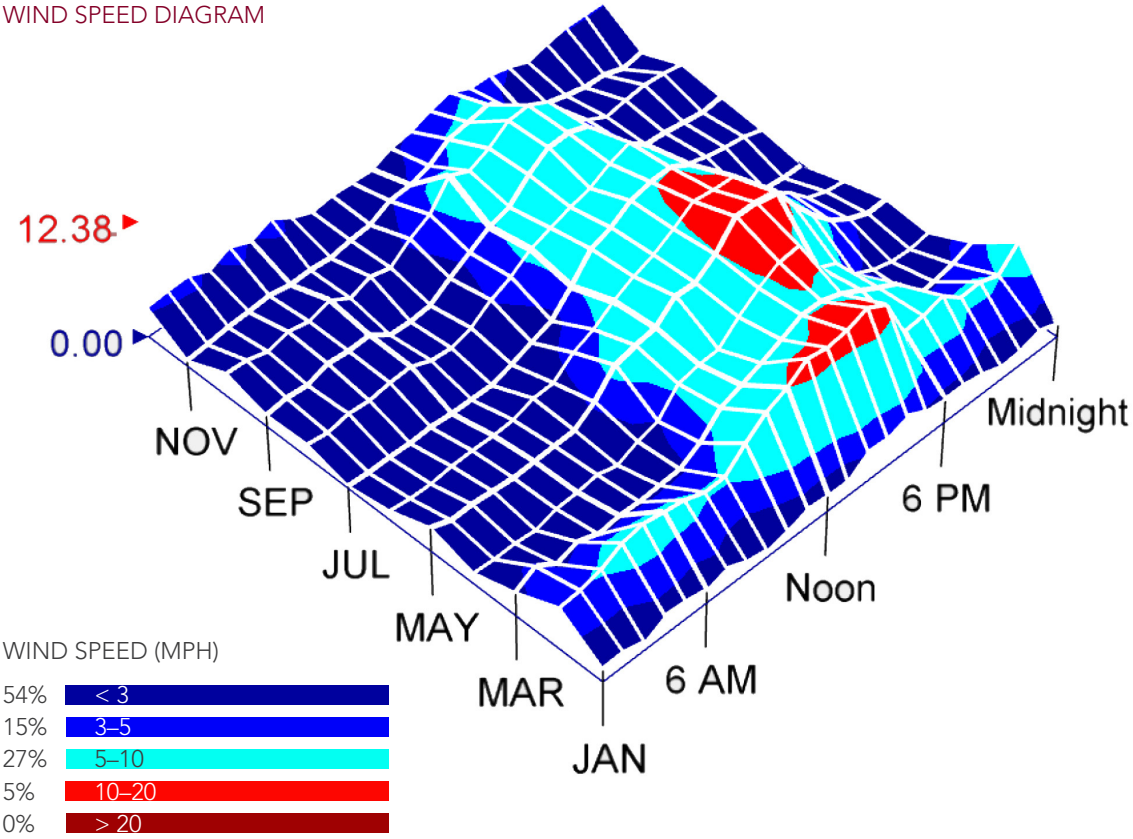
- < 30
- 30–70
- > 70

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

Wind Speed

The Wind Speed Diagram illustrates average wind velocity on Mt. SAC's campus over the hours of the day and months of the year. This diagram, accompanied by the wind rose diagrams, begin begin to tell us when natural ventilation would be the most effective for passive cooling, and when, mechanical cooling would be necessary on campus. The campus experiences an average wind velocity of 5–10 miles per hour, or slightly higher in the afternoon hours during most of the year, with an average maximum velocity of 12.38 miles per hour in May. High winds also occur in the afternoon hours during the months of February, March, June, and July. These winds also tend to be dry and warm. During this time of year, the temperature may be uncomfortable at times, and therefore mechanical cooling would be warranted in buildings. During the evenings from September through November and during the mornings or the late afternoons from February through May, gentle and cool breezes prevail, creating conditions in which natural ventilation would be effective.

WIND SPEED DIAGRAM



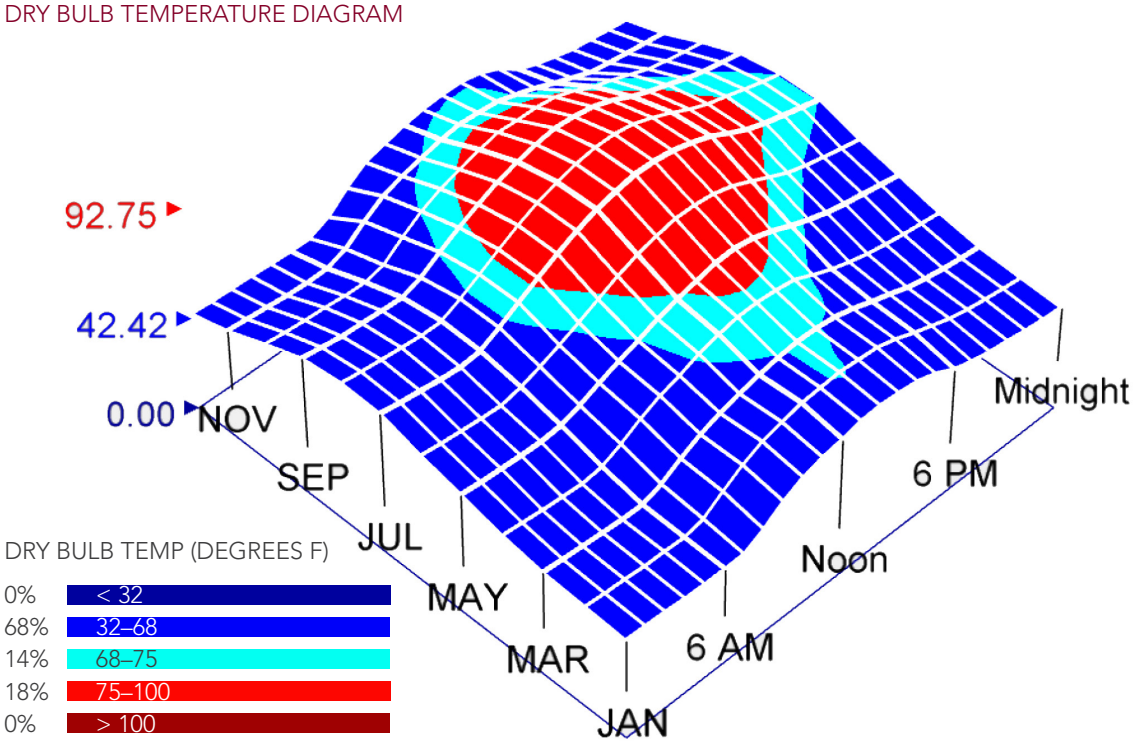
Dry Bulb Temperature

The Dry Bulb Temperature Diagram illustrates prevalent outdoor temperatures that occur on Mt. SAC's campus over the hours of the day and months of the year. This information indicates when mechanical cooling or heating is likely to be necessary to maintain comfort within indoor spaces, as well as when sun exposure or shade is necessary to maintain comfort outdoors.

The maximum dry bulb temperatures at Mt. SAC occur during May through November, with the peak of 92.75 degrees Fahrenheit occurring during the noon hour in August. This peak temperature is accompanied by clear skies. During this time, solar power systems would reach peak production. In addition, mechanical cooling would be required to keep buildings cool and comfortable. However, the temperature is fairly comfortable for most of the time. During 82 percent of the year, it ranges between 32–75 degrees Fahrenheit and the College could rely less on mechanical cooling. Natural ventilation may even be an option during the late afternoon hours.

From November through January, the campus experiences cooler temperatures, with the coldest times of the day occuring between 10 p.m. and 6 a.m. During these times of year, radiant heated floors combined with natural ventilation would be effective for buildings during evening and night classes.

DRY BULB TEMPERATURE DIAGRAM



SECTION 3: CAMPUS CLIMATE CONDITIONS

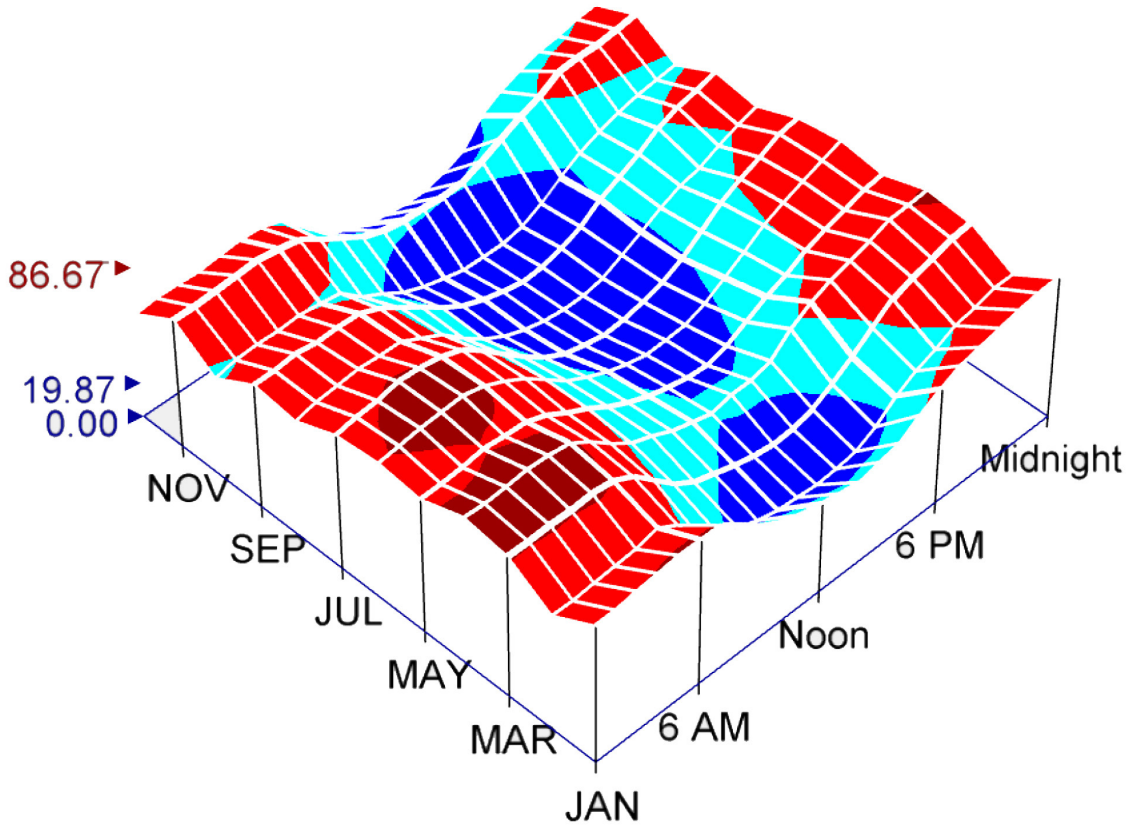
ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

Relative Humidity

The Relative Humidity Diagram indicates when building occupants may benefit from either more or less humidification to be comfortable. People generally are most comfortable when the relative humidity is approximately between 40–50 percent. During 37 percent of the year, Mt. SAC experiences 50–60 percent relative humidity in the mornings and evenings. During this time, some form of natural or mechanical ventilation would be needed to reduce the level of humidity.

During the middle of the day, however, the humidity level tends to be very low—between 20–40 percent—and humidification, combined with either heating or cooling, is necessary to maintain comfort. During these conditions, direct-indirect air handling units would be well-suited to cool and humidify interior spaces.

RELATIVE HUMIDITY DIAGRAM



RELATIVE HUMIDITY (PERCENT)

0%	< 20
22%	20–40
31%	40–60
37%	60–80
11%	> 80

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

Sky Cover Range

The Sky Cover Diagram indicates the occurrence of cloud cover over the months of the year and the hours of the day over Mt. SAC's campus. This information shows the times when being outdoors would be pleasant and comfortable, when solar shades would be necessary for indoor comfort, and when solar photovoltaic systems would be most efficient.

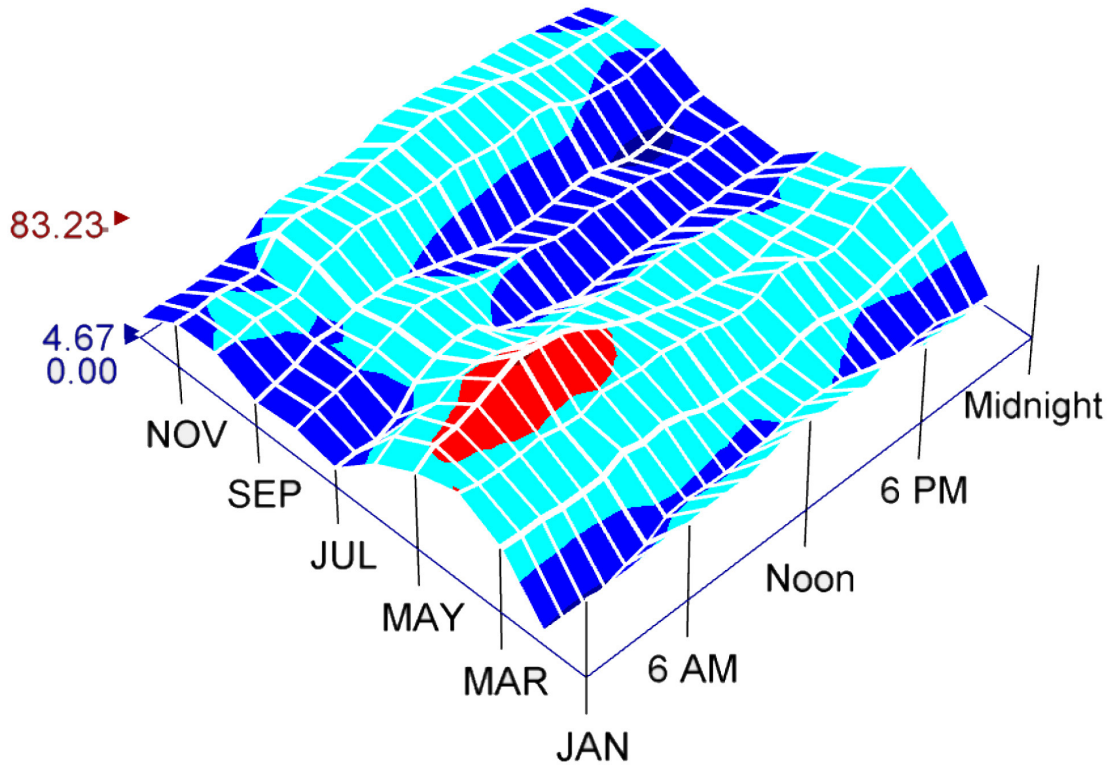
The data for Climate Zone 10 shows that the campus experiences a maximum of 83.23 percent cloud cover and a minimum of 4.67 percent cloud cover over the course of the year. Mt. SAC experiences the least cloud cover from July through September, at about 10 percent. During these times of year, solar shades would be necessary to keep building interiors cool; shade trees would be necessary to provide pedestrians with comfortable outdoor settings; and photovoltaics would be the most productive.

The campus experiences maximum cloud cover of between 60 percent and 80 percent during the morning hours in the month of May. Solar panels would be the least productive during this time of year. Buildings on campus would not be subject to overheating, however with high humidity levels, air conditioning may be necessary to provide thermally comfortable spaces within.

From March through June, the campus experiences an average of about 45 percent cloud cover, with temperate to warm temperatures. Passive cooling techniques may be an option during these times of year for at least the earlier part of the day.[67]

[67] Geospatial Data Science Team, *Solar Maps*, National Renewable Energy Laboratory: Geospatial Data Science, https://www.nrel.gov/gis/solar.html

SKY COVER DIAGRAM



SKY COVER (PERCENT)

3%	< 10
32%	10–30
60%	30–60
4%	60–80
1%	> 80

ENVIRONMENTAL CHARACTERISTICS AND CLIMATIC PROFILE *(cont.)*

Global Radiation and Heat Island Effect

Global Radiation is the total amount of shortwave radiation received from above by a surface horizontal to the ground. This value is of particular interest to heat island studies, shade structure studies, and photovoltaic installations. Global Radiation includes both Direct Normal Irradiance (DNI) and Diffuse Horizontal Irradiance (DIF). From 9 a.m. to 12 p.m., the campus receives the most global horizontal radiation, with a peak of 291.27 kBtu/SqFt in the month of July, as indicated in the Heat Island Effect Diagram on the opposing page. During this time of year, solar access is ample, temperatures are high, and shade is limited. These conditions produce three key results.

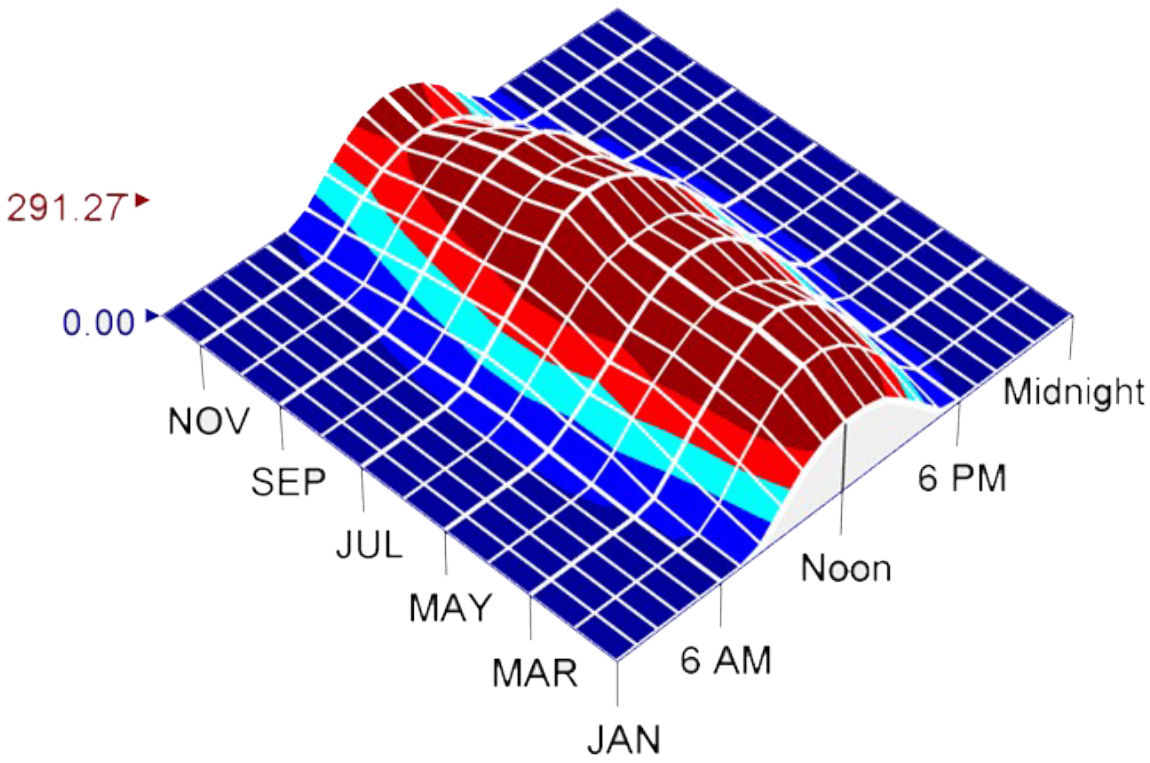
1. Mechanical cooling will be needed in order to keep buildings comfortable.

2. Photovoltaic production will be at its peak.

3. Unshaded portions of the campus will experience the heat island effect.

An Urban Heat Island (UHI) is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities and exposure to solar radiation. The Existing Heat Island Effect diagram in Chapter 7: *Existing Facilities and Site Analysis* of the EFMP illustrates which parts of campus are exposed to solar access. An ample amount of asphaltic parking and walkways reveals that the campus is susceptible to overexposure. This results in hotter surrounding buildings and uncomfortable outdoor conditions. To help combat this condition, additional shade trees, additional ground cover landscaping, alternative paving surfaces such as pavers, concrete, or even decomposed granite could be explored.

HEAT ISLAND EFFECT DIAGRAM



GLOBAL HORIZ RADIATION (BTU/SQFT)

49%	NIGHT TIME
13%	1–50
7%	50–100
9%	100–150
23%	> 150


EXIT

SECTION 4: INSTITUTIONALIZATION

MANAGEMENT AND ORGANIZATIONAL STRUCTURE

The success of Mt. SAC's *Climate Action Plan* depends upon the institutionalization of the implementation work into the College's established organizational structure. Implementation of CAP actions would otherwise require continuous efforts by disparate campus groups, and would suffer from lack of follow-through and consistency. Staff and faculty resources are needed to support the oversight of these implementation activities. To begin implementation it is recommended that the following positions be created and funded: a Sustainability Director and a faculty reassigned position of Sustainability Coordinator.

CLIMATE COMMITMENT IMPLEMENTATION COMMITTEE

The Carbon Commitment requires the establishment of institutional structures as a first step towards the development of this plan. The Climate Commitment Implementation Committee (CCIC) was established as a campus Governance committee in 2015 to provide leadership and guidance in the development of campus sustainability goals, and to shepherd the creation of this *Climate Action Plan*. The CCIC reports to the President's Advisory Council (PAC). It consists of faculty, staff, and students to provide representation from different campus stakeholders. Additional input comes from the Sustainability Committee, which is open to all campus groups and community members.

It is proposed that the Sustainability Coordinator will be the Co-chair of the CCIC. The Climate Commitment Implementation Committee is responsible for overseeing the implementation of the Carbon Commitment by raising awareness about climate change and ways to implement cultural and institutional change. The CCIC both supports the incorporation of sustainability into the curriculum and promotes compliance with the Carbon Commitment. The *Appendix* gives the complete text of the CCIC purpose and function.

INSTITUTIONALIZATION STRATEGIES

Adopt District Sustainability Policies and Procedures

It is recommended that the Board of Trustees establish a district Board Policy (BP) on Sustainability. The Sustainability Director can review established BPs and Administrative Procedures (APs) that may be impacted by climate action initiatives, and update these to include sustainability considerations where appropriate.

Establishment of a district BP on Sustainability, as well as a review of established BPs and APs that may be impacted by climate action initiatives, will help institutionalize sustainability. Board policies provide standards for College operations, and therefore should include standards being adopted as articulated in this plan. Administrative Procedures guide the work of the College, and should be updated to include sustainability considerations where appropriate. For example, there is agreement that all appliances purchased will have efficiency at Energy Star or better levels and this should be reflected in the appropriate AP.

All Board Policies and Administrative Procedures go to the Board. BPs are approved by the board and APs go to the board as informational items after being approved through the shared governance process by the appropriate group.

MANAGEMENT AND ORGANIZATIONAL STRUCTURE *(cont.)*

The Sustainability Director will assist in this process by reviewing what other community colleges are doing. The Director will also work with appropriate units on campus to review, develop, or recommend necessary policies and procedures.

Adopt an Idling Policy

The California Air Resources Board (ARB) currently restricts idling of commercial diesel-powered vehicles to no longer than five minutes.[68] Some states have adopted more comprehensive restrictions that further reduce idling time and encompass all mobile sources of harmful emissions, including passenger vehicles.[69] These states include Connecticut,[70] Hawaii,[71] Massachusetts,[72] Maryland,[73] New Hampshire,[74] New Jersey,[75] and Vermont.[76] Mt. SAC should investigate instituting an idling policy, following models from these states or from UC San Diego,[77] UC Irvine,[78] and UC Berkeley.[79] Instituting this policy will require education to dispel misperceptions about energy used to restart the vehicle.

Create a Campus Bike Policy and Bicycle Plan

As recommended in the *2018 Educational and Facilities Master Plan*, a Mt. SAC Bicycle

[68] California Environmental Protection Agency: Air Resources Board, *Written Idling Policy Guidelines*, June 2009, https://www.arb.ca.gov/msprog/ordiesel/guidance/writtenidlingguide.pdf

[69] Clean Cities, "Idlebase Database of Idling Regulations," U.S. Department of Energy, https://cleancities.energy.gov/files/docs/idlebox_idlebase_database.xlsx

[70] Conn. Regs. §22a-174-18, "Environmental Protection: Control of Particulate Matter and Visible Emissions," *Regulations of Connecticut State Agencies*, 21 April 2017, https://eregulations.ct.gov/

[71] Hawaii Administrative Rules, Department of Health, Title 11, Chapter 60.1 (penalties covered under Hawaii Revised Statutes, Haw. Rev. Stat. §342B-47, http://health.hawaii.gov/opppd/files/2015/06/11-60.1.pdf

[72] Massachusetts General Law, Chapter 90, Section 16A; Massachusetts General Law, Chapter 111, Section 142A; 310 Code of Massachusetts Regulations 7.11 and 7.52.

[73] Maryland Transportation Code, §22-402 (3).

[74] Department of Environmental Services, Administrative Rules Env-A 1101.05, 1101.06, and 1101.09.

[75] New Jersey Administrative Code Title 7, Ch. 27-15.8; N.J.A.C. 7:27-15.8, Control and Prohibition of Air Pollution from Gasoline Fueled Motor Vehicles.

[76] Vermont General Assembly Statute Title 23, Chapter 13, Subchapter 11, §1110.

[77] UC San Diego, Environment, Health, and Safety Department, "Diesel Idling Policy," *blink*, 4 April 2017, https://blink.ucsd.edu/safety/environment/outdoor/diesel.html

[78] University of California Irvine, Environmental Health and Safety, *Diesel Powered Equipment Idling Policy*, University of California Irvine, https://www.ehs.uci.edu/programs/enviro/DieselPoweredEquipmentIdlingPolicy.pdf

[79] University of California, Berkeley, *Off-Road Diesel Powered Equipment Idling Standard Operating Procedure*, https://ehs.berkeley.edu/sites/default/files/lines-of-services/environmental-protection/idlingstandardoperatingprocedure.pdf

Plan[80] could serve as a guide to the continuing improvement and encouragement of bicycling as a significant mode of transportation to, from, and on the Mt. SAC campus. It could describe existing policies and facilities related to campus bicycling, and include a list of projects and programs intended to improve the Mt. SAC cycling environment in the future. This description is paraphrased from the *UC Davis Bicycle Plan*, and other models are found from the University of North Carolina at Greensboro,[81] the University of North Carolina at Chapel Hill,[82] the University of Illinois at Urbana-Champaign,[83] the University of Wisconsin in Milwaukee,[84] the University of Kansas,[85] and Georgia Tech.[86] Los Angeles County already has a *Bicycle Master Plan*,[87] and Mt. SAC could coordinate its Bicycle Plan within this existing structure. Section 7: *Transportation, Commuting, Campus Fleet, and Travel* discusses this in more detail.

Establish a Campus Landscape Advisory Committee and Participate in the Tree Campus USA Program

Landscape advisory committees exist to provide input on various landscaping issues. One model can be found at Chaffey College, in the form of their Trees, Plants, and Grounds Committee. Their committee "works to maximize the pedagogical interest and utility of the college's grounds," and "is advisory to the Superintendent/ President or designee on landscaping design and maintenance."[88] The Tree Campus USA program is administered by the Arbor Day Foundation. In order to be recognized by the program, a college must meet several requirements, which include establishing a Campus Tree Advisory Committee, and developing a Campus Tree Care Plan.[89] The Landscape Guidelines included in the *Appendix* of the *2018 Educational and Facilities Master Plan* recommend both the establishment of a Campus

[80] Transportation and Parking Services, *UC Davis Bicycle Plan*, UC Davis, 2011, http://taps.ucdavis.edu/sites/taps.ucdavis.edu/files/attachments/BikePlanUCDCampus2011.pdf

[81] University of North Carolina at Greensboro, *Campus Bicycle Master Plan*, 2008, https://parking.uncg.edu/docs/UNCGBicycleMasterPlanFullFINAL.pdf

[82] UNC Transportation and Parking, *Bicycle Master Plan*, University of North Carolina at Chapel Hill, 2014, https://move.unc.edu/bike/bicycle-master-plan/

[83] Facilities and Services, Transportation Demand Management, *Campus Bicycle Plan*, University of Illinois at Urbana-Champaign, 2014, https://icap.sustainability.illinois.edu/files/project/37/2014%20Campus%20Bicycle%20Plan.pdf

[84] Community Design Solutions, *UW-Milwaukee Bike Study*, University of Wisconsin-Milwaukee, 2014, https://uwm.edu/community-design-solutions/wp-content/uploads/sites/314/2015/10/UWM-Bike-Study.pdf

[85] University of Kansas, *KU Bike Plan*, 2016, https://sustain.ku.edu/campus-bike-plan

[86] Georgia Tech, *Campus Bicycle Master Plan*, 2015, https://space.gatech.edu/bicycle-master-plan

[87] County of Los Angeles, Bicycle Master Plan, 2012, http://dpw.lacounty.gov/pdd/bike/masterplan.cfm

[88] "Committees: Trees, Plants, and Grounds Committee," Chaffey College, 2018, http://www.chaffey.edu/committeelist/trees.shtml

[89] "Tree Campus USA Standards," Arbor Day Foundation, https://www.arborday.org/programs/treecampususa/standards.cfm

MANAGEMENT AND ORGANIZATIONAL STRUCTURE *(cont.)*

Landscape Advisory Committee and participation in the Tree Campus USA program. The Campus Landscape Advisory Committee should include a sub-committee for campus tree-related issues. Furthermore, the City of Walnut has been named a Tree City USA and is well positioned to provide Mt. SAC with the appropriate community representative and to partner in observance of Arbor Day.

Endorse a Statement that Mt. SAC will not Adopt New Sources of Emissions

The greenhouse gas mitigation strategies identified in this CAP are based on the assumption that the campus will not establish new sources of greenhouse gas emissions. An example of this policy is in the Climate Action Plan of Bemidji State University in Minnesota, which states that "all new construction on campus will be conducted in a carbon neutral fashion: there will be no new emissions added to the system."

Provide Local Accounting for Externalities

Externalities are costs or benefits that affect a party when that party did not choose to incur the cost or benefit. One example of a negative externality is freeway pollution that damages the lungs of people living nearby. Externalities represent failures of our economic system, and lead to an inefficient allocation of resources. By accounting for the costs of climate-related impacts and pollution, Mt. SAC and our community could make more efficient and sustainable decisions. Potential interventions are numerous, and include reframing debates, such as viewing road fatalities as a public health issue[90], or establishing Pigouvian taxes on particular products or behaviors, such as London's congestion charge and British Columbia's carbon tax.[91] Some cities in California are initiating legal action against fossil fuel companies to account for costs of even broader climate-related impacts such as sea-level rise,[92] drought, and wildfires.[93] Mt. SAC and surrounding communities could use these or similar tools to properly account for the impacts of local activities.

Integrate Climate Action Planning into Institutional Planning and the Educational and

[90] Alina Rocha Menocal, Leni Wild, Daniel Harris, Joseph Wales, Clare Cummings, and Helen Dempster, "The Politics of Road Safety," Overseas Development Institute, 2018, https://www.odi.org/projects/2874-politics-road-safety

[91] "Externalities: Pigouvian taxes," *The Economist*. 19 August 2017, https://www.economist.com/economics-brief/2017/08/19/pigouvian-taxes

[92] Anne C. Mulkern, "California Locales Sue Fossil Fuel Companies for Rising Seas," *Scientific American*, 18 July 2017, https://www.scientificamerican.com/article/california-locales-sue-fossil-fuel-companies-for-rising-seas/

[93] David Zahniser, "L.A. Lawmakers Look to Sue Big Oil Companies Over Climate Change — and the Costs that Stem from it." *Los Angeles Times*, 23 January 2018, http://www.latimes.com/local/lanow/la-me-ln-climate-change-lawsuit-20180113-story.html

Facilities Master Plan

Mt. SAC already engages in an integrated planning process. It is recommended that Institutional Planning include planning and reporting of sustainability (or sustainable/climate neutrality/resilience) activities and that these be added to the current institutional planning process. An important component of successful CAP implementation is the integration of climate action planning into the established planning and operational campus structures.

The Planning for Institutional Effectiveness (PIE) process could be used to integrate sustainability planning into the existing institutional planning process. Through the PIE process all campus departments could report and request resources for curricular or operational activities related to sustainability. These department requests could then be folded into CAP mitigation strategies and sustainable practices to be prioritized through strategic planning, and reports could be folded into regular reports on CAP progress. The *2018 Educational and Facilities Master Plan* (EFMP) utilized a process that included sustainability throughout the development of the EFMP. Including activities from the CAP in campus planning structures will enable the capture and reporting of activities at various levels of the institution which will contribute to reducing the Mt. SAC carbon footprint and increasing sustainability.

Ideally, as programs, departments, and divisions are assessing their achievements in the area of sustainability, they will consider what actions have been taken in the past year to support the Carbon Commitment—whether it is a class, a lecture, professional development opportunity, sponsoring students on a field trip, adding a new major, or streamlining or removing paper from a process. If these are reported systematically and the data is retrievable, these distributed activities can be measured together.

The PIE and Strategic Plan are under the purview of the Institutional Effectiveness Committee (IEC). The IEC Co-chair has agreed to place integrating sustainability into campus planning on the IEC agenda, and the Climate Commitment Implementation Committee (CCIC) will track progress on this front. CCIC members have been part of the EFMP development, including presenting at an Eco-Charrette and providing feedback on the draft EFMP document.

Perform Sustainability Assessments in All Units and Departments

It is recommended that all units and departments complete sustainability assessments of their activities. The assessment model was presented to faculty in a Flex Day session in Fall 2016. The assessment[94] includes questions about department or program administration (e.g., integrate sustainability into unit's mission), waste (e.g., reusable dishes for all food), energy (e.g., use of natural light), curriculum (e.g., courses with sustainability content), community service and

[94] Mt. SAC Climate Commitment Implementation Committee, "Unit Level Sustainability Planning," 2016, Google Form.

MANAGEMENT AND ORGANIZATIONAL STRUCTURE *(cont.)*

outreach (e.g., community partnerships to pursue sustainability), and research (e.g., publications on sustainability issues). The Fall 2016 Flex Day session collected information from nine campus units and departments, each within about one hour.

Establish Sustainable Purchasing Policies

Mt. SAC already has an informal policy of purchasing Energy Star-rated equipment, and some recycled paper products. It is recommended that the Sustainability Director works with Facilities Planning and Management, Custodial Services, and Purchasing to develop a formal policy regarding these and other green purchasing guidelines. These guidelines should include social responsibility considerations. This recommendation grew out of conversations with leadership from the campus Purchasing Department.

Establish Sustainable Food Policies

It is recommended that the Director of Sustainability coordinates with on-campus food vendors to establish policies regarding sustainable food purchasing and waste disposal.[95] The College currently contracts with Sodexo for food services. Sodexo has been consulted in the development of the CAP and has shown interest in working with the CCIC on implementing sustainability measures. Section 8: *Solid Waste* discusses this in more detail, under Solid Waste Reduction Strategies and Sustainable Food Purchasing.

Consider Funding to Support Sustainability Activities

Funding considerations include grants, state initiatives, utility agreements, local bonds, and savings from adopted conservation measures. President Scroggins has stated that sustainability projects will be identified in the project list for the upcoming local facilities bond. The project list will include relevant sustainability-related expenses such as planning, personnel, and materials. Expenses such as professional development and investments in changing campus processes will be funded through regular College budget development processes.

Funding is necessary to maintain membership in certification organizations, such as in Second Nature.[96] Specifically, membership in Second Nature's Climate Leadership Network grants Mt. SAC employees access to Second Nature's expertise, such as the information provided by their Climate Programs Senior Manager who was instrumental in helping the authors of this CAP, by gathering information from other campuses and by answering questions regarding carbon calculations and institutional strategies. Second Nature also distributes software that is critical for greenhouse gas inventories. The current software is called SIMAP, and it streamlines the analysis and organization of emissions data. Furthermore, Second Nature membership establishes Mt. SAC as part of a community of higher education

[95] "Corporate Responsibility: Environment," Sodexo, 2016, https://www.sodexousa.com/home/corporate-responsibility/sustainable-development/environment.html

[96] Second Nature. http://secondnature.org/

institutions, and affords Mt. SAC the additional benefits of ambitious deadlines and third-party verification and accountability.

It is recommended that the Sustainability Director explores various funding possibilities, working closely with Facilities Planning and Management, the Foundation, the Grants Office, and the Board of Trustees.

It is also recommended that the College institutionalize in-house accounting methods that calculate all savings from sustainability and climate-related initiatives and projects and set these savings aside in a "green fund." This fund should be used to fund additional sustainability and climate-related initiatives and projects.

Develop a Policy of Sustainability in Investments
It is recommended that the Director of Sustainability work with the Mt. SAC Foundation to develop policies and practices regarding sustainability in investments. This is to include environmental, social, and corporate governance criteria (also known as ESG).[97] See recommendation regarding divestment in *Appendix*.

Build Sustainability into Existing Student Life Structures
The Associated Students of Mt. SAC currently appoint an Environmental Senator, whose duties include promoting environmental awareness on campus and reporting on current environmental issues or concerns.[98] Associated Students also established a Student Sustainability Council in the 2017–2018 academic year. One sustainability-related club on campus is the Environmental Action Group for a Livable Earth (E.A.G.L.E.). It is recommended that the following opportunities to further weave sustainability into Student Life be explored.

- **Institutionalize Sustainability Tours within Associated Students** to create more student jobs on campus as well as provide opportunities for passionate individuals to teach their fellow classmates about sustainability at Mt. SAC

- **Establish Student "Green Ambassador" Positions**, as recommended by current students, to help run the Sustainability Tours. Responsibilities of Green Ambassadors may include projects such as maintaining a recycling center on campus

- **Collaborate with the Energize Colleges program**, a state-funded program through Strategic Energy Innovations (SEI), to place students in a variety of sustainability internships. The program partnered with Mt. SAC starting in Spring 2017. Through Energize Colleges, SEI recruits and places a dedicated Fellow at each participating campus. Fellows are expected to implement programs that

[97]The Forum for Sustainable and Responsible Investment, "SRI Basics," 2017, https://www.ussif.org/sribasics
[98] Mt. SAC Associated Students, "Environmental Senator," *Organizational Directive*, 2014, p. 13, http://www.mtsac.edu/studentlife/as/documents/Organizational_Directive_approved_update06.3.14.pdf

MANAGEMENT AND ORGANIZATIONAL STRUCTURE *(cont.)*

provide significant professional development experience through the implementation of climate resiliency projects

Establish a Sustainability Center
It is recommended that Mt. SAC establish a Sustainability Center. This Center shall do the following.

- Serve as an office location for the Sustainability Director and any additional staff
- Serve as the point of contact for organization and coordination of all sustainability-related projects with the community
- Promote, store, and display sustainability-related research activities, including our annual greenhouse gas inventory data and Climate Action Plan
- Provide a community and campus hub for sustainability activities, planning, and training, and environmentally-related educational programs
- Serve as a repository of ideas for sustainability-related educational activities, to be shared among instructors and with our community. This fits with the theme of the campus as a "living laboratory," mentioned in the *2018 Educational and Facilities Master Plan*

Provide Adequate Staffing
The CAP is a complex plan with various components to implement, and will need to be updated at least every five years. In the summer and fall of 2017, nine Lecture Hour Equivalents (LHE) of reassigned time were granted and divided among three faculty members to research and write components of the CAP. Additionally, consultants and interns worked to complete the second greenhouse gas emissions inventory and to develop recommendations for mitigation strategies. Following the approval of this CAP in 2018, updates will be required in 2023, and again in 2028. In addition, the GHG inventory is meant to be completed annually. Regular progress reports benefit the campus.

Accomplishing the work outlined in this CAP will require ongoing funding and human resources to be successful. Consistent attention and regular cross-campus collaboration will be necessary to ensure that the mitigation strategies identified in this CAP are implemented.

Fund and Appoint a Sustainability Director
(Alternative titles: Campus Sustainability Director, Director of Climate Action, Environmental Solutions Director)

It is recommended that Mt. SAC establish the position of Sustainability Director, who shall do the following.

- Oversee the completion of the annual greenhouse gas inventory
- Develop program implementation plans, related budget requirements, and manage the funding to achieve Climate Action Plan objectives

- Lead the review and revision of the CAP in collaboration with the CCIC, the Facilities Advisory Committee (FAC), and the Sustainability Coordinator
- Summarize activities, metrics, and progress towards CAP goals in a bi-annual report, which will be available publicly on the Mt. SAC sustainability website
- Act as an advocate for sustainability practices on campus and foster collaboration across campus and with the local community
- Work closely with Facilities Planning and Management, the Foundation, the Grants Office, and the Board of Trustees to explore funding opportunities from grants, state initiatives, utility agreements, local bonds, and savings from adopted conservation measures
- Work with the Mt. SAC Foundation to develop policies and practices regarding sustainability in investments and endowments
- Work with the Marketing Office to identify awards in the area of sustainability that Mt. SAC may be eligible for and apply for them and should also work with the grants office to identify sustainability-related grants that Mt. SAC is eligible for and apply for them
- Work with Facilities Planning and Management, Custodial Services, and Purchasing to develop a formal policy regarding these and other green purchasing guidelines. These guidelines should include social responsibility considerations
- Coordinate with on-campus food vendors to establish policies regarding sustainable food purchasing
- Assist in the development of BPs and APs. Review what other community colleges have done and make recommendations. Work with appropriate units on campus to review, develop, or recommend necessary policies and procedures
- Foster regular cross-campus collaboration to ensure that the mitigation strategies identified in the CAP are implemented
- Act as liaison between the community and the campus on sustainability issues
- Promote relevant campus events and activities, such as annual Earth Day events
- Serve as the advisor for student Green Ambassadors
- Work closely with any Fellow from Energize Colleges to provide insight and connections
- Establish a campus Office of Sustainability
- Help designate the temporary location, and eventually guide the construction of, a Sustainability Center as the point of contact for organization and coordination of all

MANAGEMENT AND ORGANIZATIONAL STRUCTURE *(cont.)*

joint sustainability-related projects with the community

- Contact other colleges in the region and explore possible opportunities for collaboration with regard to meeting training and labor force needs of green businesses as well as research needs of green businesses
- Consider creating a consortium of regional colleges and businesses that can work together with policy makers on sustainability-related issues
- Meet regularly with municipal sustainability officers in the Mt. SAC region
- Build partnerships between academia and community organizations working on issues of sustainability and environmental justice
- Serve on community boards related to sustainability
- Meet regularly with Sustainability Directors at other colleges with an interest in partnering on sustainability projects
- Conduct an inventory of all green businesses in the Mt. SAC region and survey them regarding labor force needs that Mt. SAC can provide

Allocate Faculty Release Time for a Reassigned Position of Sustainability Coordinator
(Alternative titles: Sustainability Education Coordinator, Sustainability Learning Coordinator)

It is recommended that Mt. SAC allocate faculty release time for a reassigned position of Sustainability Coordinator. As a faculty reassignment, this position must be negotiated between the District and the Faculty Association.

The Sustainability Coordinator shall do the following.

- Serve a two-year term
- Represent the position of the Academic Senate on all sustainability matters
- Serve as the primary faculty contact for questions or concerns regarding the Carbon Commitment
- Serve as Chair of the Climate Commitment Implementation Committee (CCIC)
- Perform such functions as the Academic Senate President or Executive Board assign to assist in carrying out the purposes and policies of the Academic Senate with regard to sustainability and the Carbon Commitment

- Mentor and facilitate the College's integration of sustainability into the curriculum, including maintaining the listing of Leaf-designated courses and classes

- Work closely with the Faculty Professional Development Committee and Faculty Professional Development Coordinator to implement professional development for faculty on sustainability, including identifying or developing materials or curriculum for faculty professional development

- Present an annual written report to the Academic Senate and write the curriculum component of annual reporting to Second Nature (oversees Carbon Commitment) documenting activities and outcomes

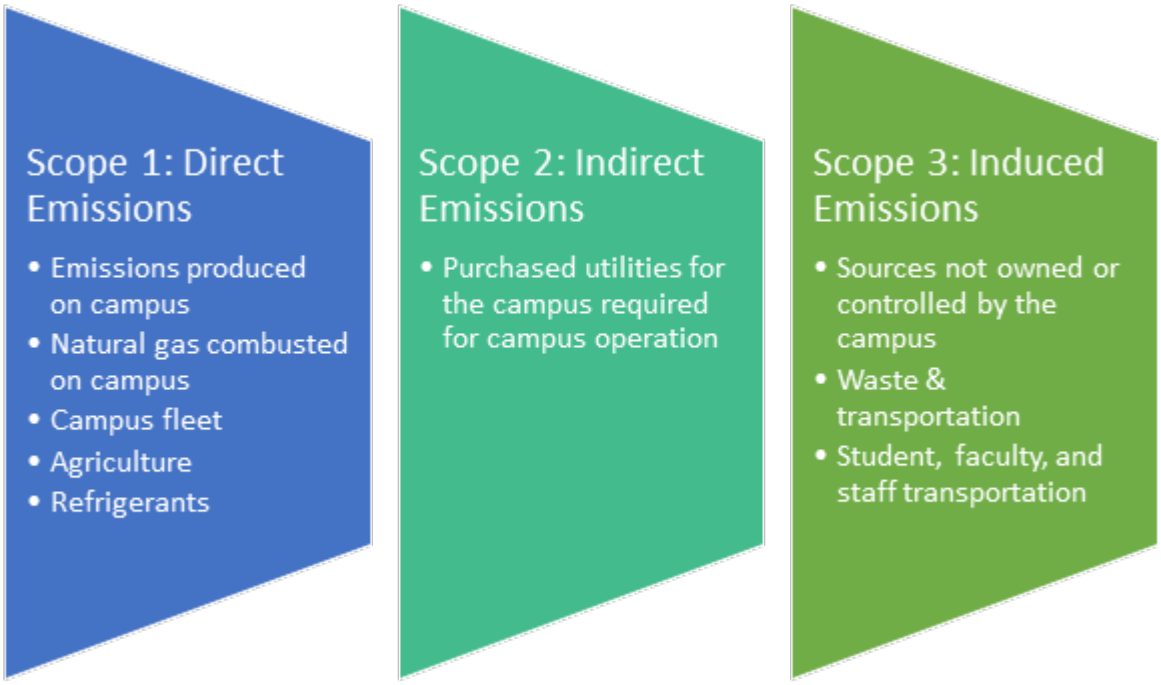
- Ensure that the Mt. SAC President's Student Sustainability Awards are promoted and awarded annually, either by coordinating the awards directly, or ensuring that there is a faculty member in place to coordinate the process and jury

GREENHOUSE GAS EMISSIONS—BY SCOPE

Mt SAC's *Climate Action Plan* documents emissions associated with campus operations from 2014 to 2017. The American Colleges and University Presidents' Climate Commitment (ACUPCC) delineates the scope of emissions included in the inventory. The inventory includes emissions associated with Scope 1, Scope 2, and Scope 3. Scope 1 includes direct emissions from owned or controlled sources, such as natural gas combusted on campus, campus fleet, agricultural sources, and refrigerants. Scope 2 emissions include purchased electricity from utilities which is then used on campus. Scope 3 includes transportation and commuting of students, faculty, and staff, as well as an accounting of solid waste.

The figure on the following page illustrates these inventory results by sector. Units are in MTCO2e, an abbreviation for "metric tons of carbon dioxide equivalent."[99] This plan addresses a variety of activities and chemicals, and it is useful to have a single unit to describe and compare relative impacts of these activities and chemicals. For example, once everything is

SCOPES



[99] "Greenhouse Gases, CO2, CO23, and Carbon: What Do All These Terms Mean?" Ecometrica, 2012, https://ecometrica.com/white-papers/greenhouse-gases-co2-co2e-and-carbon-what-do-all-these-terms-mean

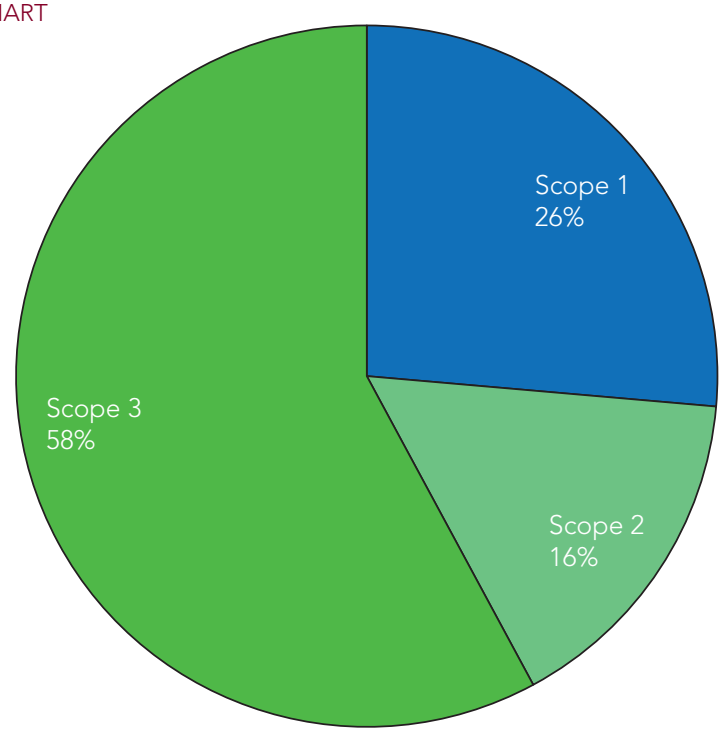
GREENHOUSE GAS EMISSIONS—BY SCOPE *(cont.)*

converted to MTCO2e, it is easy to compare the pollution from a diesel bus with the emissions from generating electricity. Refer to the College's GHG inventory report for a complete accounting of these emissions (*Appendix: Carbon Calculations Spreadsheets*). The majority of emissions is contributed by Scope 3, transportation. Located centrally and offering students a wide variety of academic paths, Mt. SAC attracts students from a large radius. However, this attribute also results in a considerable number of miles traveled, and subsequently, a significant amount of resulting greenhouse gases.

GREENHOUSE GAS EMISSIONS BY SECTOR, 2016

In 2016, the net greenhouse gas emissions totaled 71,396 metric tonnes of carbon dioxide equivalent (MTCO2e). Scope 1 accounted for 18,867 MTCO2e; Scope 2 accounted for 11,262 MTCO2e; and Scope 3 accounted for 41,386 MTCO2e. Scope 3 accounted for 58 percent of the total carbon emissions of the campus, 46 percent of which was attributed to transportation alone. Offsets attributed by the College's on site nature preserve reduced the total emissions by 120 MTCO2e, thereby resulting in a total of 71,396 metric tonnes of carbon dioxide equivalent.

2016 SCOPE PIE CHART



GREENHOUSE GAS EMISSIONS BY SUBCATEGORY OF EACH SECTOR, 2016

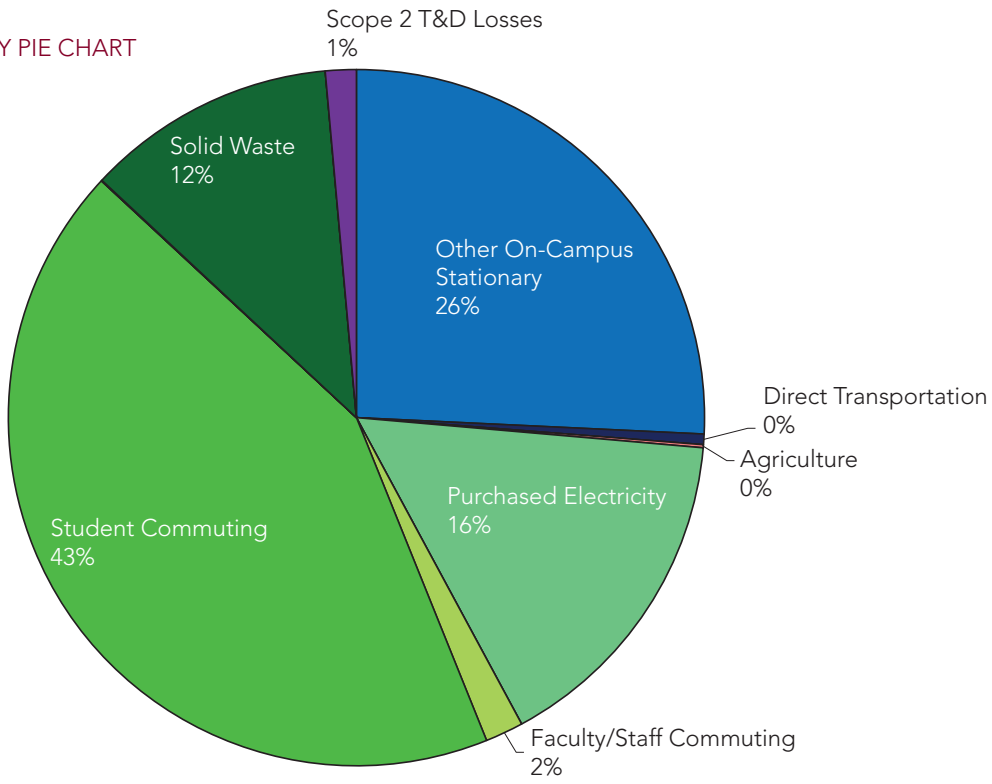
A further breakdown of each scope shows where the emphasis of emissions resides.

Within Scope 1, "Other On-Campus Stationary" sources account for 26 percent of the campus emissions. This subcategory refers to the on-campus natural gas combustion. "Direct Transportation" refers to the Campus Fleet, but accounts for less than 1 percent of emissions. Lastly, "Agriculture"—although a large component of the College campus in terms of square footage—accounts for less than 1 percent of total emissions.

Within Scope 2, "Purchased Electricity" accounts for 16 percent of the campus emissions. This subcategory refers to the electricity purchased from the utility company. "Scope 2, T and D Losses" refers to transportation and distribution (T and D) losses associated with purchased electricity, but accounts for only 1 percent of total emissions.

Within Scope 3, "Student Commuting" accounts for 43 percent of the campus emissions. This subcategory refers to the emissions that result from students commuting in vehicles in order to get to campus. "Faculty and Staff Commuting" is also captured within Scope 3 and refers to emissions that result from faculty and staff

2016 SUBCATEGORY PIE CHART



GREENHOUSE GAS EMISSIONS—BY SCOPE *(cont.)*

commuting in vehicles in order to get to campus. As this population is significantly smaller than that of the student population, it accounts for only 2 percent of the emissions. "Solid Waste" is the last subcategory included within Scope 3 and accounts for 12 percent of the total campus emissions.

Looking further into a detailed breakdown of total emissions by sector, major sources of emissions include commuting, purchased electricity, solid waste, and on-campus combustion of natural gas. In 2016, campus activities resulted in total net emissions of 71,396 metric tons of CO2e. The chart on the following page summarizes emissions for 2016. Details regarding calculations and equivalencies can be found elsewhere.[100]

[100] Sustainability Institute, "Campus Calculator Home," University of New Hampshire, 2018, https://sustainableunh.unh.edu/calculator

MT. SAC 2016 EMISSIONS

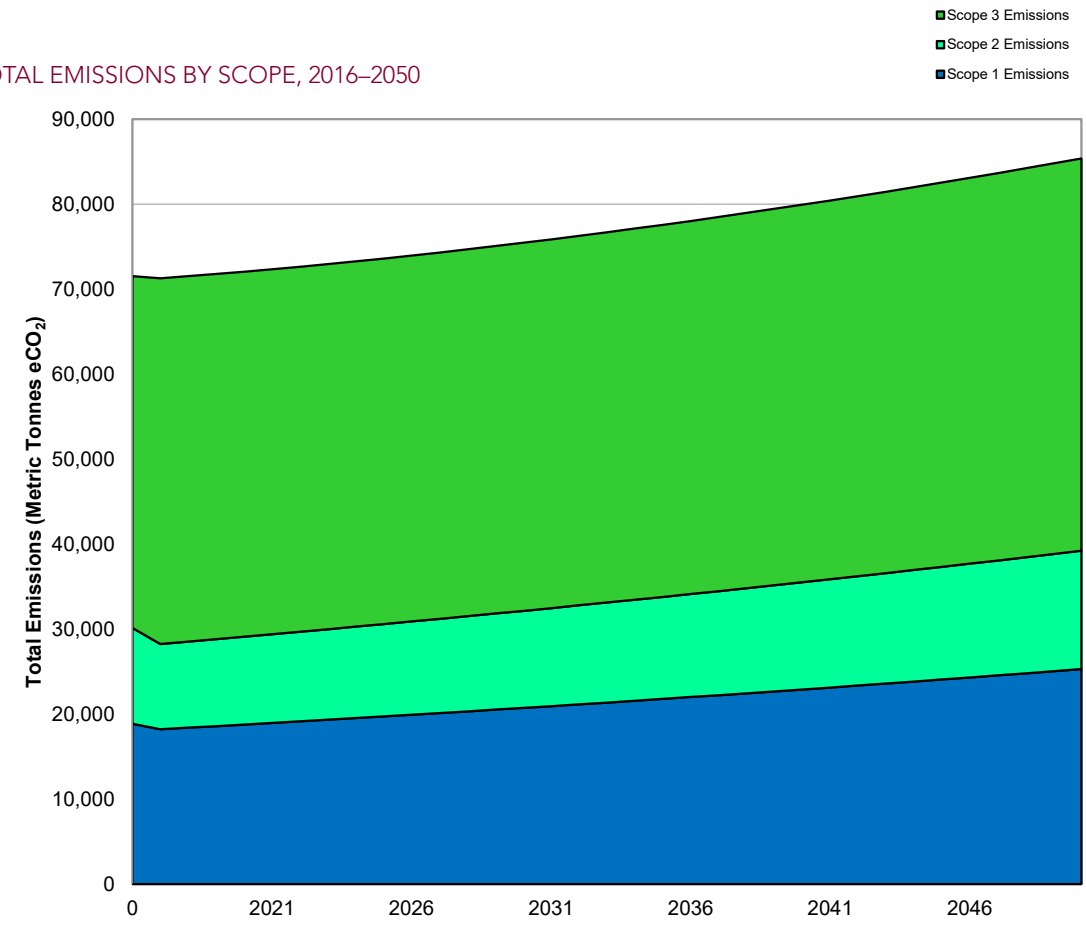
	Energy Consumption (MMBtu)	CO_2 (kg)	CH_4 (kg)	N_2O (kg)	$_eCO_2$ (Metric Tonnes)
SCOPE 1					
Co-gen Electricity	-	-	-	-	-
Other On-Campus Stationary	346,389.6	18,365,576.6	1,641.6	32.8	18,416
Direct Transportation	4,757.7	341,276.5	65.9	22.4	350
Agriculture	-	-	3,540.7	43.3	101
SCOPE 2					
Purchased Electricity	68,269.1	11,192,628.3	155.1	218.6	11,262
Purchased Steam / Chilled Water	-	-	-	-	-
SCOPE 3					
Faculty / Staff Commuting	17,220.9	1,236,517.5	233.0	79.4	1,266
Student Commuting	418,406.5	30,042,971.2	5,660.9	1,928.2	30,759
Study Abroad Air Travel	119.5	23,298.8	0.2	0.3	23
Solid Waste	-	-	332,568.0	-	8,314
Scope 2 T and D Losses	6,205.7	1,017,414.5	14.1	19.9	1,024
OFFSETS					
Additional					(120)
TOTALS					
Scope 1	351,147.3	18,706,853.0	5,248.1	98.5	18,867
Scope 2	68,269.1	11,192,628.3	155.1	218.6	11,262
Scope 3	441,952.5	32,320,202.0	338,476.3	2,027.7	41,386
All Scopes	861,368.9	62,219,683.3	343,879.5	2,344.8	71,515
All Offsets					(120)
				NET EMISSIONS	**71,396**

GREENHOUSE GAS EMISSIONS—BY SCOPE *(cont.)*

BUSINESS AS USUAL GREENHOUSE GAS EMISSIONS: 2016–2050

Details of 2014, 2015, and 2016 greenhouse gas inventories are given in detail in the *Appendix*. In general, overall campus emissions ranged from about 67,279 MTCO2e in 2014, to 63,209 MTCO2e in 2015, to 71,396 MTCO2e in 2016. Without further conservation measures, and with continuing growth, emissions are projected to rise steadily, reaching 95,856 MTCO2e in 2050. The "Business as Usual Trend" assumes a steady student population growth rate over the next 34 years, which results in greater transportation emissions due to increased travel, greater solid waste emissions due to increased waste production, as well as greater energy use emissions as a result of greater building energy use throughout campus.

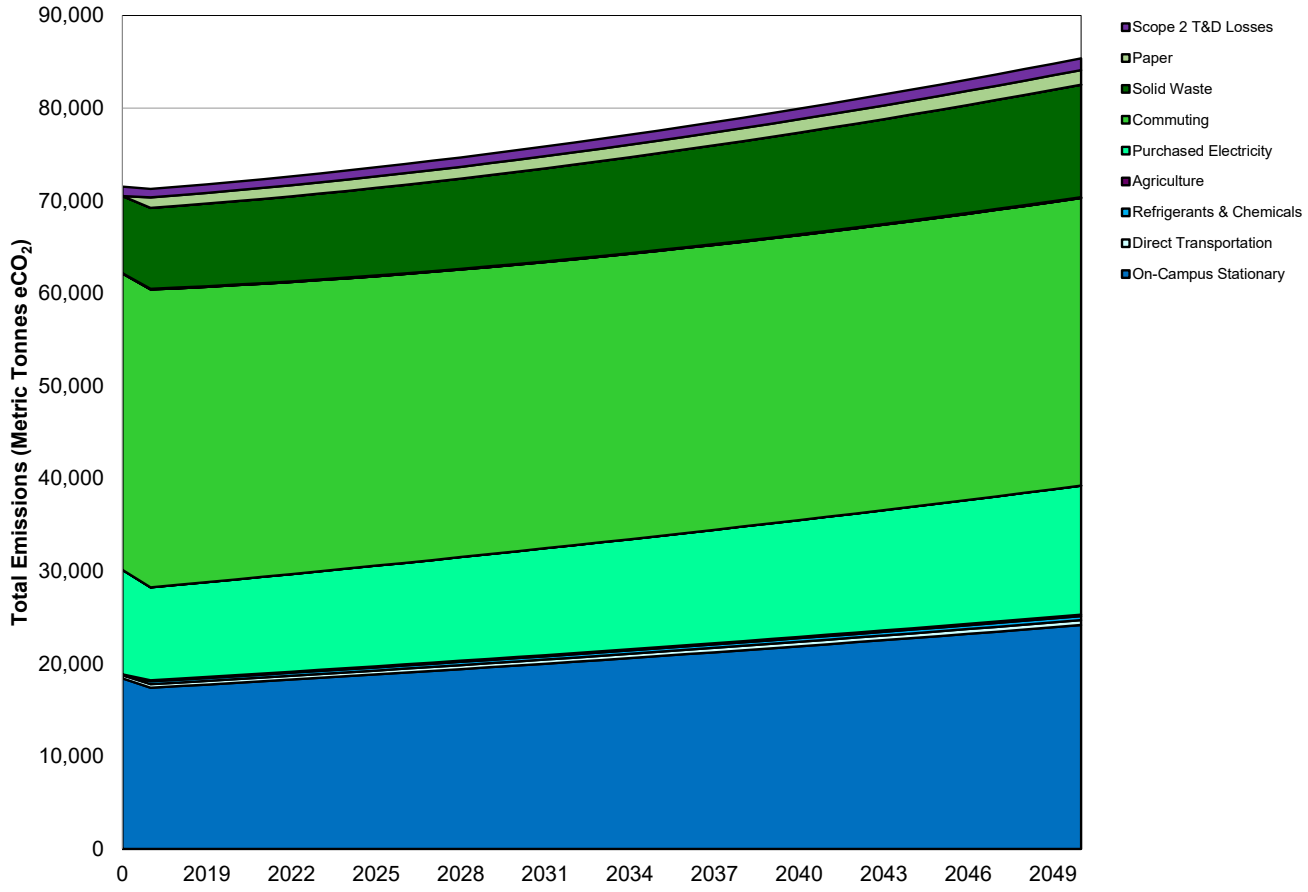
TOTAL EMISSIONS BY SCOPE, 2016–2050



Looking at a further breakdown of each scope, it is evident that "Direct Transportation" and "Solid Waste" (both within Scope 3) are projected to increase at a more rapid rate from 2016–2050, while Scope 1, "On-Campus Stationary" and Scope 2 "Purchased Electricity" are projected to increase at a slightly slower rate.

Section 6: *Purchased Electricity, Stationary Emissions, Building Practices, and Reduction Strategies* and Section 7: *Transportation, Commuting, Campus Fleet, and Travel* review existing greenhouse gas emissions and corresponding emissions reduction strategies for Scopes 1, 2, and 3. Predicted greenhouse gas

TOTAL EMISSIONS BY SUBCATEGORY, 2016–20150



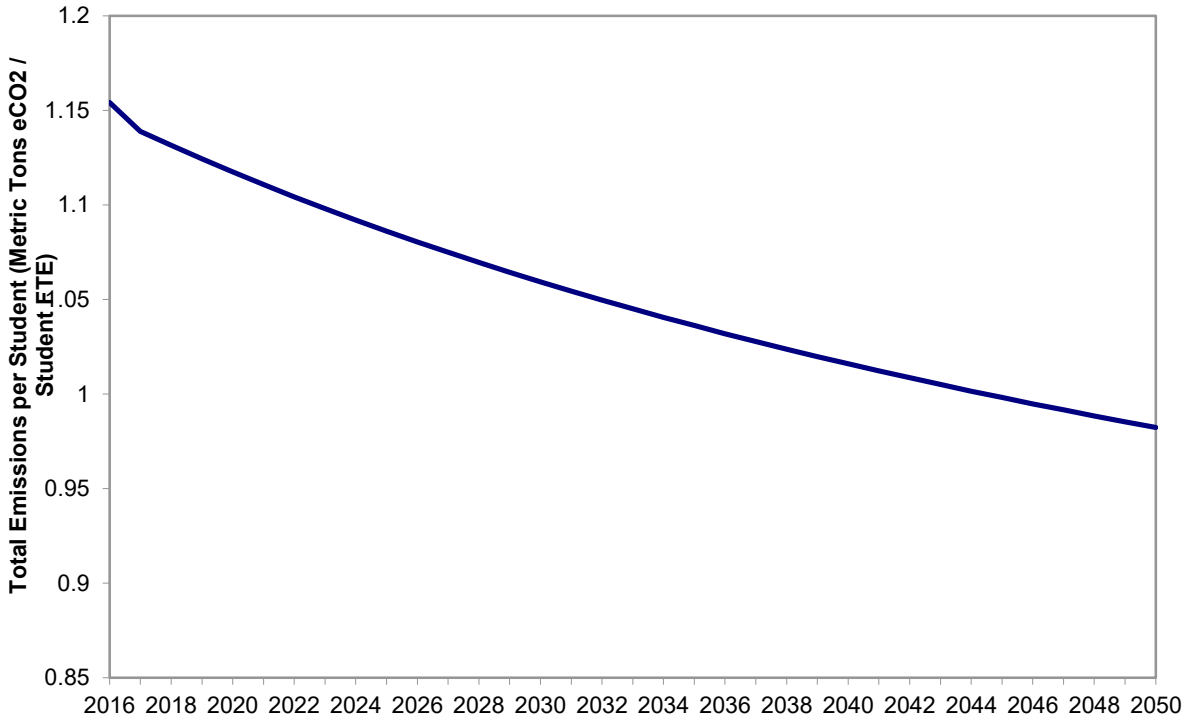
GREENHOUSE GAS EMISSIONS—BY SCOPE *(cont.)*

emissions are then outlined in Section 10: *Emission Reductions and Projections.*

EMISSIONS PER STUDENT 2016–2050

The total emissions of the campus was calculated relative to the student population of the College, and then projected from 2016 to 2050. Emissions per student were calculated to be 1.2 MTCO2e in 2016. With the implementation of various emission reduction strategies, this value is likely to go down. A steady-state average of the early measurements, or about 1.1 MTCO2e per student, is likely to continue through 2050. As more greenhouse gas inventories are completed, and more mitigation measures are implemented, any underlying trends will become more apparent.

METRIC TONS ECO2 / STUDENT FULL TIME EQUIVALENT



ANNUAL ENERGY USE

Major emission sources for the Mt. SAC campus include purchased electricity, purchased natural gas for use in the Cogeneration Plant to produce electricity, and natural gas for direct use in buildings (e.g., boilers and heating). Energy Use Intensity (EUI) is a measurement of total annual energy use per square foot, and is typically expressed in thousands of BTU (British Thermal Units) per square foot per year (kBTU/SF/yr). "Purchased Electricity" data is shown in kilowatt hours (kWh), and "Purchased Natural Gas" is shown in therms (a unit of heat equivalent to 100,000 BTU). These values are converted into a common unit, known as kBTUs (1,000 BTUs). The total kBTUs are then divided by the gross square footage of the campus. The resulting value provides an Energy Use Intensity (EUI) for the campus. The EUI can be used to evaluate the energy performance of a building or campus. Certain building types, such as science buildings with labs, currently use more energy than other buildings, such as non-lab classroom buildings. A standard classroom building has an EUI of roughly 70 kBTU/SF, whereas a lab building may use over 150 kBTU/SF (*Source: Energy Star*). Typical net-zero buildings of today are targeting 25–35 kBTU/SF. Mt. SAC's EUI ranged from 171–189 kBTU/SF between 2014 and 2016. In the future, specific buildings can be compared on campus, to determine which are performing below expectations for the average building of a similar type.

ANNUAL ENERGY USE 2014–2016 (PURCHASED ELECTRICITY AND NATURAL GAS)

Year	Gross Sf	Annual Purchased Electricity (kWh)	Annual Purchased Natural Gas (Therms)	Annual kBTU	Annual Source kBTU	Annual Source EUI (kBTU/SF)
2014	1,544,390	16,768,680	1,058,124	163,027,136	292,387,563	189
2015	1,544,390	14,261,024	1,187,662	167,424,814	279,048,258	181
2016	1,622,769	20,023,144	587,068	127,025,767	277,433,965	171

SECTION 6: PURCHASED ELECTRICITY, STATIONARY EMISSIONS, BUILDING PRACTICES, AND REDUCTION STRATEGIES

PURCHASED ELECTRICITY

Mt. SAC has been purchasing electricity from Southern California Edison (SCE). The campus derives its service from a 12 kV (kilovolt) SCE substation located near Grand Avenue. This service is metered at the 12 kV substation and distributes power to substations in each building on campus through a series of electrical maintenance holes and medium voltage duct banks.

Mt. SAC emissions from purchased electricity were 9,431 MTCO2e in 2014, 8,021 MTCO2e in 2015, and 11,262 MTCO2e in 2016. This data was extracted from Mt. SAC's utility bills.

Emissions from 2014–2015 were reduced by approximately 15 percent. During this period, a number of general energy conservation measure (ECM) projects were implemented on campus. These typically consisted of upgrades to higher efficiency equipment and improved building automation, lighting controls, and sequences of operations. In addition, changes in building schedules, operations, and failure of equipment can impact energy use. These ECM projects directly correlate with some of the energy savings experienced during this time.

Emissions have risen approximately 28 percent from 2015 to 2016 as the College's cogeneration (combined heat and power) system experienced failure issues during this time. The failure of the cogeneration system requires the campus to purchase more electricity in lieu of on-site production. In addition, the College added roughly 78,379 Gross Square Feet (GSF) in several buildings (a 5 percent increase). Future new building projects will further increase the campus' GSF and therefore may impact corresponding purchased emissions. The campus has recently upgraded the main central plant and piping distribution system to account for future building loads. These upgrades include a new 840-ton electric centrifugal chiller and 20,000 ton-hour thermal energy storage (TES) tank. The system includes energy-efficient design to reduce the GHG emissions when compared to a traditional electric chilled water plant. Even so, emissions associated with this equipment are not yet captured, because the installation occurred in 2016 and 2017. The new equipment and increase in future building square footage will likely result in increased GHG emissions, unless renewable energy systems are installed for the campus.

PURCHASED NATURAL GAS FOR COGENERATION

The campus' main central plant equipment was installed in 2003 and consists of a 500-ton gas-fired absorption chiller and two 750-ton electric centrifugal chillers. Recent upgrades in 2016 and 2017 include the addition of a fourth chiller, which is an 840-ton electric centrifugal chiller as well as a 20,000 ton-hour thermal energy storage (TES) tank. The 500-ton gas-fired absorption chiller is driven by waste heat from a 1.5 MW cogeneration system housed in the central plant. The absorption chiller has had issues with operation throughout its life and is currently being used to cool and return water back to the TES.

Natural gas service is derived from Southern California Gas Company's (SoCalGas) high-pressure service laterals leading into the campus. A meter located at the southwest corner of Student Parking Lot D serves the cogeneration on-site system.

In addition to the natural gas utilized for the campus cogeneration system, natural gas is distributed to the campus for heating, cooking, and other ancillary needs. Similar to the cogeneration system, natural gas service used for these other purposes is derived from SoCalGas' high-pressure service laterals leading into the campus. Three main meters are located throughout the campus as the main connection to the SoCalGas laterals.

Mt. SAC natural gas usage associated with the cogeneration and building systems from 2014–2016 is shown in the Annual Energy Use Table (Purchased Electricity and Natural Gas). Natural gas usage increased slightly from 2014–2015 (~12 percent). There are no identified causes for this increase in usage. However, a substantial decrease in natural gas usage occurred from 2015–2016. The campus has determined that the cogeneration system was infrequently in operation during this time period.

STRATEGIES FOR REDUCTION OF STATIONARY EMISSIONS

The following strategies have been identified as viable options for reducing the emissions from stationary sources. These strategies are based on the current costs of these technologies and methods, potential incentives, utility rates and structures, and campus usage. As each of these items and the campus evolve, these strategies and others, should be evaluated for potential implementation.

Emission reduction strategies are categorized by phases and are associated with corresponding milestone target years.

EMISSION REDUCTION STRATEGY PHASES

Phase 1 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 20 percent by 2025.

Phase 2 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 50 percent by 2035.

Phase 3 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 100 percent by 2050.

PHASE 1: 2018–2025

Implement Interior Lighting Upgrades/Retrofits

Interior lighting accounts for approximately 33 percent of annual electric energy use in colleges.[101] One strategy to reduce this energy use is to replace existing on/off manual controls with new high-efficiency light-emitting diode (LED) light fixtures and associated controls. Interior LED light fixtures are typically designed with dimming controls, occupancy sensors, and daylighting sensors to allow for a significant reduction in energy use. With the current utility incentives and time of use structure, these system upgrades typically pay back within 15 years. Some added benefits of LED lighting include integration with building automation systems and better control of the lighting levels within the spaces. The projected annual savings is approximately 506,000 kWhs, or about 140 MTCO2e.

Upgrade HVAC and Building Automation Controls

Heating, ventilation, and air conditioning (HVAC) systems can consume both electricity and gas, and are typically separated into cooling, heating, fans, and pump energy end-uses. HVAC systems account for approximately 43 percent of annual electric energy use and 63 percent of annual natural gas use in colleges.[102] Multiple HVAC upgrades and modifications can be made on a case-by-case basis. Strategies include converting constant-speed fans to variable speed, supplying temperature reset and pressure reset controls, and replacement of equipment. A starting point is to conduct an ASHRAE (American Society of Heating Refrigeration and Air Conditioning Engineers) energy audit. There are various levels of the ASHRAE audits, which range from a basic walk-through of facilities and high-level energy savings calculations to more in-depth energy modeling techniques. At this time, no such audit has occurred and the following projection for Mt. SAC is based on past experience on similar campuses. The projected annual savings of HVAC upgrades is approximately 506,000 kWhs, or about 140 MTCO2e. The return-on-investment will be dependent upon chosen strategies and existing building conditions, but is estimated to be roughly 20 years.

Implement Plug Load Management

Electric use from receptacles accounts for approximately 8 percent of the annual electric energy use in colleges.[103] Plug load management consists of modifying the electrical distribution system within a building to control receptacles independent of the switch of the equipment plugged into the outlet. The controlled receptacles are typically turned off during off-hours, regardless of what equipment is plugged in, since occupants may accidentally leave equipment and devices powered on during off-hours. The projected annual energy savings is approximately 126,000 kWhs, or about 35 MTCO2e.

[101] Intron, *California Commercial End-Use Survey. California Energy Commission*, 2006: Table 10-2, http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF

[102] Intron, Tables 10-2 and 10-4.

[103] Intron, Tables 10-2 and 10-4.

STRATEGIES FOR REDUCTION OF STATIONARY EMISSIONS *(cont.)*

Implement Exterior Lighting Upgrades/Retrofits

Exterior lighting accounts for approximately 6 percent of annual electric energy use in colleges.[104] This strategy includes the replacement of existing fixtures with high efficiency LED light fixtures and associated controls. Exterior LED light fixtures are typically designed with occupancy sensors and daylighting sensors to allow for a significant reduction in energy use. With the current utility incentives and time-of-use structure, these system upgrades typically pay back within 15 years. The projected annual savings is approximately 84,000 kWhs, or about 23 MTCO2e.

Undertake Retro-commissioning

Retro-commissioning (RCx) is the process employed to improve the efficiency of existing building equipment and systems. This process may include the resolution of problems that occurred during design or construction, as well as resolving problems that developed throughout the building's life as equipment has aged, building usage changed, and system setpoints and operations have changed. Some of the strategies employed in retro-commissioning will be similar to the ASHRAE energy audits; however, the investigation will go deeper into the operation and condition of the equipment. Studies show that typical payback ranges are within three years and can result in approximately 15 percent energy savings. The projected annual savings is approximately 169,000 kWhs, or about 47 MTCO2e.

Install BioPCM

BioPCM is a phase change material that acts to increase the thermal mass of a building.[105] Increasing a building's thermal mass reduces temperature fluctuations within the structure by absorbing, storing, and then releasing heat energy. BioPCM can be installed in walls or above ceilings. The simplest approach for retrofit applications is to install in easily accessible T-bar (dropped or suspended grid) ceilings. The projected energy savings is approximately 126,000 kWhs, or about 35 MTCO2e.

Monitor Utilities

Monitoring electric and natural gas utilities consists of submetering these systems at the building level, and potentially submetering end-uses within the building. Only recent building additions to the campus currently include building level monitoring and end-use monitoring. Studies have shown that submetering of energy use results in energy savings, due to the fact that with information, users will change their behavior. This strategy would include providing electric and natural gas meters at each building. The data would be shared with users via a dashboard (an information management tool that visually tracks, analyzes, and displays key performance indicators) or similar communication method. The projected energy savings is approximately 338,000 kWhs, or about 93 MTCO2e.

[104] Intron, Table 10-2.

[105] Phase Change Energy Solutions, 2018, https://phasechange.com/

MONITORING UTILITIES

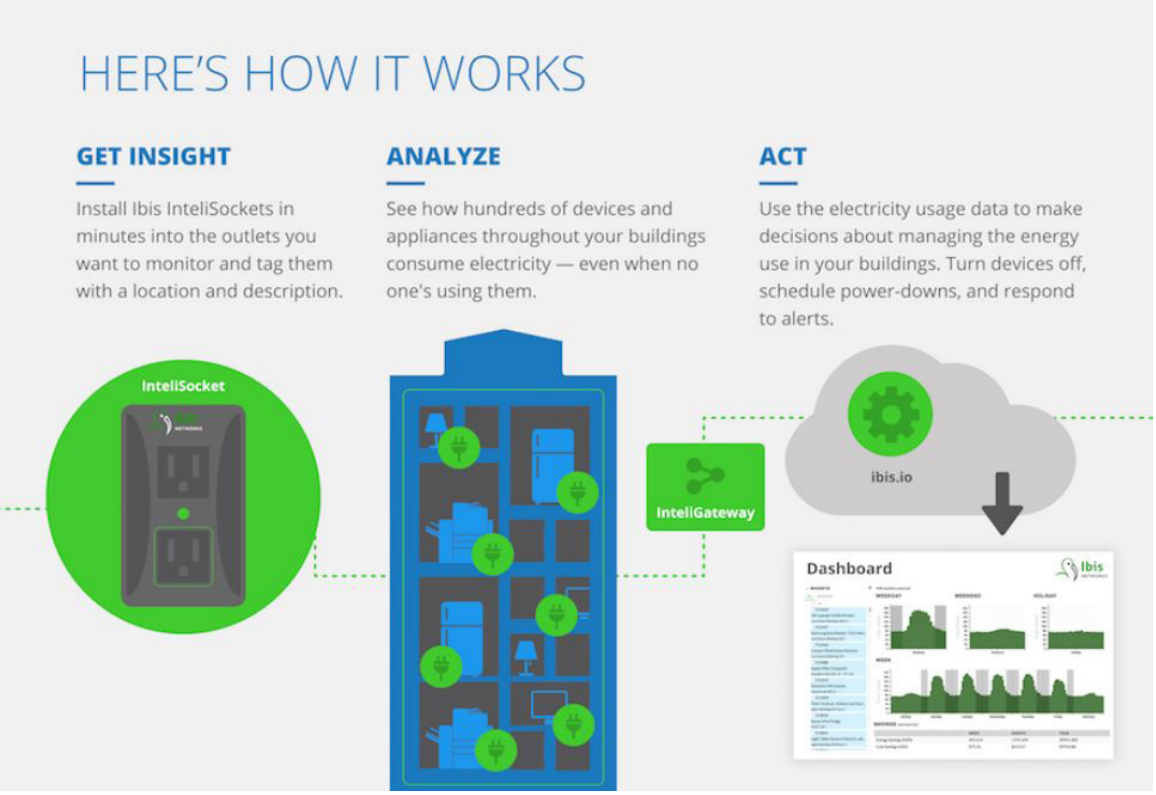


Image Credit: Ibis Networks. Accessed 11 March 2019. www.ibisnetworks.com.

STRATEGIES FOR REDUCTION OF STATIONARY EMISSIONS *(cont.)*

Construct Photovoltaic Systems

These systems are pending discussion with the College. Phase 1 of the photovoltaic (PV) system will be to provide PV on the roof of the proposed Parking Structure S. The PV will be used to offset energy consumption in order to reach a 20 percent reduction. The size of the system required will be 500kW which will generate approximately 775,000 kWh on an annual basis and will equate to a greenhouse gas offset of approximately 214 MTCO2e. The approximate cost of the system will be $2 million and it will require approximately 54,000 SqFt of collection area.

Purchase Renewable Energy Credits

Renewable Energy Credits (RECs) can be used to offset emissions by purchasing the electricity from certified renewable energy sources. One REC will offset 1 MWh of energy which amounts to roughly 610 lbs or between 0.28 and 0.56 MTCO2e of emissions depending on emission source. The on-site generation will not offset the total emissions alone, additional Renewable Energy Credits will be purchased to offset the remaining greenhouse gas emissions unless a larger scale option is available. Factoring in the 6,420 MTCO2e that is reduced from the Phase 1 efficiency improvements and on-site PV systems since the baseline year, the remaining 8,702.6 MTCO2e in 2025 will be offset with RECs. In 2025 an estimated 15,473 MWh in RECs will be required to be purchased. As costs for RECs change based on market conditions, costs could increase or decrease at time of REC purchase. Based on today's best estimates the cost would be around $464,190 of purchased RECs.

PHASE 2: 2025–2035

Participate in Demand Response Programs

SCE offers multiple demand response (DR) programs that help customers save energy and money. SCE incentivizes customers to voluntarily reduce their electricity consumption or shift usage to off-peak hours during particular events. The utility provides advance notice of the event, allowing the customer to take the necessary measures to prepare for the reduction. The participation in DR programs relieves stress on the electrical grid to help prevent power shortages in the community. In addition, SCE offers incentives to purchase and install technologies associated with supporting DR programs. Further information can be found at www.sce.com/drp.

Identify and Take Advantage of Grant and Incentive Programs

Mt. SAC currently participates in SCE's Savings by Design (SBD) program which incentivizes owners and design teams to design and construct energy-efficient buildings. SCE supports this process through design support, detailed analysis, and financial incentives. This process requires involvement at the early stages of a project so that SCE can provide guidance to all the parties involved.

SCE also has a Retro-commissioning (RCx) program to provide incentives for existing buildings greater than 25,000 GSF. RCx seeks to identify operational improvements of existing buildings that will increase occupant comfort and save energy. Modification to the building systems may

PURCHASING RENEWABLE ENERGY CREDITS

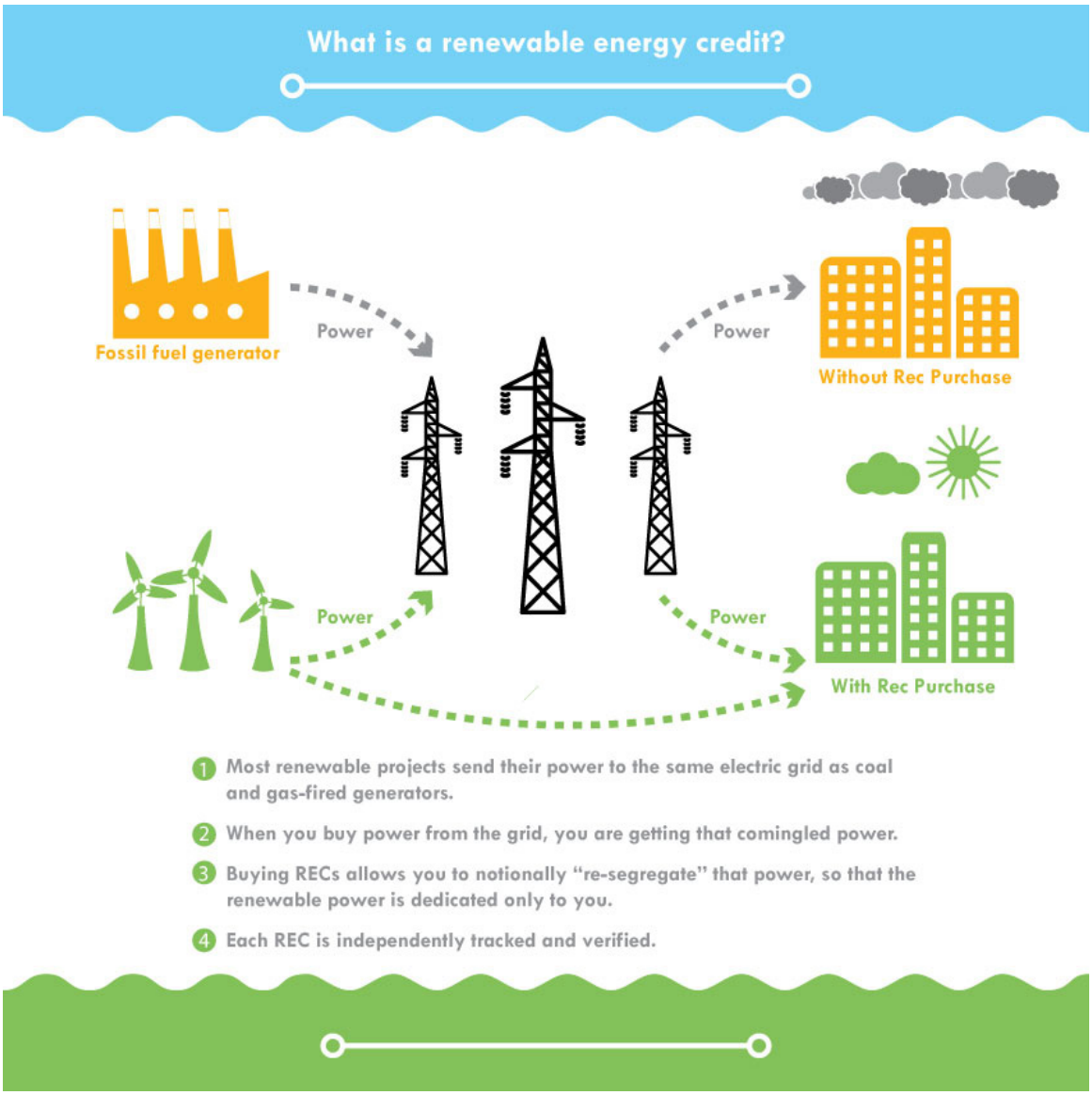


Image Credit: "Terrapass: Buy Carbon Offsets to Reduce Carbon Footprint." Accessed 11 March 2019 www.terrapass.com/product/productres-recs.

STRATEGIES FOR REDUCTION OF STATIONARY EMISSIONS *(cont.)*

include operational changes as well as retrofit modifications to the equipment.

Specify, Purchase, and Install Energy-efficient Equipment

Mt. SAC's commitment to Savings by Design and the Leadership in Energy and Environmental Design (LEED) rating system will further encourage the use of energy efficient equipment and systems within buildings to meet the requirements of these goals. The incorporation of energy-efficient equipment is required in order to meet these goals.

Encourage and Support Energy Efficiency Training of Staff

All new major HVAC and lighting equipment should be specified with training from a factory-authorized representative. In addition to the traditional installation, operations, and maintenance (IOM) training, the training should address the equipment or system's impact on energy efficiency. The training should address sequence of operation, setpoints, and how modifications impact the system's energy performance.

Install Energy Management Systems

All new buildings and major renovations should incorporate Energy Management Systems (EMS) in accordance with Mt. SAC campus standards. The current campus standard EMS system is a BACnet (a data communication protocol for Building Automation and Control networks) system by Automated Logic Corporation (ALC). The system should be used for control and scheduling of the building's HVAC systems. In addition, the system should include, at a minimum, metering of electricity, natural gas, domestic water, and chilled water. The integration of other building systems, such as lighting and security, should be discussed further with the College.

Adjust Temperature Setpoints and Schedule Operating Times

Building HVAC systems should be scheduled to operate according to occupancy of the spaces being served. The systems currently start only as early as necessary to meet desired indoor temperatures. This practice should continue, or defer to the one-hour standard in the California Energy Code (CEC). In addition, occupancy sensors should be used to turn off the system when spaces are no longer occupied. Temperature reset strategies should also be employed (beyond the buildings where they are already used), to further reduce the heating and cooling demands

on the campus. These strategies would include temperature resets of supply air and supply chilled water as well as resetting the space temperature setpoint during unoccupied times. Optimizing the system parameters will improve the energy efficiency of the equipment as well as reduce run time of the equipment.

Optimize Building Occupancy Scheduling

The College should evaluate the scheduling of classes to optimize the space utilization of buildings. There is a perception that space is limited and scheduling classes is difficult. It is possible that alternative scheduling of classes may lead to better utilization of the existing building stock. This is a desirable alternative to increasing building square footage, since additional buildings are likely to increase annual energy and maintenance costs.

Activate Energy-saving Features for Appliances and Computers

All appliances available with an Energy Star rating (www.energystar.gov) are the standard for new and replacement equipment. This includes personal computers, laptops, and monitors, among others. In addition, it is recommended to transition to laptops in lieu of desktop personal computers (PCs), where possible, as the power consumption of laptops is a 65 percent reduction from desktop PCs. Staff should be educated on further energy-saving features for appliances and computers, including sleep and standby modes. In the future, plug load management will likely be required per

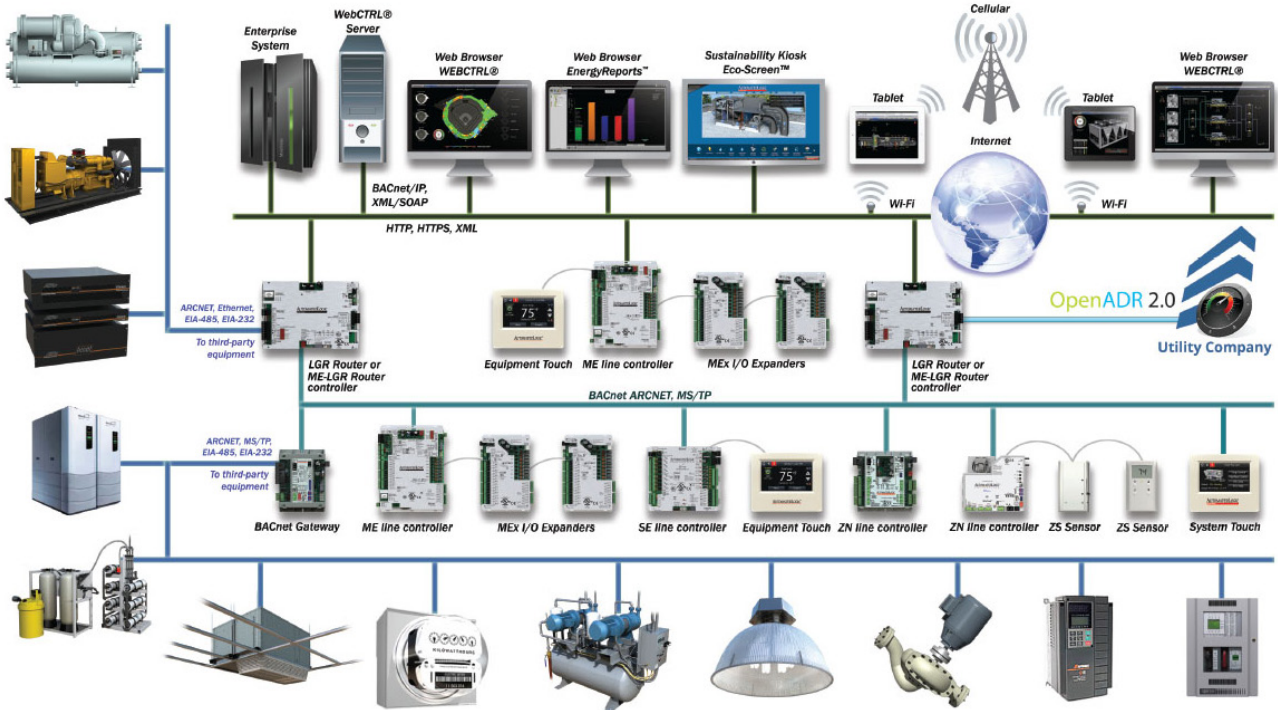


Image Credit: "Automated Logic: Validated Sites." Accessed 11 March 2019. www.automatedlogic.com/Pages/Validated%20Sites.aspx.

STRATEGIES FOR REDUCTION OF STATIONARY EMISSIONS *(cont.)*

the California Energy Code for all new buildings, and should be reviewed for feasibility in existing buildings to control receptacles and automatically turn off receptacles during off-hours.

Pursue Monitoring-Based Commissioning (MBCx)/Retro-commissioning

Retro-commissioning (RCx) is a systematic process to improve an existing building's performance. This process includes an evaluation of building systems and how they are supposed to operate. A list of operating deficiencies is generated and the issues prioritized. From there, the deficiencies are evaluated and addressed, as appropriate.

Monitoring-based commissioning (MBCx)

MBCx takes RCx further while utilizing constant feedback. According to a report from the Lawrence Berkeley National Laboratory, "Monitoring-based commissioning (MBCx) combines ongoing building energy system monitoring with standard retro-commissioning (RCx) practices with the aim of providing substantial, persistent energy savings." MBCx utilizes continued energy system monitoring to optimize the operation of the building systems, with an average return-on-investment of 2.5 years.

The existing campus building stock should be evaluated and prioritized for RCx or MBCx. Programs from Southern California Edison offer incentives for RCx and MBCx to further improve the payback rate.

MONITORING-BASED COMMISSIONING (MBC_x)

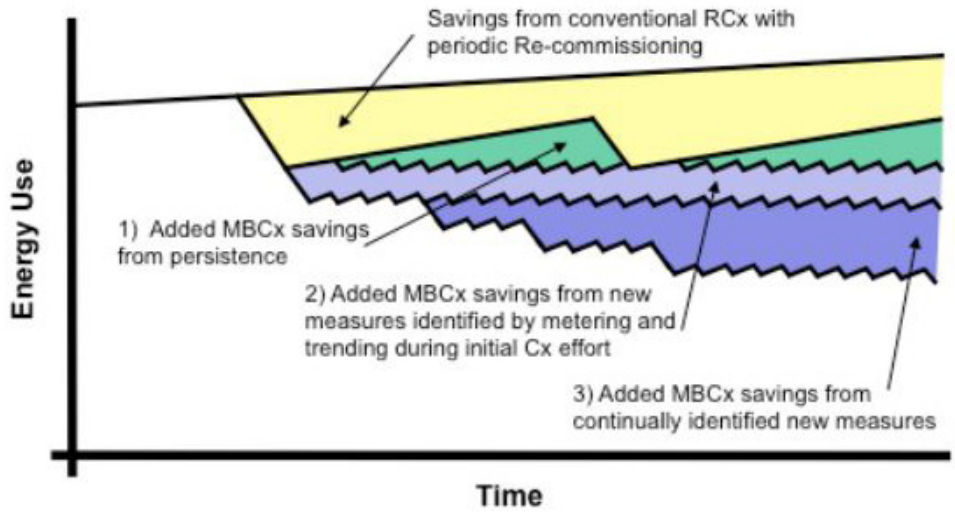


Image Credit: Sharer, Peter. "Monitoring-based Commissioning for Proactive Energy Management." 2010. www.automatedbuildings.com/news/aug10/articles/agilewaves/100726124303agilewaves.htm.

Construct Photovoltaic Systems

A single kW of PV system will generate approximately 1,550 kWh of energy annually and offsets emissions of 0.4 MTCO2e. Phase 2 implementation of photovoltaic systems will provide additional PVs on building rooftops, parking structures, and surface parking lots, to offset energy consumption in order to reach a 50 percent reduction. If alternative cleaner technologies are available at the onset of Phase 2, review the feasibility of implementation. The size of the system required will be 4,000 kW which will generate approximately 6,200,000 kWh on an annual basis and will equate to a GHG offset of approximately 1716 MTCO2e. The approximate cost of the system will be $16 million and it will require about 431,000 SqFt of collection area. Battery storage should be reviewed at this time for feasibility and impact on electrical demand reduction.

Purchase Additional Renewable Energy Credits

The remaining emissions will need to be offset with Renewable energy credits. Factoring in the 15,020 MTCO2e that is reduced from the Phase 1 and Phase 2 efficiency improvements and on-site PV systems since 2016, the remaining 22,787 MTCO2e in 2035 will be offset with RECs. In 2035 an estimated 40,515MWh in RECs will be required to be purchased. As costs for RECs are changing based on the market conditions, costs could increase or decrease at time of REC purchase. Based on today's best estimates the cost would be $1,215,453 of purchased RECs.

PHASE 3: 2035–2050

Pursue Additional Strategies

In addition to the strategies presented above, several other strategies were evaluated but not pursued further due to current limitations in terms of technology or cost. As these technologies evolve, utilities incentives or rates change, and capital and/or operating costs of these strategies lowers, the College should reconsider them for implementation. For the purposes of this CAP, the following technologies were considered, but not pursued: solar thermal, electric storage via batteries, and microgrid installation.

Utilize Photovoltaic Systems, Battery Storage and Future Technology

Phase 3 of the photovoltaic system will be to provide PVs on building rooftops, parking structures, and parking lots, in combination with battery storage systems as well as alternative cleaner technologies that are not yet developed commercially. Future technology may allow for easier implementation of renewable energy as costs go down and efficiencies increase. The PV and storage systems will be used to offset energy consumption in order to reach a 100 percent reduction, effectively allowing the Mt. SAC campus to operate as a Zero Net Energy (ZNE) site. The estimated size of the system required will be 6,500 kW which will generate approximately 10,075,000 kWh on an annual basis which will equate to a GHG offset of approximately 2,787 MTCO2e. The approximate cost of the system will be $26 million and it will require about 700,000 SqFt of collection area and an additional 5,000 SqFt for the battery storage systems.

STRATEGIES FOR REDUCTION OF STATIONARY EMISSIONS *(cont.)*

Purchase Additional Renewable Energy Credits

The remaining emissions will need to be offset with RECs. Factoring in the 19,452.7 MTCO2e that is reduced from the Phase 1, 2, and Phase 3 efficiency improvements and on-site PV systems since 2016, the remaining 56,161.4 MTCO2e in 2050 will be offset with RECs. In 2050 an estimated 99,854MWh of RECs will be required to be purchased. As costs for RECs change based on market conditions, costs could go increase or decrease at time of REC purchase. Based on today's best estimates the cost would be $2,995,636 of purchased RECs.

ON-SITE GENERATION AND RENEWABLE ENERGY STRATEGIES

EVALUATE CLEAN COGENERATION AND RENEWABLE ENERGY GENERATION

Technologies such as cogeneration, fuel cells, solar hot water, and photovoltaics are often utilized on college campuses to offset energy use. With the 2030 net zero energy goals set forth by the State of California, renewable energy generation is more prevalent and necessary than ever before. It is recommended that Mt. SAC investigates the full suite of available renewable technologies available on the market in order to make an informed decision regarding the College's renewable future.

The College has a 1.5 MW cogeneration system on campus, as noted earlier in the CAP. This system generates electricity as well as waste heat to run the absorption chiller at the central plant. The cogeneration system provides independence from utility companies; however, the system has been problematic to operate and maintain. Further use of cogeneration on campus should be evaluated.

Fuel cells are an emerging technology that should be evaluated for future projects.

Solar hot water systems use rooftop collectors to convert solar energy into hot water. These systems are most appropriate for buildings with a constant heating load, such as swimming pools and athletic, residential, and food service facilities. This technology should be considered as it continues to develop.

Photovoltaic (PV) systems convert solar energy into electricity using solar arrays and inverters. These systems can be used to offset electrical use on the campus grid and are often located on parking structures, surface parking lots, building roofs, and other site locations. The College intends to require future buildings to include PV arrays.

EVALUATE LOAD-SHIFTING TECHNOLOGIES

The College has a thermal energy storage (TES) chilled water system to generate chilled water during off-peak hours, and use the chilled water during peak hours. The chilled water TES was added between 2016 and 2017 for storage of chilled water. The TES system shifts the generation of chilled water to off-peak hours to reduce operating costs and reduce peak demand charges. The system is sized to accommodate future campus growth as well as the current load.

Other load shifting technologies include battery storage and microgrid technologies. Battery storage is an emerging technology that stores electricity during off-peak hours and discharges during peak hours. This technology can be paired with PV systems for further energy savings. The technology is fairly new and should be considered as it evolves.

Microgrids are localized energy grids with control technologies to optimize the use of energy systems. The system can choose which generation system is most appropriate at a given time to reduce costs. As batteries, PV, and cogeneration become more prevalent on campus, a microgrid control system will be able to optimize the operation of the generation systems.

EVALUATE PARTICIPATION IN COMMUNITY CHOICE AGGREGATION

Community Choice Aggregation (CCA) is an alternative to the investor-owned utility energy supply system in which local entities aggregate the buying power of individual customers within a defined jurisdiction in order to secure alternate energy supply contracts. CCAs typically lower costs for consumers or allow consumers greater control of their energy mix. CCAs should be considered for the College if available in the future.

FUEL CELLS GRAPHIC

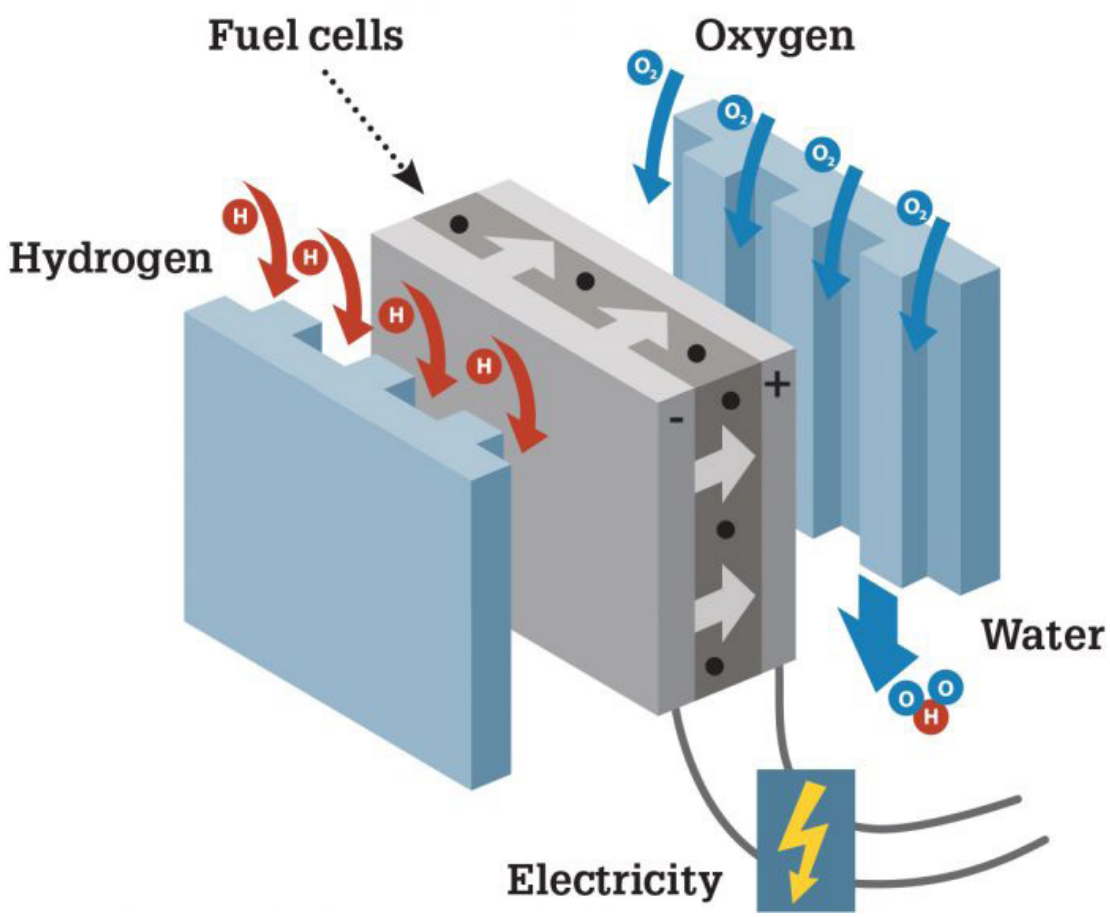


Image Credit: "Hydrogen a fuel of the future?" Accessed 11 March 2019. Scania Group. www.scania.com/group/en/hydrogen-a-fuel-of-the-future.

SUSTAINABLE BUILDING PRACTICES

BUILDINGS AND GREENHOUSE GAS EMISSIONS

In the United States, the building sector, (residential and commercial sectors combined) are responsible for 39 percent of the carbon dioxide (CO_2) emitted in the United States per year.[106] This exceeds every other sector in the country, including transportation and industrial sectors. Furthermore, buildings in the United States account for more CO_2 emissions per year when compared to buildings in other parts of the world, second only to China.

It is the combustion of fossil fuels used to power, heat, and cool these buildings that is responsible for the emissions. In order to reduce emissions in the United States, it is necessary that the building industry evolves and becomes more energy-efficient and climate-conscious in the future.

With more than 1.5 billion gross square feet of higher education facilities in the United States, coupled with an energy demand that represents the second-highest expense area after personnel, higher education facilities are pivotal to the goal of reducing CO_2 emissions.[107] In doing so, higher education institutions stand to achieve another, perhaps more meaningful goal. No longer simply a destination for higher learning, college campuses are rapidly becoming "living laboratories" that cultivate the environmental stewards of tomorrow. By addressing climate change through the transformation of college facilities into cutting-edge, climate-conscious buildings that teach, motivate, and inspire students, these facilities become incubators for the next age of sustainability—an age which embraces climate action through thoughtful and proactive planning.

FACILITIES PLANNING AND MANAGEMENT ACCOMPLISHMENTS TO DATE

Over the past ten years, Mt. SAC has solidified its dedication to a green campus (buildings, grounds, and resources) by accomplishing the following:

- Leadership in Energy and Environmental Design (LEED) green building projects
  - Administration Building, LEED certified
  - Athletics Complex East, LEED certification in progress
  - Business and Computer Technology Building Complex, LEED certification in progress
  - Child Development Complex, LEED certified
  - Design Technology Building, LEED Silver
  - Mountie Café, LEED Silver
  - Student Success Center, LEED certification in progress

- Energy and water conservation retrofits
  - Installation/upgrade of the central cooling plant with thermal energy (ice) storage
  - Site lighting upgrades
  - Building lighting upgrades
  - HVAC upgrades for several buildings on campus
  - Plumbing fixture upgrades in several buildings on campus

[106] U.S. Green Building Council, "*Buildings and Climate Change*," http://www.eesi.org/files/climate.pdf
107 Legislative Analyst's Office, "Building Standards in Higher Education" 2002, Web, www.lao.ca.gov/2002/bldng_standards/building_standards.html

- Drought-tolerant landscaping and drip irrigation conversions
  - Installation of drip irrigation throughout campus ornamental landscaped areas
  - Introduction of time and weather sensored irrigation control for athletics fields
  - Incorporation of demonstration gardens into the *2018 Educational and Facilities Master Plan*

- Electric vehicle charging stations (EVCS)
  - 10 EVCS have been installed in Parking Lot D
  - 4 EVCS have been installed near Building 23A

- Several sustainability-related projects are in the planning process, including:
  - On-campus transit center that will make riding the bus to campus more convenient
  - Installation of additional Level 2 EVCS in new parking structures
  - Conversion of existing Level 1 EVCS to Level 2
  - Connection to reclaimed water service to irrigate the athletics fields south of Temple Avenue
  - Distribution of additional recycling stations and containers
  - Installation of outdoor bottle-filling stations

SUSTAINABLE BUILDING STRATEGIES

The latest evolution of the California Energy Code, the California drought crisis, and a state mandate for the development of net-zero buildings by 2030 necessitate an evolution in how the College approaches its response to the changing climate.[108] This requires engagement in an integrated process that reaches beyond green building standards, codes, and mandates, and that identifies sustainable strategies that are unique to Mt. SAC. The strategies outlined in this section could be adopted by the College's various departments in new capital projects or renovations to existing buildings and serve as a supplement to Scope 1 and Scope 2 strategies.

USE AN INTEGRATED SYSTEMS APPROACH IN BUILDING DESIGN

An "Integrated Systems Approach" is a collaborative building design process, resulting in optimized solutions from an engaged team that is committed to the process from start to finish. This process brings all stakeholders of a specific project to the table at the very beginning. Stakeholders include the College, the architect, engineers, and the construction manager. Larger projects may include building stakeholders (such as staff and Trustees), consultants (such as a LEED specialist), and tradespeople (electricians, plumbers, and HVAC technicians) which can make for a richer, more comprehensive process. Key to the success of the project is a consistent representative, project manager, or champion from the College who stays on for the life of the project.

The following six steps of the Integrated Systems Approach will ensure that the building will function as was originally designed and intended.

1. **Prepare**: During the pre-design phase, the team gathers all available data regarding the project site, climate, and utilities. Sustainability metrics are studied to determine a set of energy, water, and material resource goals. An Eco-charrette is conducted to help the team further understand the College's sustainability goals for the project.

2. **Analyze**: During the schematic design phase, the team engages in research in which all sustainable strategies are investigated through a series of life-cycle cost analyses, energy models, and LEED credit assessment.

3. **Develop**: During the design development phase, the team begins to weave a compilation of sustainable strategies together. Strategies are retested to determined their efficacy.

4. **Detail**: During the construction documentation phase, the team fine-tunes sustainable strategies into the construction set of drawings and specifications.

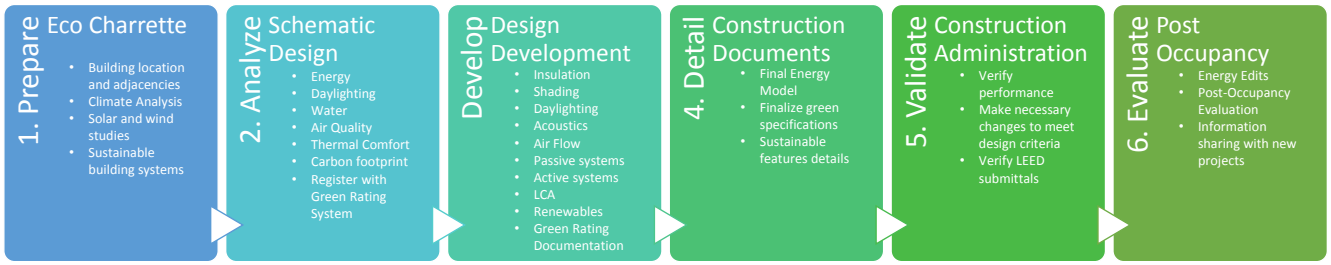
5. **Validate**: During construction administration, the team validates that the project's sustainable design elements are implemented and installed as designed.

[108] California Public Utilities Commission, "Zero Net Energy," 2018, http://www.cpuc.ca.gov/ZNE/

6. **Evaluate**: Once the building is occupied, the effort continues. By conducting post-occupancy evaluations (POEs), the team will be able to identify what sustainable strategies are effective, and which, if any, require an adjustment. This last step will ensure happier, healthier building occupants, as well as a more efficient facility.

The Integrated Systems Approach diagram below outlines the six step process that, if followed, will ensure the success of green building projects on campus.

INTEGRATED SYSTEMS APPROACH



SUSTAINABLE BUILDING STRATEGIES *(cont.)*

DOING GOOD DESIGN

The State of California has stayed ahead of the national pack with stringent and consistent updates to the California Green Building Code (CALGreen), the California Energy Code (CEC), and the adoption of Zero Net Energy goals as spelled out in the California Energy Efficiency Strategic Plan. Attempting to stay above this ever-escalating status quo can prove to be challenging and even cost-prohibitive. However, in order to exemplify sustainability leadership in higher education, it is recommended that the College commits to "Doing Good Design"—where good design is synonymous with sustainable design. This includes the adoption and implementation of several key sustainable building design practices for all new construction and major modernizations. These include the following.

- Reduce energy consumption from the 2014 baseline by 20 percent by the end of 2025, 50 percent by 2035, and 100 percent by 2050
- Design and construct all new major capital projects (10,000 square feet and above) such that they will outperform Title 24 Standards by at least 15 percent, and all major renovation projects will outperform Title 24 by at least 10 percent
- Reduce water use per student from the 2014 baseline by 50 percent by 2030
- Achieve Net-Zero Waste by 2050
- Including 10 percent recycled content in building materials where feasible
- Including 10 percent regional content in building materials where feasible
- Installing 30–40 percent more efficient water saving sinks
- Installing water efficient plumbing fixtures (e.g. water closets and urinals). To ensure ease of maintenance, the gallons per flush of these fixtures should not be lower than 1.6
- Specification of No-VOC (emit no volatile organic compounds) interior finishes
- Ensuring the design of tight building envelope assemblies which limit air infiltration through additional layers of exterior insulation, high performance low-emissivity dual pane glass, and cool roof coatings
- Specification of light colored paving materials to prevent heat island effect
- Specification of stormwater saving strategies where feasible
- Continued use of native and drought-tolerant landscaping

PLANNING FOR NET-ZERO

In order to plan for a sustainable future at Mt. SAC, it is recommended that net-zero energy is adequately addressed by the College. In order to achieve this, a four step process to achieve net-zero energy consumption can be applied.

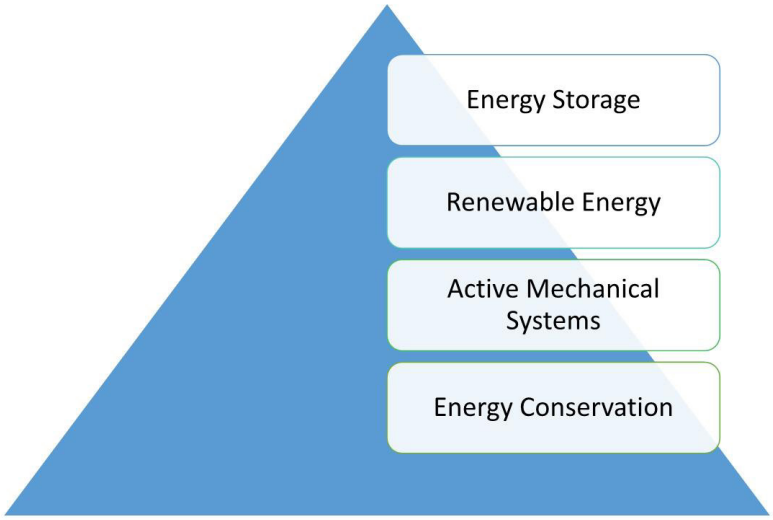
1. **Conserve energy.** Through passive energy efficiency measures and good building envelope design, 20–30 percent energy savings can be attained without costly additions.

2. **Implement active systems.** Right-sized mechanical systems will prevent overuse of energy.

3. **Produce on-site renewable energy.** To offset energy use and plan for a net-zero future, provide infrastructure for net-zero on all new building rooftops and all new parking structures.

4. **Invest in energy storage systems.** Microgrid and battery energy storage systems will store renewable energy produced during sunlight hours. Rather than sending this excess energy back to the electrical grid, these storage systems will allow the College to use "free renewable energy" during off-peak hours.

PLANNING FOR NET ZERO DIAGRAM



SUSTAINABLE BUILDING STRATEGIES *(cont.)*

LIFE-CYCLE COST ANALYSIS

Building and renovating sustainably involves planning and taking into consideration the full life-cycle perspective on buildings. This means assessing both the environmental impact and economic value of a building over its entire lifetime—from extraction of resources to demolition and recycling. Life-cycle cost analysis (LCCA) is a tool for determining the economic costs and benefits of specific systems, for example, heating over the lifetime of the building. It is a valuable tool when attempting to improve an operational feature of a building that is related to how that building was designed. It is important to note that construction costs are often not the largest part of the total cost of owning and running a building. The costs associated with maintenance and operations are often higher than construction, so investing in energy efficiency as well as waste and water management can bring significant savings. Other notable benefits, such as significantly improved indoor air quality, can lead to increased productivity and higher work attendance, which can justify an investment in sustainable construction or retrofitting. In order to make the best use of College funds, LCCA is highly recommended for all building projects. This will ensure that not only the best system or strategy is chosen for the life of the building, but that occupants will be more comfortable and productive, and money saved may be used for other purposes on campus.

GREEN BUILDING STANDARDS

Mt. SAC is committed to design all new construction to the United States Green Building Council's (USGBC's) Leadership in Energy and Environmental Design (LEED) Silver standards, and is poised to adopt even more rigorous LEED Gold standards. The LEED building rating system sets a threshold for sustainable design that results in buildings which are on average 18–39 percent more energy efficient, 40 percent more water efficient, and which produce 75 percent less construction waste than standard buildings.[109] Although LEED certification can result in additional capital costs due to documentation and the certification process, it is also recognized that

[109] U.S. Green Building Council, "Benefits of Green Building," 2018, https://www.usgbc.org/articles/green-building-facts

sustainable performance is best validated through a third-party audit. Self-reporting is not reliable enough to ensure that a project is performing as originally designed or intended. Therefore, it is recommended that the College's current protocol for LEED certification is continued: larger capital projects will pursue official LEED certification, while smaller building projects will use the LEED rating system as a rubric for the design process. All new construction and major renovation, regardless of building size, will abide by California's Energy Code, Title 24. New buildings will aim to exceed the California Energy Code standards by at least 15 percent and all major renovation projects will aim to outperform Title 24 by at least 10 percent.

To advance beyond today's accepted guidelines and standards, it is necessary to consider green rating systems that push beyond LEED. Other third-party rating systems include the Living Building Challenge, Net-Zero Certification or WELL Building Standard. The Living Building Challenge requires net-zero energy as a primary energy goal, rather than as an option like in LEED. The WELL Building Standard focuses on the occupants of a new building once construction is complete, rather than focusing on the design phase of a project. Each rating system has attributes which promote sustainability, health, wellbeing, and efficiency. It is recommended that these ratings systems be considered as potential matches for larger capital projects on campus, or for model buildings or facilities such as the planned Nature Center and Sustainability Center.

Image Credit: "Living Building Challenge." International Living Future Institute. Accessed 11 March 2019. www.living-future.org/lbc.

Image Credit: International WELL Building Institute. Accessed 11 March 2019. www.wellcertified.com/en/start-a-project.

SUSTAINABLE BUILDING STRATEGIES *(cont.)*

BUILDING AS A LEARNING TOOL AND BUILDING TOURS

The College currently conducts regular green building and site tours of the campus. These tours are led by students and provide incoming and existing students with a broad understanding of the sustainable practices which the College engages in. It is recommended that these tours are continued and perhaps extended to additional areas of the campus, including the future Transit Center (in planning stages), the Farm, and the athletic fields. In addition, the College may choose to promote its sustainability achievements further through exhibition of campus sustainability projects on flat panel displays in high pedestrian traffic zones, regular social media posts, and virtual tours via the College website or mobile apps.

IMPLEMENTATION OF GRANTS AND FUNDING

Over the past two decades, Mt. SAC has invested in upgrading the campus with energy-efficient facilities and infrastructure through the implementation of sustainable design practices. The College has taken advantage of opportunities such as Proposition 39 and utility company incentives to fund retrofits. Proposition 39, or the California Clean Energy Jobs Act, provides up to $550 million annually through 2018 to help California K–12 schools and community colleges improve energy efficiency and expand clean energy generation in schools. Mt. SAC has utilized Prop 39 funding to support campus lighting retrofits and upgrades to mechanical units across campus. These energy efficient improvements have proven to have an excellent rate of return, paying for themselves within 5–10 years. The savings gained through these energy efficiency upgrades have the potential to pay for additional retrofits around campus.

LOCAL UTILITY INCENTIVES

Local utility incentives [Southern California Edison (SCE) and the Southern California Gas Company (SoCalGas)] are available to Mt. SAC and should be pursued in order to help offset any costs associated with energy efficiency measures. These incentives are funded through the California Public Utilities Commission (CPUC). Large capital projects may be eligible for as much as $150,000. Projects are required to perform at least 10 percent more efficiently than baseline buildings. With a standard of 15 percent better than baseline, Mt. SAC's new building projects would be well-situated to qualify for such utility incentives.

HIRE SUSTAINABLE DESIGN PROFESSIONALS

In order to bring the College's sustainable future to fruition, it is recommended that Mt. SAC engage with design professionals (architects, contractors, and engineers) with portfolios of at least five completed and verified net-zero building projects. This added screening process will increase the likelihood that the building project will achieve its sustainable design goals, and result in a richer sustainable building stock for the campus.

COMMISSIONING, ENHANCED COMMISSIONING, AND RETRO-COMMISSIONING OF BUILDINGS

California's 2016 Building Energy Efficiency Standards states that "building commissioning (Cx) as required in this code involves a quality

assurance process that begins during design and continues to occupancy. Commissioning verifies that the new building and its systems are planned, designed, installed, tested, operated, and maintained as the owner intended, and the building staff are prepared to operate and maintain its systems and equipment." The commissioning described in the Energy Standards is in addition to any commissioning required by the California Green Building Code (CALGreen). The LEED rating system has additional requirements There are three common versions of commissioning.

1. **Fundamental Commissioning**: Per the *2016 California Energy Code*, fundamental commissioning is required for compliance, while enhanced commissioning is optional. Fundamental Commissioning includes a review of the Owner's Project Requirements (OPR) and Basis of Design (BOD), design phase review, incorporation of commissioning measures in construction documents, implementation of a Commissioning (Cx) Plan, verification of the installation and performance of the building systems through functional testing, documentation via a systems manual and systems operations training, and delivery of a Cx Report. The building systems which are included in this scope of work include mechanical, electrical and lighting systems.

2. **Enhanced Commissioning:** Enhanced Commissioning builds upon the Fundamental process to include: review of contractor submittals, and review of building operations within ten months of substantial completion, and review of systems that go beyond mechanical, electrical and lighting. Enhanced commissioning may also include renewable systems and building envelope for example.

3. **Retro Commissioning (RCx)**: Retro Commissioning is a systematic process to improve an existing building's performance. Using a whole-building systems approach, retro-commissioning seeks to identify operational improvements that will increase occupant comfort and save energy. The process is typically performed on existing buildings which are undergoing upgrades or retrofits.

It is recommended that all new building projects determine which level of commissioning is required for specific projects on campus. Commissioning agents should be engaged early on in order to maximize the benefits of the process. Buildings that are properly commissioned typically have fewer change orders, tend to be more energy efficient, and have lower operations and maintenance costs. The documentation of the commissioning process provides the foundation for correctly benchmarking the baseline energy consumption of the facility. The OPR should be authored by the College, possibly with the assistance of the commissioning agent. This document should become available in a customizable format in order to allow for new projects to adopt the OPR for its specific needs.

SUSTAINABLE BUILDING STRATEGIES *(cont.)*

POST-OCCUPANCY EVALUATIONS

Post-occupancy Evaluation (POE) is the process of obtaining feedback on a building's performance. The value of POE is being increasingly recognised, and it is becoming mandatory on many public projects. POE is valuable in evaluating operational costs, occupant well-being, and building efficiency. Post-occupancy Evaluations will do the following.

- Highlight any immediate problems that can be addressed and solved
- Identify any gaps in communication and understanding that impact building operation
- Provide lessons that can be used to improve design and procurement for future projects
- Act as a benchmarking aid to compare across projects and over time

It is recommended that post-occupancy evaluations be performed on all newly constructed buildings on campus. These evaluations may be conducted by Facilities Planning and Management Department personnel, a third-party consultant, the Sustainability Director, or even by faculty and students as part of a green building curriculum.

ENERGY STAR PORTFOLIO MANAGER AND SECOND NATURE ONLINE TOOL

Until a campus-wide energy management system is put into place, it is recommended that energy use on campus is monitored through the Energy Star Portfolio Manager. This free online tool will allow Mt. SAC's Manager of Energy Services and future Sustainability Director to monitor monthly energy use and water use for each building.

Sustainability Indicator Management & Analysis Platform (SIMAP) is another option for the College to consider for the purposes of monitoring and tracking campus performance. This online tool is part of Second Nature's portfolio of online tools. SIMAP, developed by the University of New Hampshire, will allow the College to monitor carbon emissions in Scopes 1, 2 and 3 year after year.

Image Credit: "Certification Options." International Living Future Institute. Accessed 11 March 2019. www.access.living-future.org/living-building-challenge/certification/certification-options.


Temple Ave.

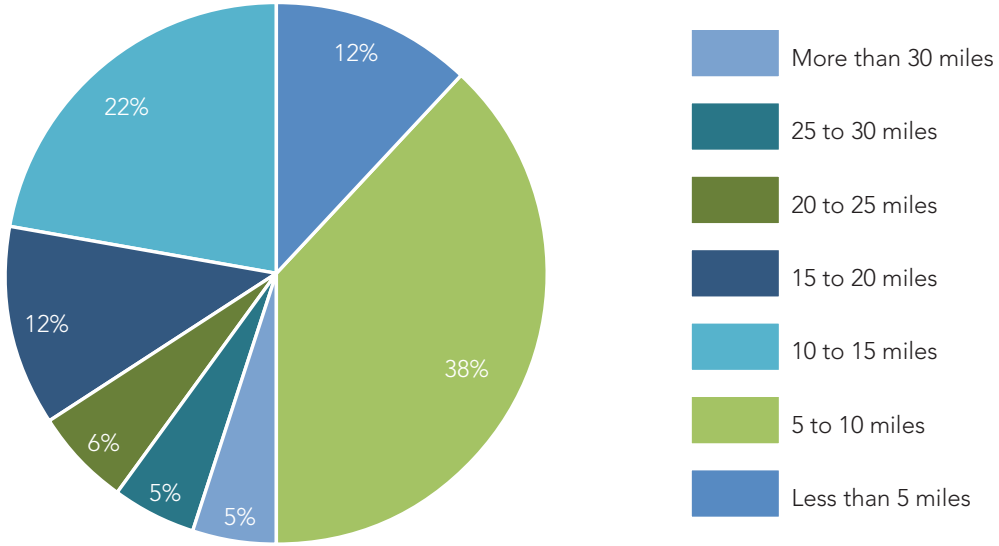
TRANSPORTATION EMISSION SOURCES

Transportation and vehicle emissions are key contributors to Mt. SAC's greenhouse gas emissions. In 2016 these emissions were 50 percent of Mt. SAC's total greenhouse gas emissions. These mobile source emissions emanate primarily from employee and student commutes and the operation of campus fleet vehicles.

COMMUTING

Mt. SAC operates as a commuter campus; nearly every student and staff member commutes to and from the campus in some manner. Based on a transportation survey filled out by a total of 2,221 students, faculty, and staff members conducted during the Fall Semester in 2017, the largest percentage of respondents (37 percent) lived between five and 10 miles from campus and nearly all students and employees (83 percent) lived within 20 miles of the campus. This survey was included as part of the class registration process.

COMMUTE DISTANCE

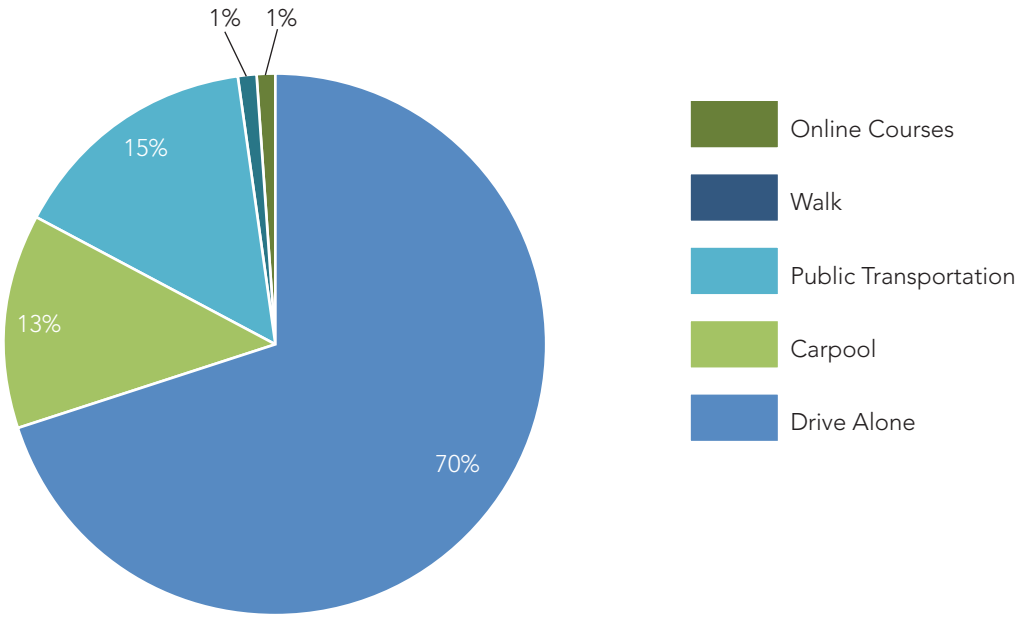


TRANSPORTATION EMISSION SOURCES *(cont.)*

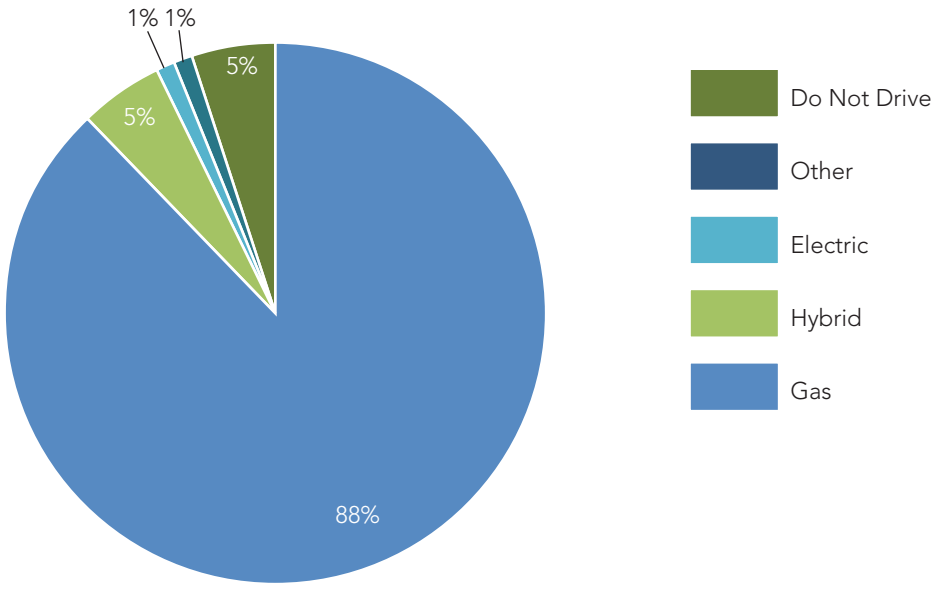
Based on survey data, approximately 70 percent of the campus population commute on a daily basis and 13 percent carpool. Of the vehicles used for commuting purposes, the majority (87 percent) are fueled by unleaded gasoline with smaller percentages of hybrid vehicles (5 percent), and electric vehicles (1 percent).

Commutes make up the largest portion of the campus' overall GHG emissions. GHG emissions associated with commuting for the base year 2016 were approximately 32,025 metric tons of CO2. Approximately 80 percent of emissions are from employee and student commutes to campus each day, including single occupant vehicles, carpools, and motorcycles.

COMMUTING HABITS



VEHICLE MIX

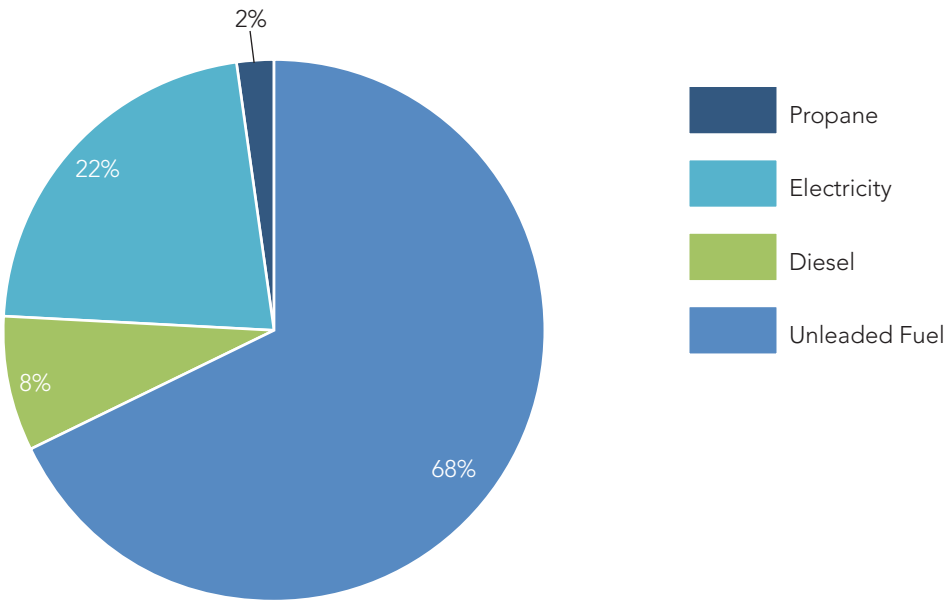


TRANSPORTATION EMISSION SOURCES *(cont.)*

CAMPUS FLEET

The campus' mobile source greenhouse gas emissions also include campus fleet vehicles. Based on 2017 data, Mt. SAC fleet vehicles and equipment total approximately 242 vehicles and equipment, including trucks, carts, tractors, and lifts.[110] Most of the fleet's emissions result from the use of unleaded fuel for conventional internal combustion engine-driven vehicles. However, there are other fuel types used that contribute to the fleet's carbon footprint, including diesel fuel, electricity, and propane. Sixty-seven percent of these vehicles and equipment are powered by conventional gasoline and diesel fuel.

FLEET VEHICLES AND EQUIPMENT



[110] Mt. SAC Facilities Planning & Management, "Vehicle List.xls," 2017, Spreadsheet.

ALTERNATIVE MODES OF TRANSPORTATION

In addition to single-passenger vehicle and carpool commutes, students and staff at Mt. SAC utilize alternative modes of transportation including public transportation, bicycles, and walking.

Mt. SAC currently offers a bus pass program in coordination with Foothill Transit which serves the campus. In recent years, an average of approximately 13,000 bus passes were distributed annually to students at Mt. SAC. The bus pass program, "Class Pass," is funded by student activity fees, available to all enrolled students who have paid their fees, and allows unlimited rides regardless of their destination. According to Foothill Transit data, five transit lines currently service four stops at the Mt. SAC campus with a total of 390 stops daily. Since 2014, an annual average of approximately 780,000 boardings have occurred at these stops. While boardings at these stops are not restricted to Mt. SAC students and staff, according to the 2017 Transportation Survey, 15 percent of respondents identified using public transportation as their primary mode of travel. It is noted that respondents also identified their primary reasons for not using public transportation, with the top two reasons being schedule constraints and too long of a commute. Mt. SAC, in coordination with Foothill Transit, is currently in the planning stages for development of a Transit Center to be located on campus at the intersection of Temple Avenue and Bonita Drive. The Transit Center will consolidate the existing on-campus bus stops and include approximately 10 bus bays. A portion of the bus bays would also have electric charging stations.

Currently, most of the bus lines serving the campus are serviced by compressed natural gas (CNG); however, Foothill Transit has a program in place to replace their entire fleet with electric-powered buses by 2030.[111]

In 2016, public transportation serving the campus generated approximately 5,568,753 metric tons of CO2, representing approximately 22 percent of the campus' total GHG emissions.

Additionally, a small percentage of students (1 percent) identified walking as their primary mode of transportation while an additional one percent took only online courses. Mt. SAC offers a large number of online courses, with over 230 courses offered for the Spring 2018 semester, including general education core classes, as well as technical and vocational courses.

[111] "Electric Program," Foothill Transit, 2017, http://foothilltransit.org/news/sustainability/electric-program/; Bill Scroggins, "President's Cabinet Action Notes," 7 March 2017, Email, http://www.mtsac.edu/president/cabinet-notes/2016-17/CabinetActionNotes030717.pdf; and "Memorandum of Understanding between Foothill Transit and Mt. San Antonio Community College District, Transit Center," 2016, Email, http://www.mtsac.edu/president/cabinet-notes/2016-17/Mt_SAC_Foothill_Transit_MOU_March_2017.pdf

EMISSION TRENDS—MOBILE SOURCES

CURRENT MOBILE EMISSION TRENDS—"BUSINESS AS USUAL"

The "Business as Usual" (BAU) scenario for mobile sources is a projection of GHG emissions from 2016 to 2050, assuming that no future mobile emission reduction initiatives are implemented. Please see Section 5: *Greenhouse Gas Emission Trends, 2016–2030* for the Business as Usual graph.

The campus is projected to add approximately 1,972 students and employees between the 2016–2017 and 2020–2021 school years, which would proportionately increase mobile emissions.[112] Assuming that the employee and student travel modes between single occupant vehicles remain at present levels, the number of drive-alone commuters would consequently be assumed to increase in proportion with the growth in the student population, thus increasing commute GHG emission levels. Using these trends, GHG emissions would increase. The resulting GHG emission projections for 2016 through 2050 indicate an upward trend for commutes associated with the projected increases in employee and student headcount. The campus' fleet also would have increased emissions, as a larger staff population would result in increased demand for vehicles to conduct campus-related business.

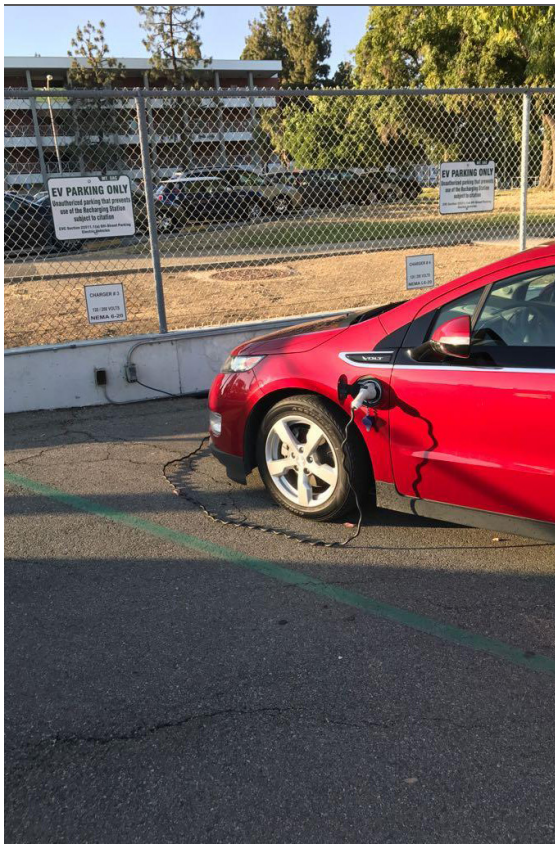
COMMUTE EMISSION TRENDS—3 REVOLUTIONS

Future GHG emissions from transportation are highly dependent on evolving disruptive technologies. These technologies include electric vehicles and autonomous vehicles. Electric vehicles offer decreased maintenance and fuel costs as compared to conventional gasoline/diesel light passenger vehicles. The range of electric vehicles has increased substantially while cost per vehicle has been reduced. Autonomous vehicles have the potential to increase the utilization of vehicles by servicing numerous people in a day, thereby increasing the profitability of transportation network companies and reducing the cost per passenger. These technologies have been evaluated in UC Davis' study entitled *Three Revolutions in Urban Transportation* (UC Davis, May 2017). Scope 3 GHG emissions have been developed that are consistent with the projections of electric vehicle usage described under the 3 Revolutions (3R) scenario of this UC Davis study. The 3R scenario includes "…widespread vehicle electrification and automation, and adds a major shift in mobility patterns by maximizing the use of shared vehicle trips." Based on the 2017 Mt. SAC survey results and the cost sensitivity of students to transportation costs, the 3R scenario best represents the future anticipated transportation choices for commutes to the campus. As indicated by this Study, future transportation choices show a gradual phase-out of gasoline fueled internal combustion engines for light duty vehicles with replacement with private and public electric autonomous vehicles.

Cost per passenger for electric autonomous vehicles varies but can be reduced by 78 percent as compared to a conventionally power gasoline vehicle (Bosch et al, 2018). This cost differential for an individual passenger in an electric autonomous vehicle would be further increased with carpooling. Sixty-two percent of Mt. SAC survey respondents indicated they would be interested in a carpool.

[112] California Community Colleges Chancellor's Office, "Mt. SAC Enrollment Forecast data mar.xls."

Electric vehicles have no direct exhaust emissions and would not add directly to GHG emissions. However, emissions may be generated by electricity generation. California's Renewable Portfolio Standard requires 50 percent of electricity to be from renewable sources by the year 2030. Recently, the California Energy Commission (CEC) was the first in the nation to adopt standards requiring solar systems for new homes. Specifically, the *2019 Building Standards* which will go into effect on January 1, 2020 will require that all new California low-rise residences built in 2020 and after have on-site solar generation equal to the annual electricity use. In addition, California's Cap-and-Trade Program has established a limit on GHG emissions from electrical generation facilities and would require GHG offsets.[113] As such, a high proportion of electricity would be from renewable energy sources which do not generate GHG emissions from energy production. The Scope 3 emissions reflect the widespread adoption of electric vehicles in 2030–2050 with substantial reductions in GHG emissions during these years.



[113] California Air Resources Board, "Cap-and-Trade Program," 2018, https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

MOBILE SOURCE EMISSIONS REDUCTION STRATEGIES

The primary objective of this *Climate Action Plan* is the identification of initiatives that will reduce emissions from both stationary and mobile sources. Initiatives that have the potential to reduce GHG emissions, but are either unquantifiable at this time or their viability remains to be determined, are not shown on the graph, yet are identified in this section.

It was assumed that there would be reduction in single occupant vehicles by 1 percent per annum starting in the year 2020. This is accompanied by a corresponding increase of 1 percent per annum of commuters who use carpools. This projection may be conservative considering that based on the transportation survey, 62 percent of the respondents indicated that they are interested in a ridesharing or carpool-arranging program provided by Mt. SAC. This is also supported by future technologies, such as self-driving cars and electric vehicles that reduce the cost of commutes by sharing a vehicle and its associated costs among multiple individuals as well as reducing the transportation fuel costs. Electric vehicles also do not have direct exhaust emissions and, as such, inclusion of greater proportions of electric vehicles would result in substantial reductions in GHG emissions. Emission reduction strategies are categorized by phases and are associated with corresponding milestone target years.

EMISSION REDUCTION STRATEGY PHASES

Phase 1 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 20 percent by 2025.

Phase 2 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 50 percent by 2035.

Phase 3 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 100 percent by 2050.

PHASE 1: 2018–2025

Increase Access to Alternative Modes of Transportation

- Work with student-run clubs or organizations to develop or utilize an existing web-based or smart phone-based app for carpooling in an effort to increase ridesharing. This tool will enable use of existing student vehicles for multiple passengers thus reducing the number of vehicles commuting to and from the campus. Along these lines, Associated Students formed a Transportation Committee in Spring 2018 to research, discuss, and support transportation based projects. The goals of the committee are to evaluate and determine the viability of a night tram system as well as a campus-wide carpool system for students

- Coordinate with Foothill Transit for construction of a centralized Transit Center on campus according to both the *2018 Educational and Facilities Master Plan* (EFMP) and the *2017 Parking and Circulation Master Plan* (PCMP). The Transit Center will serve as an on-campus transit hub for students and the local community

- Electric cars are projected to increase in popularity and current electric car ownership of campus commuters outpaces available electric vehicle charging stations (EVCS) on campus. Planning for future parking structures and surface parking lots shall meet or exceed current California Green Building Standards Code (Title 24) nonresidential mandatory measures for both EVCS and Electric Vehicle Charging Spaces (EV Space). According to Table 5.106.5.3.3 of the *2016 California Green Building Standards Code*, for new projects, 6 percent of the total number of actual parking spaces shall be required EV charging spaces. Mt. SAC will provide EVCS equaling not less than 6 percent of the total number of parking spaces on campus by 2035. Currently, Mt. SAC hosts 8,907 parking spaces. 6 percent of this total would require 535 parking spaces

- Provide incentives for carpools and vanpools, such as reduced parking fees and dedicated parking areas

- Mt. SAC will produce educational materials highlighting the benefits of alternative transportation and fuel costs, as well as additional information regarding alternative modes of transportation such as bus schedules, local car dealerships offering clean energy vehicles, bike routes and infrastructure, and pedestrian-friendly routes. Consideration of the City of Walnut's recently adopted General Plan, Chapter 3: Circulation, and Collaboration with the City, will be pursued in this mater. Mt. SAC will also investigate partnering with local organizations including BikeSGV. These materials will be available via the College sustainability page, which will also include maps of bike and pedestrian routes and links to transit routes and schedules[114]

[114] City of Walnut, "Chapter 3: Circulation," *General Plan*, 2018, Web, http://www.cityofwalnut.org/home/showdocument?id=12022

MOBILE SOURCE EMISSIONS REDUCTION STRATEGIES *(cont.)*

- Collaborate with City of Walnut to link the campus to active transportation travel modes and pedestrian trails

- Consider a contract with a rental bike program such as E-Bikes or Metro-rental bikes. These bikes will be available for last mile bus connections and for cross-campus and local travel

- The *2018 Educational and Facilities Master Plan* (EFMP) includes analysis of existing and consideration of future campus-wide pedestrian and bicycle mobility throughout campus. Additionally the *Appendix* of the EFMP includes Landscape Guideline C. Bicycle Circulation. These guidelines recommend development of a campus-wide Bicycle Plan. Mt. SAC will develop a plan that includes a map of existing and proposed bicycle routes, both on- and off-street. This plan would address issues such as dedicated bicycle paths and lanes throughout campus, enhanced bicycle infrastructure (lockers, lock-ups, showers, maintenance areas, and parking), electric bike programs, and planning of a Bike Center on campus. This plan would also address public safety elements to serve bicyclists and pedestrians, including security lighting, video surveillance, and emergency call boxes

- Enhance existing bike infrastructure (lockers, lock-ups, showers, paths, maintenance areas, lanes, and parking)

- Partner with local shoe companies and bicycle shops to provide discounts to students to promote bicycling and walking. Mt. SAC would coordinate with BikeSGV to promote this program and provide educational materials on local bikeways and bike-friendly facilities[115]

Mass Transit Education and Incentives

- Mt. SAC's sustainability webpage would feature materials related to transit opportunities, including a direct link to Foothill Transit bus schedules and routes, information regarding bus passes, the ability to purchase bus passes online, and overall benefits for using transit including charts and graphs illustrating cost benefits and emissions data. Students, faculty, and staff would be regularly updated with incentives and opportunities via campus communication

- Actively communicate with Foothill Transit regarding schedule and routes to best serve the student population. This communication will include sharing student data such as geographic distribution and peak travel times

- Coordinate with Foothill Transit to provide security at the new Transit Center, including adequate lighting and cameras

- Coordinate with Foothill Transit to develop on-bus bike racks that can accommodate four or more bicycles

[115] Bike San Gabriel Valley, http://www.bikesgv.org

- Sponsor and promote a contest between student-run clubs to develop promotional material for ridesharing, transit, and alternative modes of transportation. Winning materials will be displayed for the semester on the College's website and, possibly, posted near the transit center, electric vehicle charging stations, ride-hailing drop-off/pick-up areas, and pedestrian respite areas

- Consider providing bus passes to faculty and staff, to encourage their use of mass transit

- Transition to 100 percent clean energy vehicles with 25 percent of the fleet being clean energy by 2025. Improvements to the campus fleet can be made by negotiating with local dealerships to secure discounts on clean energy vehicles for the campus fleet

Additional Solar RECs Required to Offset GHG Emissions

- Offsite Renewable Energy Credits (RECs) could be purchased to offset the remaining greenhouse gas emissions that result from transportation

PHASE 2: 2025–2035

Alternative Transportation Infrastructure

To encourage use of alternative transportation during Phase 2, Mt. SAC must commit to developing a strong infrastructure by doing the following.

- Develop an electric vehicle charging station (EVCS) plan for the campus, to ensure that current code requirements are met or exceeded based on total number of parking spaces on campus. Newly constructed parking structures should include EVCSs to balance current surface parking lots without EVCS, and include power capacity at EV spaces for additional stations to be installed as needed in the future. Additionally, the plan should outline improved infrastructure to increase the number of EVCSs and offer EVCS that are powered by solar

- Consider incentives for electric vehicle uses for campus commuting

- Construct ground-mounted photovoltaics (PV) on surface parking lots (preferably with photovoltaic panels) to provide shade thus lowering the heat island effect and to reduce energy for climate control/air conditioning as recommended in the *2018 Educational and Facilities Master Plan*

- Encourage walking and biking through campus by providing shaded/covered seating areas, pedestrian friendly walkways, campus art, and respite areas, and design and implement pedestrian enhancements to provide physical separation from the roadway and vehicle traffic, as recommended in the *2018 Educational and Facilities Master Plan*

- Develop a Wayfinding Signage Plan, as recommended in the *2018 Educational and Facilities Master Plan*, including development

MOBILE SOURCE EMISSIONS REDUCTION STRATEGIES *(cont.)*

of a map to designate ride-hailing service (Lyft, Uber, etc.) drop-off and pick-up points to encourage students to share the cost of the service

- Work with local dealerships to secure discounts on clean energy vehicles for students, faculty, and staff

- Develop a Bike Center on the campus that would offer bike safety and repair classes, online or face to face. Recruit both student and staff volunteers to run these programs

- Provide a shuttle service from campus to the nearest Metro (the Los Angeles County Metropolitan Transportation Authority) Gold Line Station, and explore shuttles to other popular destinations to consolidate rides

Reduction in Generation of Vehicle Trips

- Increase awareness of alternative modes of transportation through increased promotion of bus passes that are already available and make bus pass information and Foothill Transit's current route and schedule information easily accessible to students

- Consider providing financial incentives to employees who do not drive to work. This could consist of a fee for parking passes, or payments for taking public transportation, biking, or walking

Off-peak Travel Period Scheduling

- Offer use of facilities/classrooms for entertainment options (movies and performances) to keep students on-campus between classes

Improve Campus Fleet and Travel

- Coordinate with local dealerships to secure discounts on clean energy vehicles for the campus fleet. Transition to 100 percent clean energy vehicles with 50 percent of the fleet being clean energy by 2035

Additional Solar RECs Required to Offset GHG Emissions

- Off-site Renewable Energy Credits (RECs) could be purchased to offset the remaining greenhouse gas emissions that result from transportation

PHASE 3: 2035–2050

Alternative Transportation Infrastructure

- Install photovoltaic (PV) panels on both new buildings and parking structures and ground-mounted PV on surface parking lots as recommended in the *2018 Educational and Facilities Master Plan*. The solar PV panels would make use of unused space and offset campus energy costs

Enhance Student Distance Learning

For some students, distance learning represents enhanced access to classes and can reduce the number of trips to campus, and therefore may have an ancillary benefit of reducing carbon emissions. Mt. SAC is committed to promoting students' access to distance learning courses to support

student completion of their Mt. SAC educational goals, and is therefore committed to expanding distance learning course offerings and increasing the number of available sections. The campus already provides technical support for faculty and students. To further support distance learning and students' use of technology, it is recommended that the campus explore partnerships to enable discounted purchasing programs for computers or tablets, software, and internet service/WiFi hotspots for students. Developing a program on campus of short-term loans of WiFi hotspots and computers or tablets should also be explored to enhance students' equitable access to technology. Additionally, broad utilization of web-based materials in classes and campus communications, (including Open Educational Resources) can also reduce carbon emissions by reducing paper use and trips to retrieve physical resources. The Distance Learning Committee was consulted in the development of these recommendations, and the Sustainability Coordinator is expected to collaborate with the committee to work towards these recommendations.

Reduction in Trip Length

- Work with surrounding communities to develop housing opportunities for students and staff near campus

Improve Campus Fleet and Travel

- Coordinate with local dealerships to secure discounts on clean energy/autonomous vehicles. Transition to 100 percent clean energy vehicles with 100 percent of the fleet being clean energy by 2050

Additional Solar RECs Required to Offset GHG Emissions

- Offsite Renewable Energy Credits (RECs) could be purchased to offset the remaining greenhouse gas emissions that result from transportation

Image Credit: "Material Flows." Bates College. Accessed 11 March 2019. www.bates.edu/sustainability/material-flows.

SECTION 8: SOLID WASTE

BACKGROUND

An estimated 130 billion pounds of food are discarded in the United States, amounting to about $160 billion in lost monetary value—the equivalent of $500 per capita.[116] This amount includes 22 million pounds from U.S. colleges, according to estimates by the Food Recovery Network.[117] According to the EPA, 75 percent of the American waste stream is recyclable; however, on average only 30 percent of total waste is actually recycled. Furthermore, the average college student produces 640 pounds of solid waste each year, including 500 disposable cups and 320 pounds of paper. Even more striking is the statistic which indicates that Americans comprise about 5 percent of the world's population and annually produce 27 percent of the world's garbage.[118]

From an environmental perspective, food requires substantial amounts of water, energy and land to produce. For example, one pound of beef requires 1,847 gallons of water, 52 pounds of cattle feed, 260 square feet of land to grow the feed, and releases 20 pounds of carbon dioxide equivalents.[119] Animal manure, pesticides and herbicides, which are widely used in our agricultural system, endanger the health of farm workers, kill wildlife, contaminate drinking water and result in methane emissions. Unsustainable farming practices contribute to soil erosion, salinization and biodiversity loss. Food waste is also the single largest waste stream entering municipal landfills, where its anaerobic decomposition can release methane, a highly potent greenhouse gas.

[116] Jean C. Buzby, Hodan F. Wells, and Jeffrey Hyman, "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States," 2014, https://www.ers.usda.gov/webdocs/publications/43833/43680_eib121.pdf

[117] Linda Poon, "When Food Is Too Good To Waste, College Kids Pick Up The Scraps." *The Salt*, NPR, 2015, http://www.npr.org/sections/thesalt/2015/02/27/389284061/when-food-is-too-good-to-waste-college-kids-pick-up-the-scraps

[118] Sustainability Office, "What You Can Do," Boston College, 2016, https://www.bc.edu/offices/sustainability/what-you-can-do/know-facts.html

[119] M.M. Mekonnen and A.Y. Hoestra, "The Green, Blue and Grey Water Footprint of Crops and Derived Crop Products," UNESCO-IHE Institute for Water Education, 2010, http://waterfootprint.org/media/downloads/Report47-WaterFootprintCrops-Vol1.pdf

SECTION 8: SOLID WASTE

SOLID WASTE PRACTICE AT MT. SAC

American Reclamation is the waste hauling company for Mt. SAC. Solid waste is taken by American Reclamation and then separated into what can be recycled by South Coast Fibers, a third-party recycling agency. The recycled materials are then taken to Covanta Long Beach Renewables and turned into waste energy. These hauling and recycling agencies claim high recycling rates of 70 percent or greater. At Mt. SAC the great majority of waste that is generated is composed of food waste, wrappers, paper, cardboard, aluminum, plastic, and residuals. The total waste collected by the hauling agencies is provided to the College in both monthly and annual reports. These values have been included in the total emissions calculations.

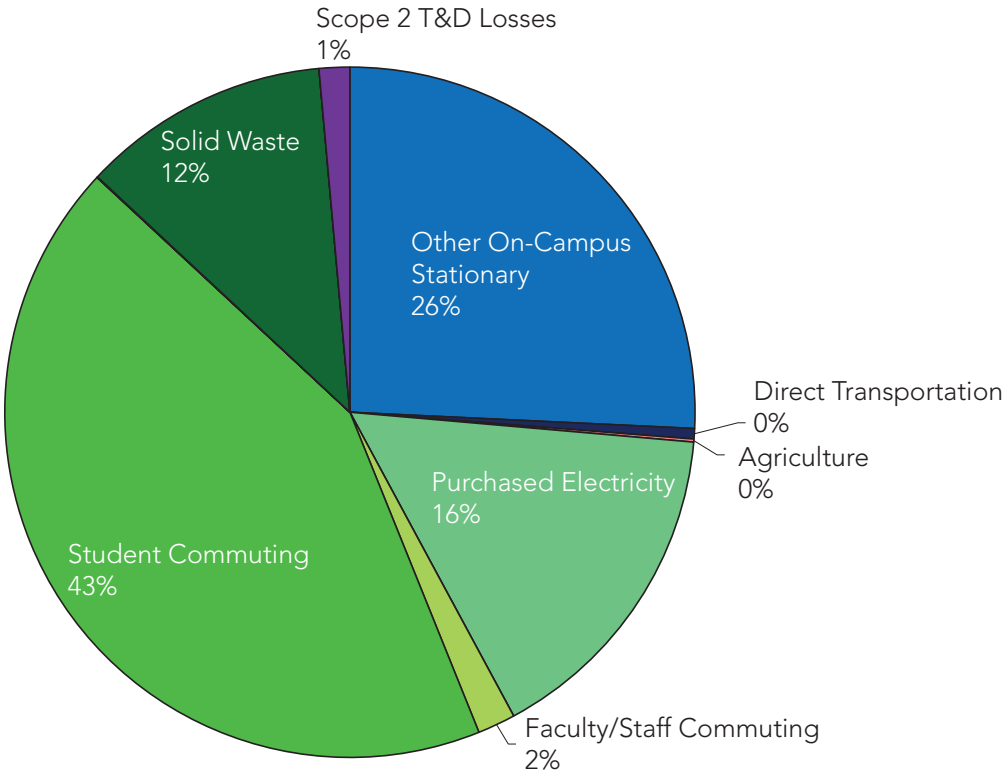
Mt. SAC students are currently working on a recycling program uniquely modified to suit the College's needs. The Clean Campus Initiative is a waste collection strategy that utilizes zero-waste stations, a responsive marketing strategy that informs the student body about living sustainably, and a collection system proposal to compost in the future. This project at Mt. SAC initially began as a student proposal for a PepsiCo grant, and after winning one of the Mt. SAC President's Student Sustainability Awards, became an internship position within Energize Colleges.

Mt. SAC is also in the process of developing plans for on-campus composting that will sustainably turn green waste from the Wildlife Sanctuary, Horticulture Unit, Farm, and campus landscaping into compost. The Landscape Guidelines, developed as part of the 2018 Educational and Facilities Master Plan, recommend that Mt. SAC "collect and compost green water (vegetation trimmings)". The Appendix on Farm Planning in the EFMP also describes composting recommendations and potential locations.

GREENHOUSE GAS EMISSIONS, SCOPE 3 SOLID WASTE

The chart below illustrates that in 2016, waste accounted for 13 percent of the total emissions on Mt. SAC's campus, which is equivalent to 8,314 metric tons of annual waste. Per capita, this equates to 0.11 metric tons of solid waste per student, or 242 pounds of solid waste per Mt. SAC student.

2016 SUBCATEGORY PIE CHART



SECTION 8: SOLID WASTE

SOLID WASTE REDUCTION STRATEGIES

Considerable progress can be made to achieve a long-term goal of zero waste at Mt. SAC. Per the EPA, "achieving Net-Zero Waste means reducing, reusing, and recovering waste streams to convert them to valuable resources with zero solid waste sent to landfills over the course of the year."[120] The following strategies outline a pathway to Net-Zero Waste by the year 2050. Emission reduction strategies are categorized by phases and are associated with corresponding milestone target years.

EMISSION REDUCTION STRATEGY PHASES

Phase 1 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 20 percent by 2025.

Phase 2 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 50 percent by 2035.

Phase 3 strategies, combined for stationary sources, purchased electricity, transportation, and solid waste, aim to result in a cumulative emissions reduction of 100 percent by 2050.

[120] United States Environmental Protection Agency, "Net Zero Concepts and Definitions," 2016, https://www.epa.gov/water-research/net-zero-concepts-and-definitions

PHASE 1: 2018–2025

Implement Sustainable Food Purchasing

Thirty to forty percent of landfill waste is composed of food waste, therefore the adoption of sustainable food practices will result in a reduction of total landfill waste. The College currently contracts with Sodexo for food services. The timing is good for Mt. SAC to work with Sodexo on improving environmentally sustainable practices, as the company has recently launched a sustainability initiative of its own. Sodexo implements recycling measures such as recycling of paper products and reduction of styrofoam and plasticware. Food and beverage vending machines are located throughout campus as well. In order to optimize reuse, reduction, and recycling of food items on campus, it is recommended that the College coordinate with on-campus food vendors to establish sustainable policies which include but are not limited to the following.

- Purchase sustainable food from fair trade, sustainably harvested, and local sources
- Discontinue use of styrofoam and plastic serving ware and replace with compostable ware which can be placed into food trash bin
- Provide well marked designated receptacles for recycling (paper, aluminum, and plastic), compost (food waste and compostable ware), and landfill (rubbage that does not fit into either of the two previously mentioned categories). Sodexo operates separately from the campus and does not currently have recycling-waste bins in the Sodexo operated food service areas. This added feature may incur additional costs and may require a revisit to the contract agreement with Sodexo
- Compost a portion of the food waste and divert the compost to the on-campus Farm and used for amendments to agriculture. It is estimated that $100,000 would be required to supply an on-site chipper/mulcher to handle this operation, as well as additional staff hours to transfer green waste to the Farm on a daily basis. Any of this waste that is diverted from the landfill will decrease the total emissions
- Provide a variety of healthy food and beverage options that are provided within environmentally friendly packaging to students. Consider incentives for students, staff, and faculty for making these choices
- Purchase a compactor for other non-Sodexo food areas around campus in order to consolidate space. Currently there is only one compactor located in the Sodexo food service areas that compacts food waste and is picked up once a month

Revisit Contract with Existing Hauling Agency and Self-auditing

Currently, the hauling agency American Reclamation picks up waste from one main bin per collection area. The bins contain commingled waste. In order to optimize landfill diversion rates of trash hauled away from campus, it is recommended that the College negotiate its policy with the existing hauling agency, in favor of the practice of picking up landfill, recycling, and compostables from separate bins on a

SOLID WASTE REDUCTION STRATEGIES *(cont.)*

weekly basis. [The College currently has plans for a request for proposals (RFP) to be issued to all interested hauling agencies, including the current agency]. Revised contracts with hauling agencies will likely result in higher costs, therefore additional funding would be required. In addition, the dispatch of three different hauling agency trucks (landfill, recycling, and compost) will add greenhouse gas emissions as well. The College could work with hauling agencies to determine if clean-fuel trucks are an option, or if it would be possible to offset these additional emissions, such as through renewable energy credits.

Improve Recycling and Waste Receptacles on Campus

Two types of waste containers are currently in use on campus: Green or Blue recycling receptacles for glass, plastic, and paper. Brown waste (landfill) receptacles are placed adjacent to the recycling receptacles.

The following strategies should be considered in order to improve the landfill diversion rates.

- Establish "zero-waste stations" with composting/recycling receptacles in all food service areas
- Provide clear signage that educates the user as to how to dispose of their "waste." For example, signage should inform the user as to whether or not they can throw away food containers that have food on them
- Develop and implement a waste-on-campus training program for students and the community. This could be developed in partnership with the Facilities Planning and Management Department, hauling agencies, and students. Student clubs could champion the marketing effort
- Provide composting bins in addition to recycling and waste bins around campus
- Explore alternative waste receptacles to make waste collection more efficient for maintenance staff

Install Bottle Filling Stations Throughout Campus

Bottle filling stations already exist on campus. These stations promote the use of personal thermoses and limit plastic being thrown away or recycled. It is estimated that 4,000 bottles per year per filling station are saved as a result.[121] In order to optimize this result, the College would need to install additional stations both indoors and outdoors. Additional funding can be costly to implement at every building; however, a phased approach could be used. The cost to install a drinking fountain is about the same as a bottle filling station, at about $1,600.[122] It is recommended that an audit is conducted to determine where these stations could go, and where they would be most useful. In addition, it is recommended that the College supply reusable bottles (metal) to students, faculty, and staff. These reusable thermoses could be distributed during

[121] Bryan Roth, "Campus Water Stations Save 400,00 Plastic Bottles," Duke Today, 2015, https://today.duke.edu/2015/10/hydrationstations

[122] Elkay, *ELP-6C Commercial Price Guide*, 2017, http://www.elkay.com/wcsstore/lkwscontent/brochure_documents/elkay/price%20books/f-4676_commercial_pricebook_2017_updates.pdf

registration or at club events, and could include a map pointing out the locations of bottle filling stations.

End On-site Use of Styrofoam, Straws, Plastic Place Settings and Plastic Bottles

Aside from the food service areas run by Sodexo on campus, many buildings have break/hospitality/kitchen areas that are stocked with eating ware. It is recommended that a sustainable purchasing program be put into place that replaces styrofoam and plastics with compostable or reusable options.

Make More Processes Paperless

From course work, to administrative functions, efforts to reduce paper use can make a significant difference in reducing the College's overall solid waste. Currently 765,060 pounds of paper are used annually at Mt. SAC. Although this paper is composed of recycled content, it would be ideal to reduce the amount purchased and used. Strategies to reduce paper use include presetting all College printers to two-sided printing, providing electronic syllabuses to students each term, as well as examining current practices to identify any processes that can be moved in part or entirely online.

Participate in RecycleMania

RecycleMania is a friendly competition and benchmarking tool for college and university recycling programs to promote waste reduction activities to their campus communities. Over an 8-week period each spring, colleges across the United States and Canada report the amount of recycling and trash collected each week and are in turn ranked in various categories based on who recycles the most on a per capita basis, as well as which schools have the best recycling rate as a percentage of total waste and which schools generate the least amount of combined trash and recycling. With each week's updated ranking, participating schools follow their performance against other colleges and use the results to rally their campus to reduce and recycle more. National recognition is provided to the winning school

Image Credit (top): "Rapid Water Bottle Filling Stations." ELKAY. Accessed 11 March 2019. www.elkay.com/bottle-filling-stations.

Image Credit (bottom): RecycleMania. Accessed 11 March 2019. www.recyclemania.org.

SOLID WASTE REDUCTION STRATEGIES *(cont.)*

in each category on the RecycleMania website and in a national press release. Winning schools receive an award made out of recyclable materials, and win the right to host that category's special traveling trophy for the coming year. This free program is an ideal way to promote awareness, participate in recycling, and even generate income for the campus.

Increase Furniture Reuse

The College has a large stock of furniture that is used throughout campus. Mt. SAC has enacted standards and processes the ensure that all furniture purchased is durable, has a long warranty period, and can withstand relocation and reuse as needs change over time. Once furniture has reached its "end of life," the campus sells old stock to an outside vendor. Additional options for more sustainable reuse of furniture should be explored, including the development of a Reuse Depot, with an online catalog of available items to support on-campus reuse of items that have not reached their "end of life" and the additional staff and equipment needed to operate the facility. The College could contact the current vendor to see how the two entities could better coordinate furniture reuse efforts.

Implement E-Waste and Hazardous Waste Collections

E-waste is a popular term for electronic products nearing the end of their useful life. Computers, printers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products. Electronic discards are one of the fastest growing segments of our nation's waste stream. Under current regulation, these devices require special handling and can no longer be disposed of in landfills. The City of Walnut is within Los Angeles County and stands to gain from free countywide Household Hazardous Waste and E-Waste collections. It is recommended that Mt. SAC coordinate with the city of Walnut to host a Household Hazardous Waste and E-Waste Day on campus. Parking lots along Temple could provide an easily visible and accessible site for this event. Campus equipment would need to be "wiped" in order to uphold College confidentiality of records. With this process is place, hazardous waste and e-waste from the campus, community, and students could all be collected in one location, reducing the amount of waste in landfills, and strengthening ties with the community.

Examples of Electronic Waste (E-Waste) Items are as follows.

- Alarm Clocks
- Answering Machines
- Camcorders
- CD & DVD Players
- Cell Phones
- Computers
- Copiers
- Digital Cameras
- Digital Thermometers
- Exercise Equipment Displays
- Handheld Electronic Devices
- Medical Monitors
- iPods & MP3 Players
- Pagers & PDAs
- Printers & Fax Machines
- Programmable Kitchen
- Appliances
- Radios (all types)

- Stereos
- Telephones
- Televisions
- VCRs
- Video Game Consoles

Another option would be to engage in the RecycleMania's subdivision, known as the E-cycleMania category. Electronics are not included with the traditional 8-week categories of RecycleMania. Campuses may include electronic waste such as computers, printers, and related equipment; consumer electronics; power cords, chargers, and other ancillary equipment.

PHASE 2: 2025–2035

Install an Anaerobic Biodigester on Campus—Small Scale

A biodigester is a large, fully enclosed tank into which organic waste is collected. Anaerobic is defined as the absence of oxygen. Anaerobic microbial organisms locked in a sealed environment without oxygen, but with abundant food and other organic waste material, produce biogas, a methane-rich gas through their digestive process. In an anaerobic biodigester, this natural process of decomposition is technologically sped up to optimal speed and efficiency. The trapped methane gas is then cleaned and used to generate electricity and steam for heating and cooling via a combined heating and power (CHP) or cogeneration system. The biogas also can be directly used to produce steam in boilers for hot water and heating. Leftover organic solid waste can be used as fertilizer, a soil enhancer, or be further composted. Small scale biodigesters are coming into the market and are worth

Image Credit (top): "Anaerobic Digestion Tech. Suite." BIOFerm Energy Systems. Accessed 11 March 2019. www.biofermenergy.com/anaerobic-digestion.

Image Credit (bottom): "UC Davis biodigester turns campus waste into campus energy." UC Davis College of Engineering. Accessed 11 March 2019. www.engineering.ucdavis.edu/blog/uc-davis-biodigester-turns-campus-waste-campus-energy.

SOLID WASTE REDUCTION STRATEGIES *(cont.)*

consideration. Working with Mt. SAC's Agricultural Sciences Department, such a biodigester could provide a means of collecting and using food waste in a responsible and educational way. The residual compost could be used on-site for crops at the Farm and for ornamental landscape around campus. One potential location for this equipment may be behind Mountie Café. Case studies from Stanford or UC Davis should be consulted.

Achieve Construction Waste Management Diversion Goals of 100 Percent

Per CALGreen Code, currently 50 percent construction waste diversion is a California mandate; however, 75 percent diversion has become an industry standard.[123] Working with local hauling agencies and contractors, a diversion rate of 95 percent is achievable in today's market and by 2035, 100 percent construction waste management will be highly achievable. Recent examples of construction projects on campus provide proof of this trend. By including this as a requirement in campus agreements with contractors and hauling agencies, the College will not only reduce the amount of waste going to landfill from its own projects, but it will be setting a new expectation for the building industry as a whole.

PHASE 3: 2035–2050

Install an Anaerobic Biodigester on Campus—Large Scale

Pending the test fit of the small scale biodigester being proposed during Phase 2, a larger scale biodigester is proposed for Phase 3. This biodigester would be designed to process up to 2,000 tons of manure from the Farm's cattle and horses to create renewable biogas. It would have an electric capacity of 64 kW and a thermal capacity of 101 kW. The average annual electricity production of such a unit would be approximately 512,000 kWh; the estimated energy produced is equivalent to providing electricity to 50 U.S. houses for a year, or heating 61 houses.

[123] "Calrecycle Publications Catalog Search | Publications Public," *www2.calrecycle.ca.gov*, 2018, https://www2.calrecycle.ca.gov/Publications/Details/1538

ANAEROBIC BIODIGESTER

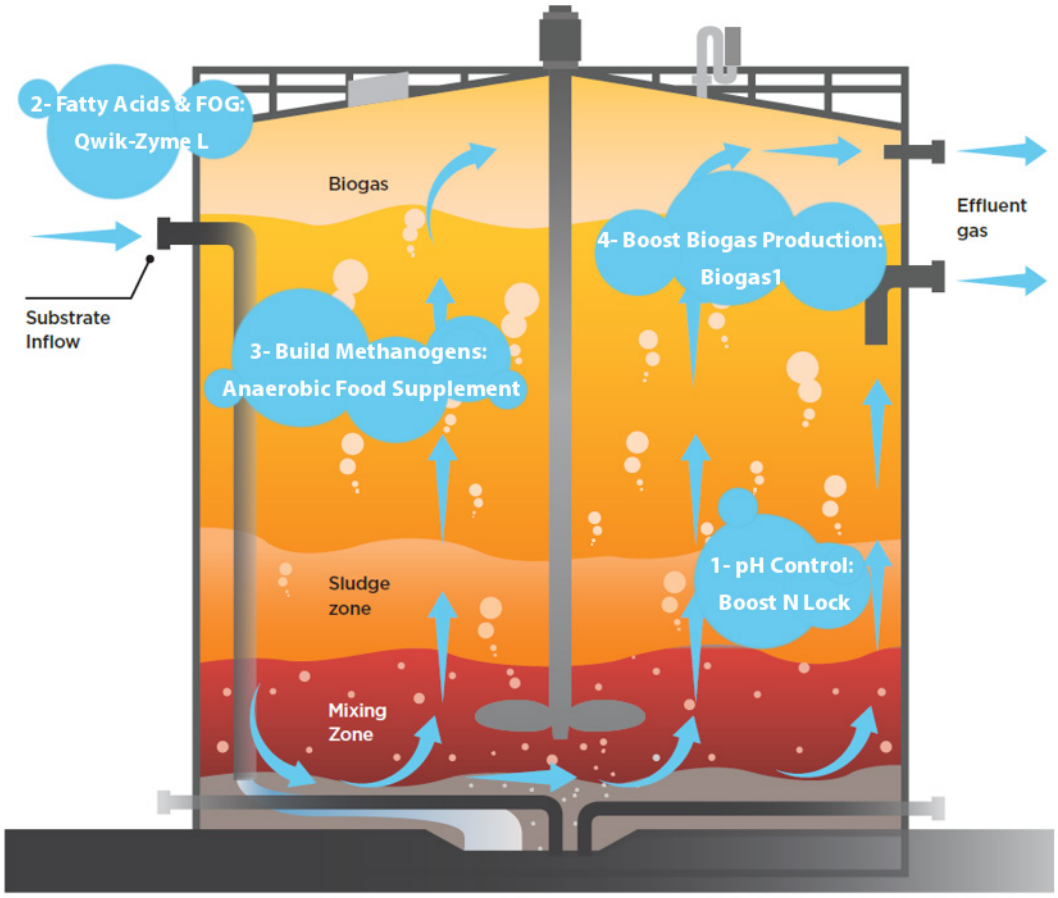


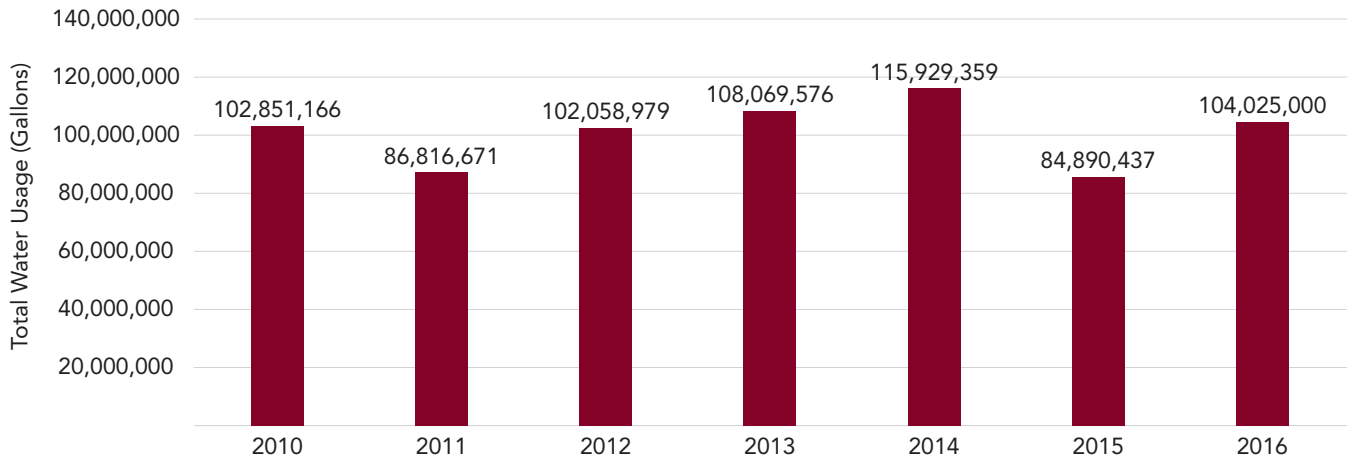
Image Credit: "Anaerobic Digester Foaming." Aquafix. Accessed 11 March 2019. www.teamaquafix.com/anaerobic-digester-foaming.

BACKGROUND

Mt. SAC purchases all of its potable water on a wholesale basis from Three Valleys Municipal Water District. As a local water agency, Mt. SAC has the legal right to produce groundwater from its own wells located on campus and has a long history of producing groundwater for its own use. Reactivating three on-campus wells, developing additional groundwater wells, and implementing aggressive strategies to conserve water are the key elements of the College's water use optimization strategy. It must be noted that the production of groundwater is contingent on identifying a feasible and sustainable method of extraction that addresses the depth of the regional water table.

Water use data was collected for both domestic use in buildings and irrigation use. The data presented in the following charts indicate that far more water is being used for irrigation than in buildings.

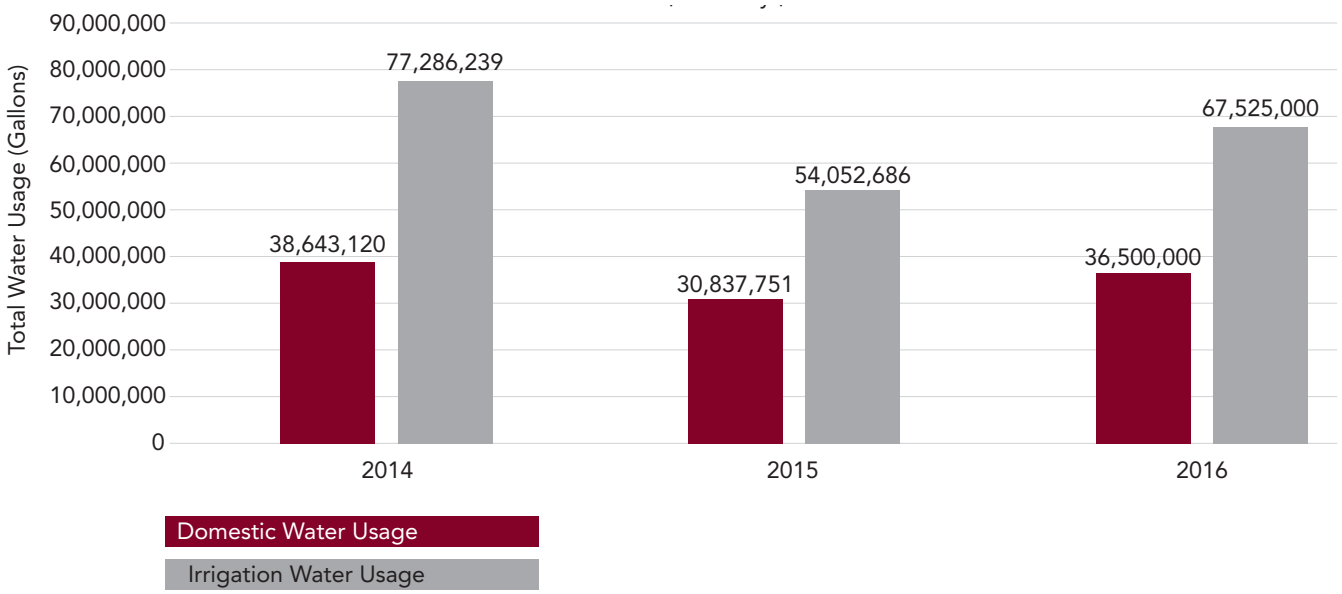
ANNUAL TOTAL WATER USAGE OF MT. SAC (GALLONS/YEAR)



BACKGROUND *(cont.)*

The College's water use includes on-campus domestic uses, landscape irrigation, athletic field irrigation, pasture, and range land irrigation, and Wildlife Sanctuary uses. Currently the water use on campus is not separated by building or site. Therefore it is challenging to estimate the amount of water consumed by each entity. Looking forward, the College will seek to meter water use at both the site level and the individual building level.

TOTAL WATER USAGE OF MT. SAC (GALLONS/YEAR)



EXISTING WATER CONSERVATION PRACTICES

The College employs the following campus programs to optimize water conservation.

- Water reclamation strategies such as on-site stormwater retention areas and bioswales have been employed on campus to capture and divert stormwater to surrounding soils rather than to stormwater lines

- Technology-based conservation such as hands-free sensor-activated plumbing fixtures (flushometers and faucets) and weather-based "smart" irrigation controllers (provide the appropriate watering schedule, adjust for weather changes, and irrigate based on the needs of the landscape and soil conditions)

- Effective landscaping approaches that look at zero water use, or 50 percent reduction in water use, as compared to an EPA baseline

- Ongoing maintenance programs which include the repair and replacement of building plumbing fixtures (water closets, urinals, etc.) which optimize water use to a minimum of 40 percent water efficiency

The Landscape Guidelines included in the *2018 Educational and Facilities Master Plan* (EFMP) recommend a series of sustainability goals related to landscape water use reduction, stormwater management, and landscape maintenance. Furthermore, the recommended planting palette was selected based on these goals and the legend clearly identifies the irrigation demands of each plant in the palette. Additionally, the EFMP includes an *Appendix* section entitled "Utilities Infrastructure," which makes recommendations regarding campus water systems—potable water, non-potable water, stormwater, and sewer. Many of the following CAP goals and strategies are articulated in and supported by the EFMP.

ESTABLISH WATER CONSERVATION GOALS

In order to lay the groundwork for a more water conscious and sustainable future, the following goals are recommended for adoption by the College.

- Achieve 50 percent reduction as compared to the Energy Policy Act of 1992 standard of building water use

- Reduce the campus landscape water requirement (LWR) by at least 30 percent from the calculated baseline for the campus's peak watering month

- Implement a comprehensive stormwater management plan for the campus that retains on-site stormwater, through infiltration, evapotranspiration, and/or reuse

- Monitor and meter water use on campus for buildings and grounds

WATER CONSERVATION STRATEGIES

The goals outlined in the previous section can be achieved through implementation of the following strategies.

REDUCE STORMWATER, SEWER DISCHARGES, AND WATER POLLUTION

Mt. SAC stormwater infrastructure has not been developed to a consistent level throughout the campus. For example, the Farm's stormwater infrastructure can be greatly improved. Currently a lack of water pressure results in inefficient irrigation. The infrastructure is in need of upgrading in order to optimize water use. Development prior to the Measure RR building program was not subject to the stricter stormwater management regulations that currently govern Mt. SAC's development. The 2018 EFMP includes a discussion of the utilities needs of the Farm Precinct in Chapter 11: *Site and Infrastructure Improvements* and proposes a series of recommendations.

Mt. SAC needs to implement a comprehensive, campus-wide approach that will reduce its impact on sensitive environments downstream and comply with current regulations. Mt. SAC's Facilities Management and Planning Department ensures that a site-specific stormwater pollution prevention plan (SWPPP) is developed for every construction project required to comply with stormwater discharge requirements. As defined by the Environmental Protection Agency (EPA), "the SWPPP is a site-specific, written document that:

- Identifies potential sources of stormwater pollution at the construction site
- Describes practices to reduce pollutants in stormwater discharges from the construction site. Reduction of pollutants is often achieved by controlling the volume of stormwater runoff (e.g., taking steps to allow stormwater to infiltrate into the soil).
- Identifies procedures the operator will implement to comply with the terms and conditions of a construction general permit"

ADOPT SUSTAINABLE LANDSCAPING PRACTICES

Chapter 8: *Environmental Analysis* of the EFMP includes a section entitled Landscape Irrigation Intensity that both discusses existing conditions and recommendations for the future. This section is reproduced here for consistency as part of the CAP recommendations.

Landscape irrigation requirements are affected by the water needs of particular plants and the use of outdoor space. There are various methods of delivering water to plants in order to accommodate these demands, and consequently, Mt. SAC's landscape incorporates multiple types of irrigation across campus. The Landscape Irrigation Intensity diagram shows the irrigation types, and ranks them from most to least efficient in the legend.

Drip irrigation is the most efficient means of irrigating non-turf areas. This form of irrigation delivers low volumes of water directly to plant roots and minimizes losses to wind, runoff, evaporation, and overspray. As a result, drip irrigation uses 20–50 percent less water than conventional pop-up sprinkler systems.

However, drip irrigation is not suitable for all types of plantings and landscape uses. High activity areas, such as select student lawns, sports fields and pastures, require more water than other areas, and also require different water distribution methods, such as rotors instead of drip. While rotors are not as efficient as drip irrigation, some types of rotors are more efficient than others. These high activity areas of the campus may require turf for a specific purpose, such as for sports events and agricultural programs. While artificial turf is an alternative to turf, it also poses environmental effects which can be adverse, such as overheating, perpetuation of stormwater runoff, and emission of volatile organic compounds (VOCs) into the air. In lieu of this option, optimizing irrigation for specific and limited turf areas, such as the select student lawns, pastures, and athletic fields is recommended.

Areas that do not utilize the most efficient irrigation type appropriate for the planting type and land use present opportunities to reduce irrigation water use. For example, areas with shrub plantings and spray nozzle irrigation could be upgraded to more efficient irrigation types. Mt. SAC is currently in the process of converting the systems in many of these areas to more efficient methods of irrigation in order to reduce water use. There is also currently an initiative to install weather-based controllers to provide additional water savings through better scheduling.

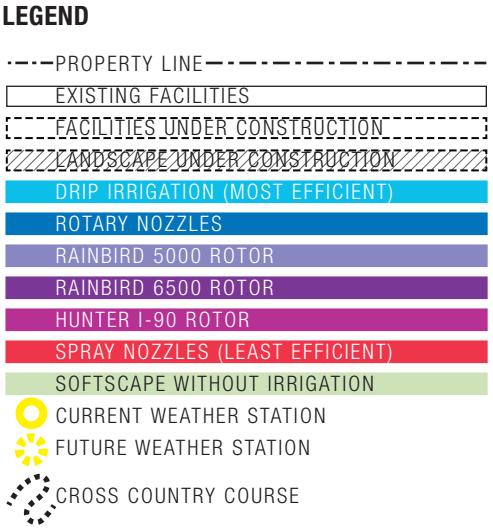
For instance, Mt. SAC's Grounds Department has addressed barren areas on campus through redesign, installing water-wise plant material, and installing drip irrigation (Building 45 Kinesiology and Mt. SAC Way brick marquees). However, the Grounds Department currently lacks the funds, staff, and resources to complete similar projects in a timely manner. An increase in funding, staff, and resources would greatly help in the renovation of existing landscaping.

WATER CONSERVATION STRATEGIES *(cont.)*

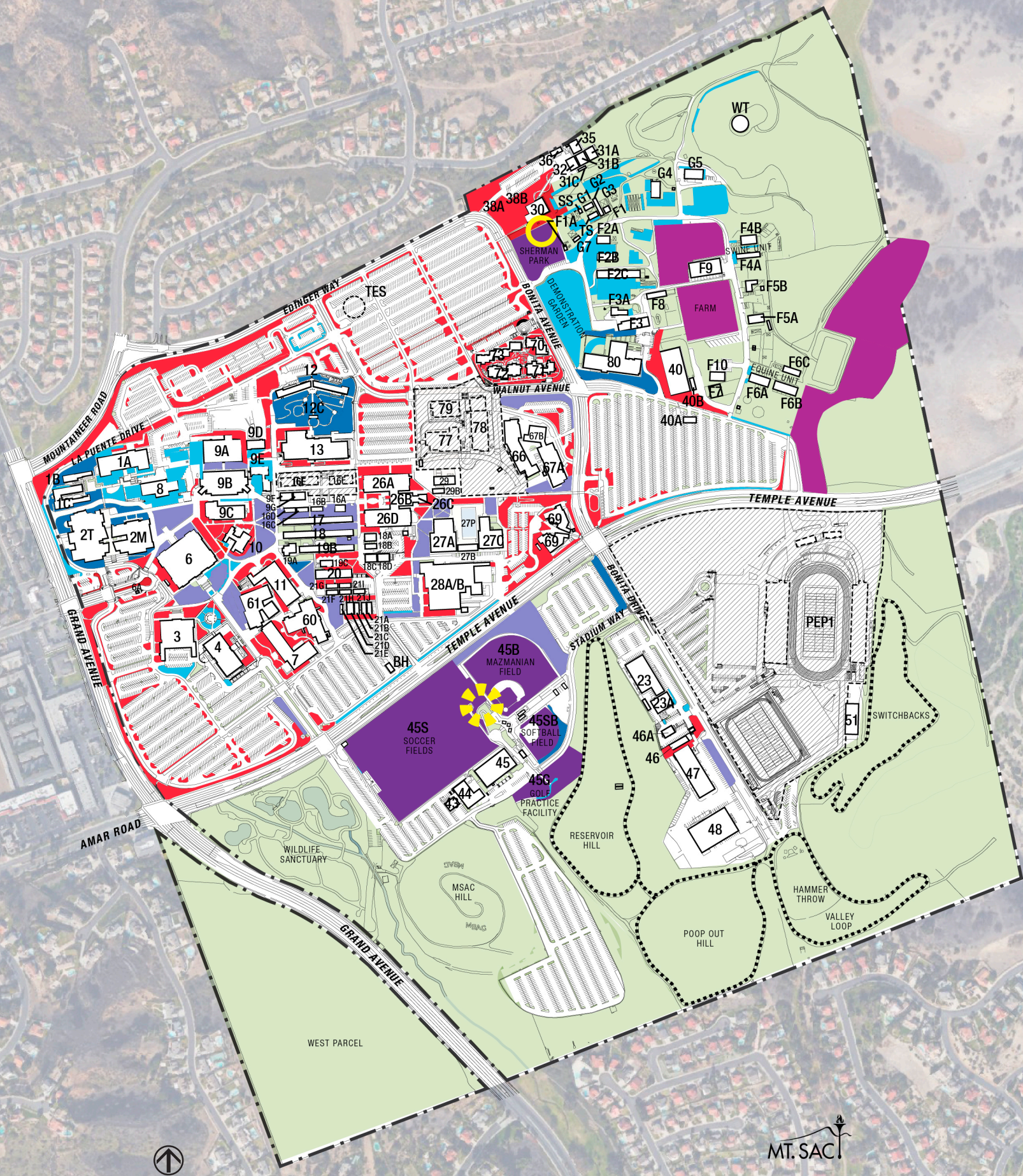
UPDATE IRRIGATION SYSTEMS WITH FLOW SENSORS

Mt. SAC received $100,000 from California state funding for upgrades to the 15-year-old irrigation system. This was matched by Mt. SAC, therefore a total of $200,000 was spent on these upgrades. The campus now uses the MaxiCom/Rainbird Irrigation System. In addition weather sensors were upgraded and 80–90 percent of controllers were replaced for the the irrigation system at all athletic fields and ornamental landscaping areas. However, despite these upgrades, it is acknowledged that the majority of water use is still due to Mt. SAC's athletics fields, at approximately 100,000 gallons of water per night.[124]

This irrigation use could be made more efficient through the implementation of flow sensors which could measure and monitor water use. Approximately 98 percent of existing master irrigation valves and flow sensors in the ground are not working adequately. Additional funding would be needed for the flow sensors as well as additional staff for installing sensors and maintaining the athletic fields. In addition more coordination with Information Technology (IT) Department would be required to capture the digital capabilities of the system. Computers and durable "smart" devices would also be needed to monitor the systems remotely. Coordination with the Kinesiology, Athletics and Dance Division, and especially the coaches, will also be required to ensure that field conditions are relayed back to the Grounds Department in a timely manner. It is estimated that these upgrades will require $300,000 in funds.



[124] Mt. SAC Grounds Staff, CAP Local Experts Focus Group, 2 March 2018.



MT. SAC

LANDSCAPE IRRIGATION INTENSITY

WATER CONSERVATION STRATEGIES *(cont.)*

CONDUCT A WATER AUDIT

An audit would allow the College to determine how much water is being used for various areas of the campus. However, the College's water for both building and grounds is routed through one shared water main. Within the existing system, the College cannot simply subtract out the water for irrigation from the total water use. Flow sensors would be required in order to quantify the use, and that would allow the Facilities Planning and Management Department to work backwards to subtract out the irrigation water from the main water utility bill. For new construction, water submeters should be installed to ensure that buildings are meeting a 35–40 percent efficiency.

COORDINATE WITH THE FARM ON FARM IRRIGATION UPGRADES

Currently, the Grounds Department does not control the Farm area on campus, where a significant amount of irrigation is being used. The infrastructure at the Farm needs to be updated in order to provide adequate water pressure to the irrigation system. The Maxicom/Rainbird irrigation system is used throughout campus exclusively, except for at Building 80 (Agricultural Science), where a variety of irrigation systems are showcased for educational purposes. Coordination between the Farm and the Maxicom/Rainbird campus-wide system would be ideal in order to maximize efficiency.

CONDUCT ONGOING STAFF TRAINING

Ongoing training of staff is essential to the future success of existing and new irrigation systems put into place at the College. Training sessions have already begun; however, regular retraining needs to be conducted. Regional training sessions with Maxicom/Rainbird could be hosted at Mt. SAC. An event such as this would also provide Mt. SAC with an ideal opportunity for demonstrating their water conservation efforts to the community at large.

EXTEND ETHERNET CONNECTIVITY TO IRRIGATION SYSTEMS

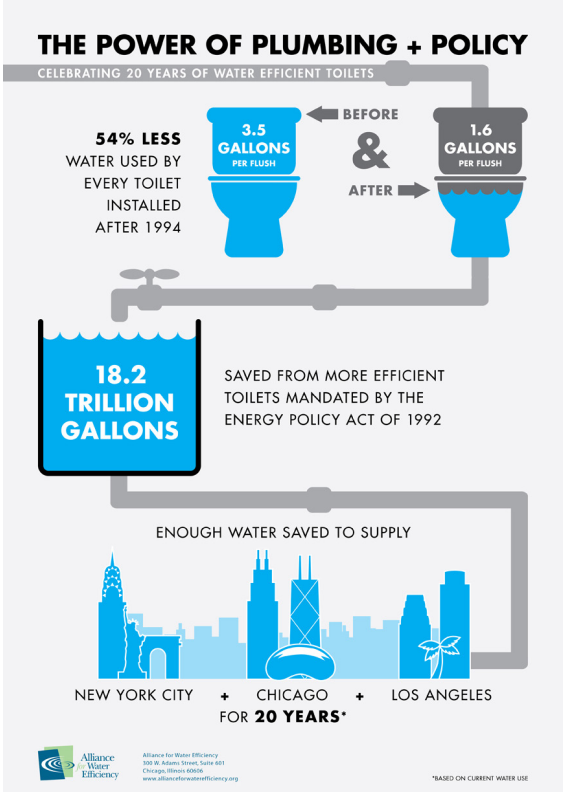
Convert Sherman Park from radio to ethernet (as at the soccer field weather station) to allow for uninterrupted wireless communication among Grounds Department staff. This will allow for closer irrigation coordination between sites and staff that will not compete with communication that occurs between construction staff over the course of the year via radio frequencies.

UPGRADE PLUMBING FIXTURES

Install 35–40 percent more efficient plumbing fixtures in existing restrooms that are durable, work effectively, and are easy to maintain. The College has retrofitted existing plumbing fixtures (such as water closets and urinals) with hands-free, sensor-activated flushometers. While these fixtures have been installed successfully, maintenance staff have experienced multiple issues with the ultra low flow fixtures (1.28 gallons per flush), since these fixtures tend to clog and stress the existing underground infrastructure due to a lack of sufficient water flow through sewer lines. It is recommended that low consumption (1.6 gallons per flush) plumbing fixtures are specified and installed to prevent this issue while still preserving water on campus.

INSTALL A LIVING MACHINE®

Water systems today are designed to use water once and flush it downstream. The growing constraints on water resources mean that the College has to redesign its systems for significant reuse. The Living Machine® is a patented form of ecological sewer treatment designed to mimic the cleansing functions of wetlands. "It blends cutting-edge science and engineering with plants and beneficial bacteria to efficiently treat and reuse wastewater."[125] This on-site sewage treatment is comprised of a bioremediation system that can also produce beneficial byproducts, such as reuse-quality water, ornamental plants and plant products—for building material, energy biomass, and animal feed. Aquatic and wetland plants, bacteria, algae, protozoa, plankton, snails, and other organisms are used in the system to provide specific cleansing or trophic functions. The tidal process operates outdoors in tropical and temperate climates.[126] This system could be installed and integrated into the existing campus landscape, while treating black water to a grey water level. The Living Machine should be situated in a visible location, where it may be used to educate students, staff, faculty, and the public about water conservation on campus.



[125] "Home." *Livingmachines.com*, 2018, http://www.livingmachines.com/

[126] Wikipedia contributors. "Living machine." *Wikipedia, The Free Encyclopedia*, 2 Sep. 2018, https://en.wikipedia.org/wiki/Living_machine


MSAC

EMISSION REDUCTIONS

The Projected Emissions Reduction Strategies graphs on the following pages illustrate the emission reduction potential for each strategy as compared to the Business as Usual projection to the year 2050. Each current and future Scope 1 and Scope 2 strategy is discussed in Section 6: *Purchased Electricity, Stationary Emissions, Building Practices, and Reduction Strategies*, while Scope 3 strategies for Transportation and Solid Waste are discussed in Section 7: *Transportation, Commuting, Campus Fleet, and Travel* and Section 8: *Solid Waste* respectively. In addition, behavioral change initiatives follow in Section 9: *Water, Wastewater, and Sustainable Landscaping*, Section 11: *Curriculum, Professional Development, and Research*, and Section 12: *Outreach* . To clearly tie each strategy's description to its corresponding emission reduction area in the Projected Emissions Reduction Strategies graph, the strategy name is followed by the color of the area that represents its calculated emission reduction potential. Initiatives that have potential to reduce GHG emissions but are unquantifiable at this time, or their viability remains to be determined, are not shown on the graph, but are discussed in Sections 6, 7, and 8 in detail.

EMISSION REDUCTIONS *(cont.)*

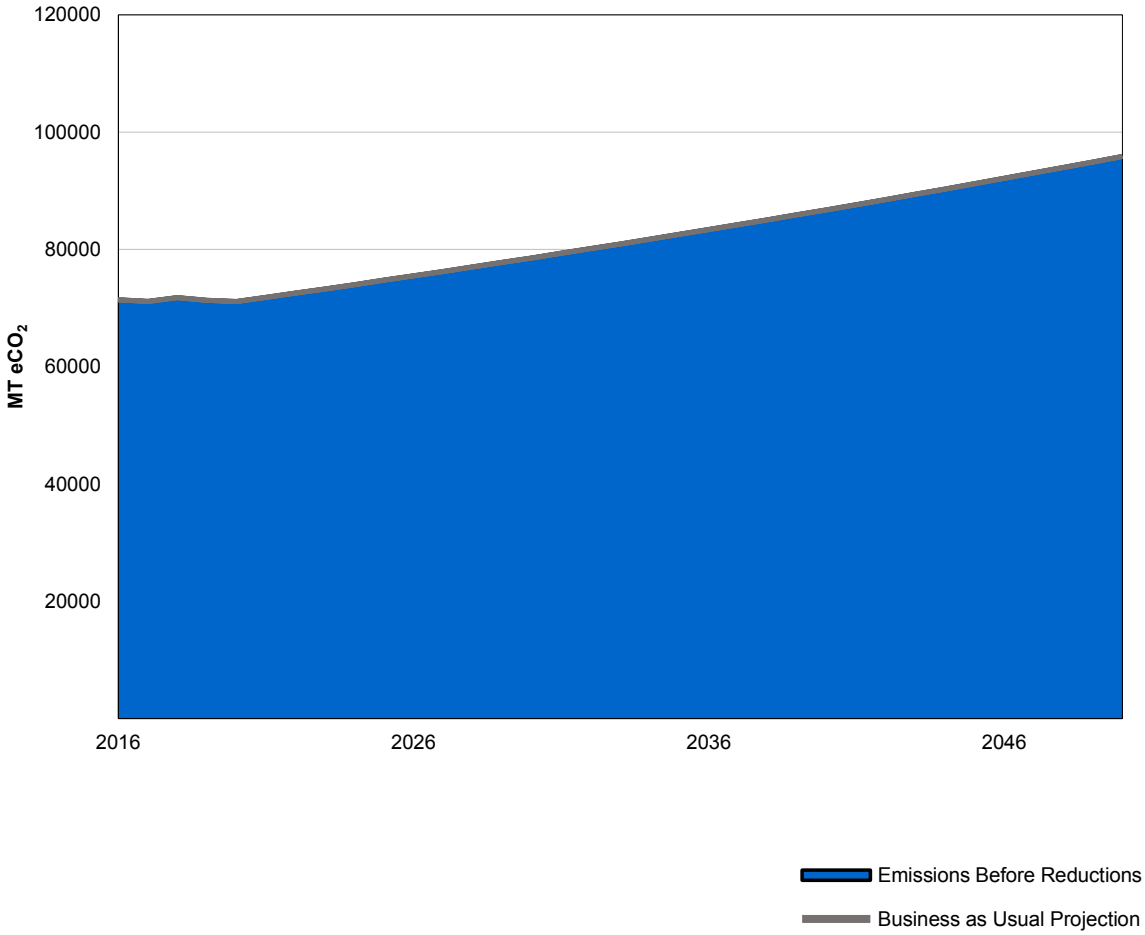
BUSINESS AS USUAL VERSUS EMISSION REDUCTION STRATEGIES

Campus emissions ranged from 67,279 MTCO2e in 2014, to 63,209 MTCO2e in 2015, to 71,396 MTCO2e in 2016. Without further conservation measures, and with continuing growth, emissions are projected to rise steadily, reaching 95,856 MTCO2e in 2050. The "Business as Usual Trend" assumes a steady student population growth rate over the next 34 years, which results in greater transportation emissions due to increased travel, greater solid waste emissions due to increased waste production, as well as greater energy use emissions as a result of greater building energy use throughout campus.

From 2016 to 2019, it is assumed that emission reduction strategies have not yet been employed. This assumption is predicated on the notion that strategies require significant life cycle studies to gain merit and validation. Furthermore, any strategies that require capital investment also require the approval of various College entities. Therefore, a target date of 2020 has been established for the implementation of the strategies listed in the Emissions Reduction graphs. The total emissions in 2016 started at 71,396 metric tons of CO2e. In 2017 total emissions rose to 75,759 metric tons of CO2e. Through the implementation of mitigation measures starting at the year 2020, total emissions are projected to decrease steadily over the next decade. It is recommended that in 2025 the College consider the implementation of significant renewable energy systems to help offset total emissions.

In addition, it is recommended that the College invest in Renewable Energy Credits (RECs) starting at year 2025 in order to further offset the emissions of the campus.

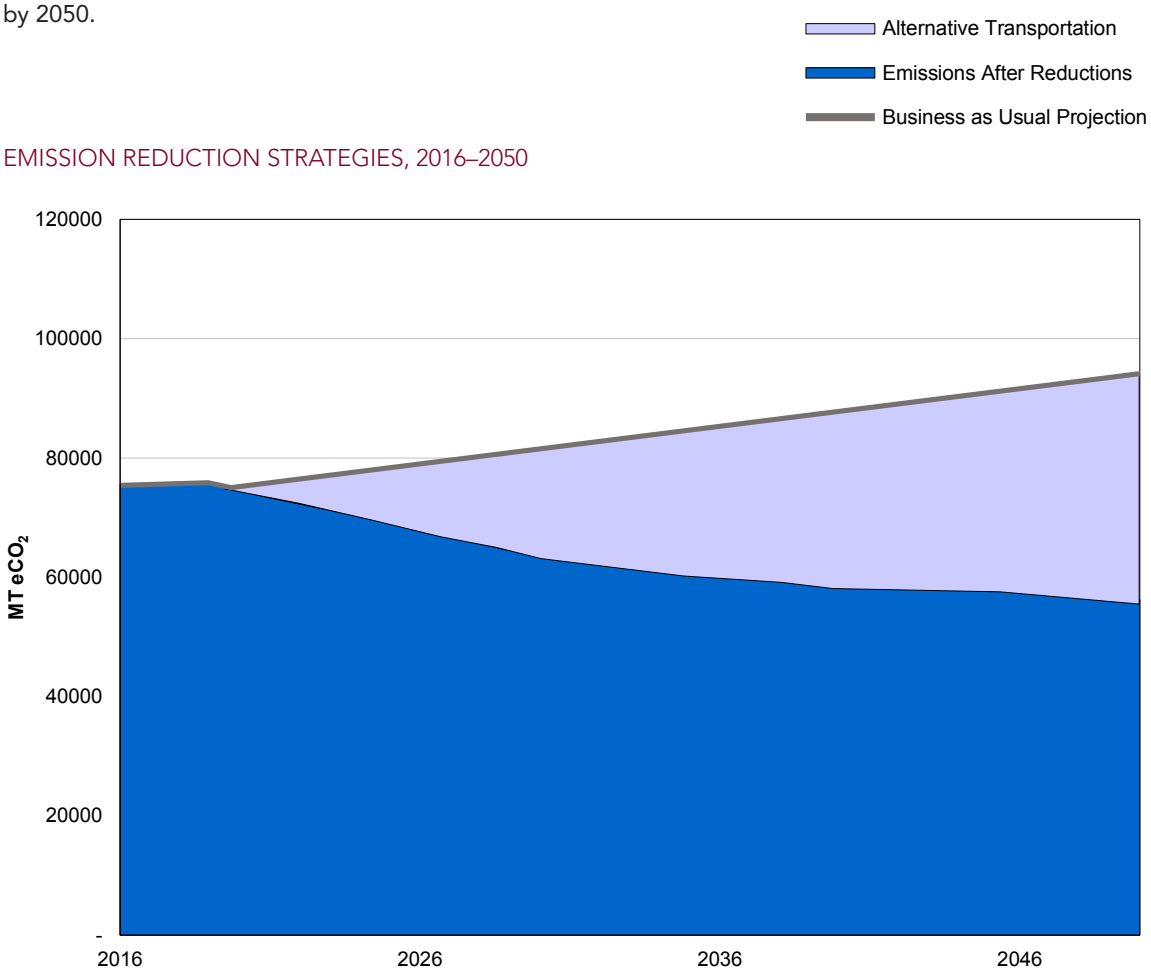
BUSINESS AS USUAL



EMISSION REDUCTIONS *(cont.)*

BUSINESS AS USUAL VERSUS EMISSION REDUCTION STRATEGIES—ALTERNATIVE TRANSPORTATION STRATEGIES ONLY

Alternative transportation emission reduction strategies such as ridesharing, mass transit and the use of autonomous vehicles will result in a significant overall decrease in emissions, declining to 56,161 MTCO2e; however, these strategies will not be sufficient to reduce emissions down to zero by 2050.

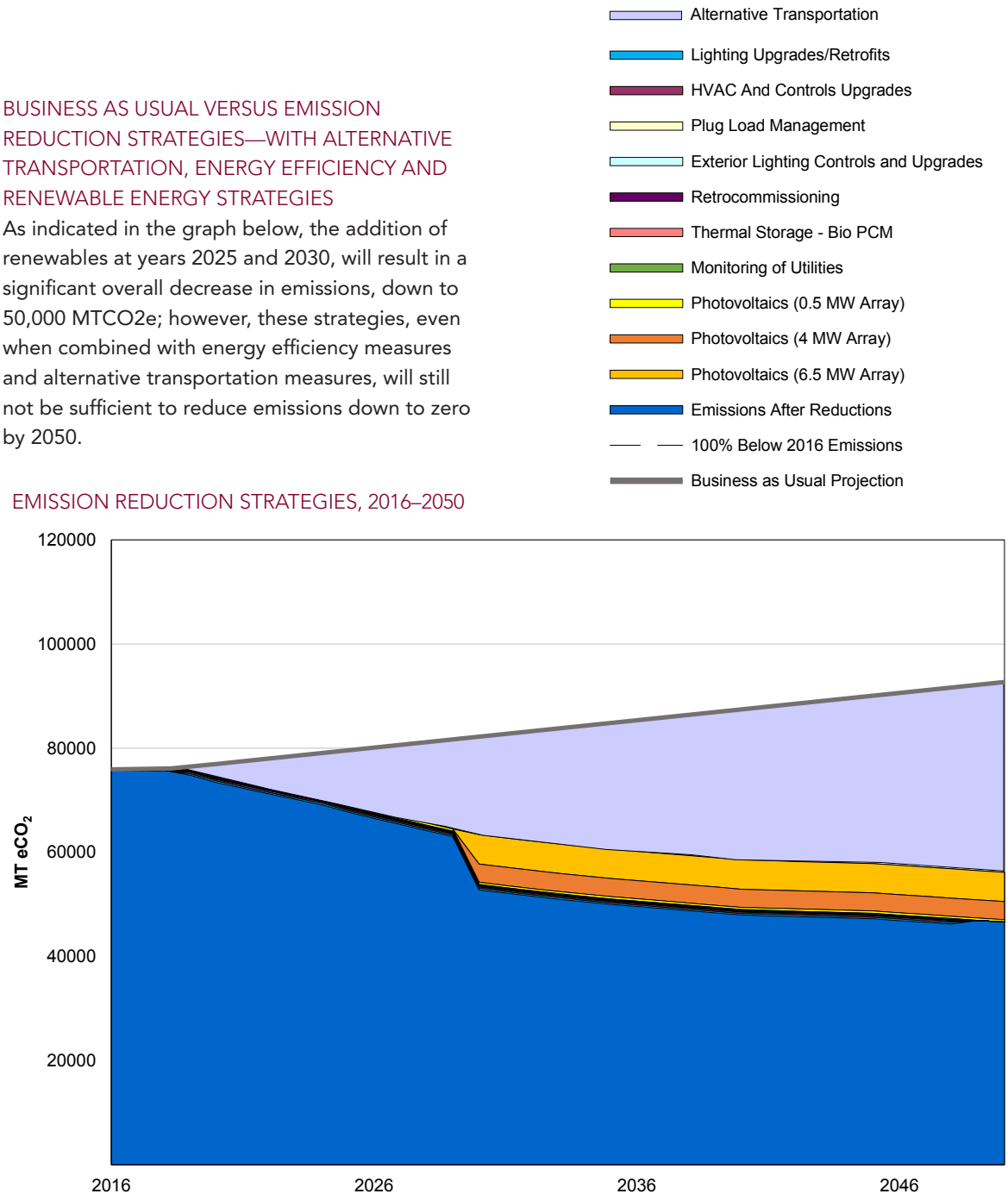


EMISSION REDUCTION STRATEGIES, 2016–2050

BUSINESS AS USUAL VERSUS EMISSION REDUCTION STRATEGIES—WITH ALTERNATIVE TRANSPORTATION, ENERGY EFFICIENCY AND RENEWABLE ENERGY STRATEGIES

As indicated in the graph below, the addition of renewables at years 2025 and 2030, will result in a significant overall decrease in emissions, down to 50,000 MTCO2e; however, these strategies, even when combined with energy efficiency measures and alternative transportation measures, will still not be sufficient to reduce emissions down to zero by 2050.

EMISSION REDUCTION STRATEGIES, 2016–2050

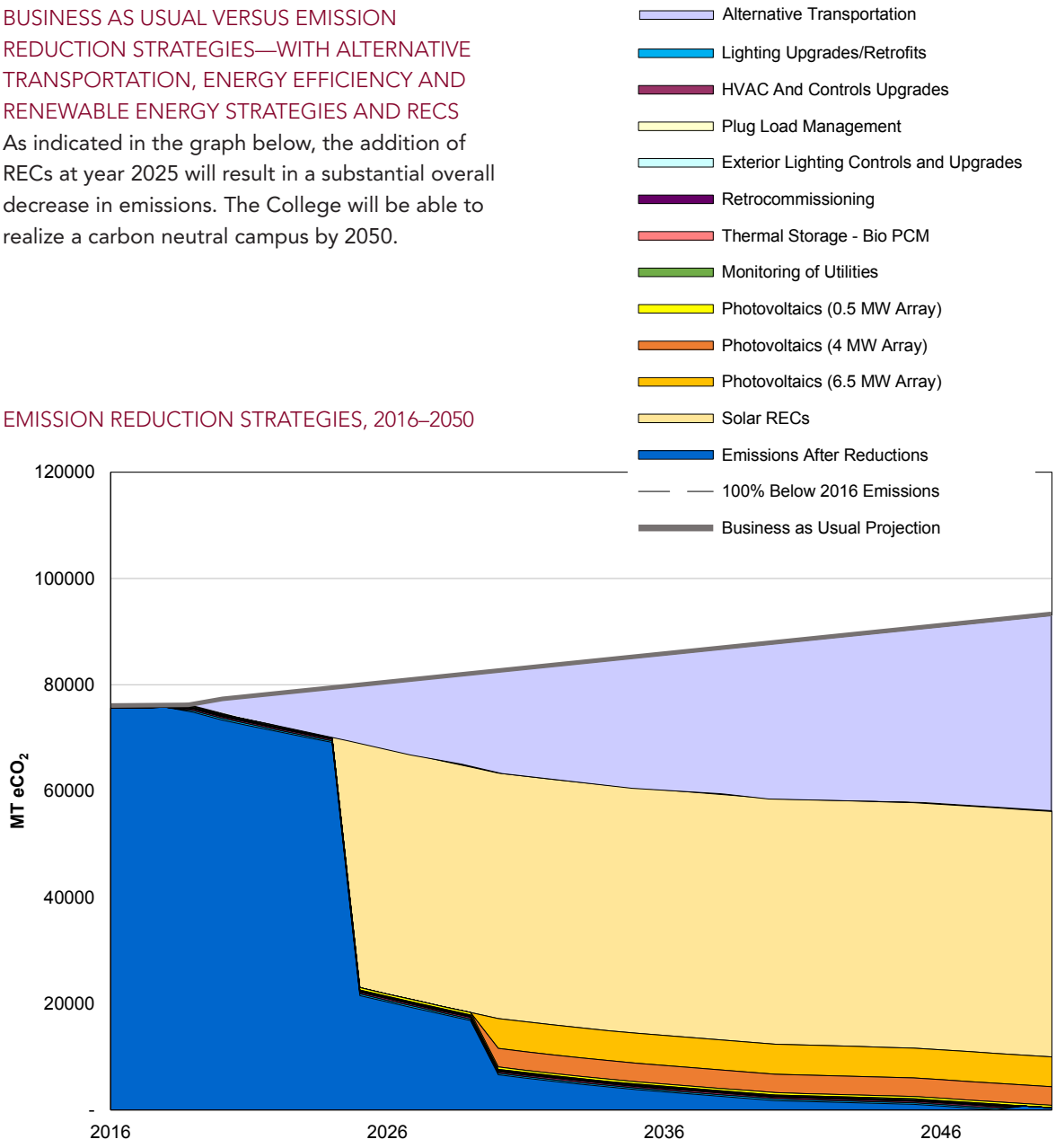


EMISSION REDUCTIONS *(cont.)*

BUSINESS AS USUAL VERSUS EMISSION REDUCTION STRATEGIES—WITH ALTERNATIVE TRANSPORTATION, ENERGY EFFICIENCY AND RENEWABLE ENERGY STRATEGIES AND RECS

As indicated in the graph below, the addition of RECs at year 2025 will result in a substantial overall decrease in emissions. The College will be able to realize a carbon neutral campus by 2050.

EMISSION REDUCTION STRATEGIES, 2016–2050



EMISSIONS AFTER REDUCTIONS (BLUE AREA)

With the implementation of the strategies outlined in the *Climate Action Plan*, the total emissions projection would decrease to 22,000 metric tons of CO2e at the year 2025 (Phase 1), 4,000 metric tons of CO2e at the year 2035, and would decrease to carbon neutral status by the year 2050. This could be achieved through the combination of Phase 1, Phase 2, and Phase 3 strategies as outlined in Section 6: *Purchased Electricity, Stationary Emissions, Building Practices, and Reduction Strategies*, Section 7: *Transportation, Commuting, Campus Fleet, and Travel,* and Section 8: *Solid Waste* of the CAP. The long-term effect of all the strategies could result in an overall annual emission reduction of 71,396 metric tons of CO2 per year by 2050, even with assumed population growth and square footage increase of the campus building stock.

ALTERNATIVE TRANSPORTATION (LIGHT PURPLE AREA)

It was assumed that there would be reduction in single occupant vehicles by 1 percent per annum starting in the year 2020. This is accompanied by a corresponding increase of 1 percent per annum of commuters who use carpools. This projection may be conservative considering that based on the transportation survey, 62 percent of the respondents indicated that they are interested in a ride-sharing or carpool facilitation program provided by Mt. SAC. This is also supported by future technologies, such as self-driving cars and electric vehicles that reduce the cost of commutes by sharing a vehicle and its associated costs among multiple individuals as well as reducing the transportation fuel costs. Electric vehicles also do not have direct exhaust emissions and, as such, inclusion of greater percentages of electric vehicles would result in substantial reductions in GHG emissions. The adoption of alternative transportation options combined with robust alternative transportation campaigns on campus will result in a reduction of 39,695 MTCO2e between 2016 and 2050

LIGHTING UPGRADES/RETROFITS (LIGHT BLUE AREA)

Lighting upgrades implemented in 2020 could result in a total emissions reduction of 8,543 MTCO2e. These lighting upgrades would largely consist of replacement of existing fixtures with on/off manual controls with new high efficiency light-emitting diode (LED) light fixtures and associated controls. Interior LED light fixtures are typically designed with occupancy sensors and daylighting sensors to allow for a significant reduction in energy use.

HVAC AND CONTROLS UPGRADES (LIGHT ORANGE AREA)

HVAC upgrades implemented in 2020 could result in a total emissions reduction of 8,543 MTCO2e. This strategy is fairly common practice over the course of a 10–15 year span, and yet could produce considerable reductions in emissions. Some typical strategies include converting constant speed fans to variable volume, supplying temperature reset, pressure reset, and possibly replacement of equipment, etc.

EMISSION REDUCTIONS *(cont.)*

PLUG LOAD MANAGEMENT (GREY AREA)

Plug load management strategies implemented in 2020 could result in a total emissions reduction of 2,135 MTCO2e. This strategy consists of modifying the electrical distribution system within a building to turn on/off (i.e., control) receptacles independent of the switch of the equipment plugged in to the outlet. The controlled receptacles are typically turned off during off-hours, regardless of what equipment is plugged in as occupants tend to leave on equipment and devices during off-hours hours.

EXTERIOR LIGHTING CONTROLS AND UPGRADES (GOLD AREA)

Exterior lighting controls and upgrades implemented in 2020 could result in a total emissions reduction of 1,423 MTCO2e. This strategy includes the replacement of existing light fixtures with on/off manual controls with new high efficiency LED light fixtures and associated controls. Exterior LED light fixtures are typically designed with occupancy sensors and daylighting sensors to allow for a significant reduction in energy use.

RETRO-COMMISSIONING (LIGHT BLUE AREA)

Retro-commissioning (RCx) implemented in 2030 could result in a total emissions reduction of 2,847 MTCO2e. Some of the strategies employed in retro-commissioning will be similar in nature to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) energy audits. However, the investigation will go deeper into the operation and condition of the equipment.

THERMAL STORAGE, BIOPCM (GREEN AREA)

Thermal storage in the form of Bio-Phase Change Material (BioPCM) implemented in 2030 could result in a total emissions reduction of 2,135 MTCO2e. BioPCM is a phase change material that acts to increase the thermal mass of a building. Increasing a building's thermal mass reduces the temperature fluctuations within the structure by absorbing, storing, and then releasing heat energy. As such, heat is stored during peak conditions and released at a later time (e.g., nighttime), when the outside temperatures are lower. BioPCM can be installed in walls or above ceilings.

MONITORING OF UTILITIES (RED AREA)

Monitoring of electric and natural gas utilities consists of providing submetering of these systems at the building level and potentially further at end-uses within the building. Presently, only recent additions to the campus include building level monitoring and end-use monitoring.

500 KW PHOTOVOLTAICS (DARK GREY AREA)

A 500 kW photovoltaic system implemented in 2025 would generate 775,000 kWh and would reduce 472,750 pounds of carbon. A 0.5 MegaWatt system could be distributed in several locations around campus, ranging from rooftops of new buildings to shade structures, to parking structure rooftops.

4,000 KW PHOTOVOLTAICS (ORANGE AREA)

A 4,000 kW photovoltaic system implemented in 2030 would generate 6,200,000 kWh and would reduce 3,782,000 pounds of carbon. A 4

MegaWatt system could be distributed in several locations around campus, ranging from rooftops of new buildings to shade structures, to parking structure rooftops.

6,500 KW PHOTOVOLTAICS (YELLOW AREA)

A 6,500 kW photovoltaic system implemented in 2030 would generate 1,007,500 kWh and would reduce 6,145,750 pounds of carbon. A 6.5 MegaWatt system could be distributed in several locations around campus, ranging from rooftops of new buildings to shade structures, to parking structure rooftops.

RENEWABLE ENERGY CREDITS (LIGHT YELLOW AREA)

Although the combination of the strategies detailed above result in a significant reduction of emissions, the remaining emissions will need to be offset with Renewable Energy Credits (RECs). For each target goal year, additional RECs will need to be purchased. One REC will offset 1 MWh of energy which amounts to roughly 610 lbs or between 0.28 and 0.56 MTCO2e of emissions depending on emission source. For the 2025 goal of 20 percent emission reductions, the remaining 8,702.6 MTCO2e will need to be offset after factoring in the 6,420 MTCO2e that is reduced from the Phase 1 efficiency improvements and on-site PV systems. In 2025 an estimated 15,473 MWh in RECs will be required to be purchased. For the 2035 target goal of 50 percent emissions reduction, 22,787 MTCO2e of emissions will need to be offset with RECs after factoring in the 15,020 MTCO2e of reductions from Phase 1 and 2 efficiency improvements. In 2035 an estimated 40,515MWh in RECs will be required to be purchased. In order to achieve the 2050 goal of 100 percent emissions reductions, and factoring in the 19,452.7 MTCO2e that is reduced from the Phase 1, 2, and Phase 3 efficiency improvements and on-site PV systems since 2016, the remaining 56,161.4 MTCO2e in 2050 will be offset with RECs. In 2050 an estimated 99,854MWh of RECs will be required to be purchased. As costs for RECs change based on market conditions, costs could increase or decrease at the time of REC purchase. Based on today's best estimates the cost for each phase would be around $464,190 in 2025, $1,215,453 in 2035, and finally $2,995,636 in 2050 of purchased RECs.

SECTION 11: CURRICULUM, PROFESSIONAL DEVELOPMENT, AND RESEARCH

BACKGROUND

Educating students on climate change, greenhouse gas emissions, environmental sustainability, and climate adaptation can and should be addressed across a diverse range of disciplines at the community college level. Sustainability education is more than just transferring knowledge about sustainability issues and how to tackle them. It entails a focus on changing mindsets, developing skills in critical and systemic thinking, and enhancing capacity for facilitating change. It is about giving people, communities, and organizations, new sets of skills and knowledge, so that they can identify and respond to sustainability challenges, in ways that lead to long-term and sustained change. The related skills and knowledge gained will be vital in the workforce:

> "From business practices to ecosystem management, from community planning to law, from architecture to health care, trained professionals who understand the impacts of climate change and the best practices for responding to them will be vitally needed as communities and citizens face the realities of changing climate."[127]

The Mt. SAC community will be most successful in working towards sustainability and moving the campus towards the commitment of becoming a net-zero carbon emissions campus if students, faculty, staff, and administrators develop and utilize skills in critical sustainability thinking. Utilizing critical sustainability thinking requires giving consideration to the carbon impacts of our actions, work, and decisions, and planning to ensure that the environmental impacts are balanced by greater or equal benefits to the environment.

Sustainability is already integrated into the College mission as a commitment to educating students to "become productive members of a diverse, sustainable, global society," and as a commitment to the community through "active civic engagement."[128] The Institutional Level Outcomes (ILOs) articulate expectations for students' overall experience with the College. ILO #4 speaks directly to environmental sustainability, "Personal, Social, Civic, and Environmental Responsibility: Students demonstrate awareness and respect for personal, social, civic, and environmental responsibilities."[129]

This section of the *Climate Action Plan* (CAP) was developed from two CAP conferences, which were attended by students, faculty, staff, and managers, and from the recommendations of the Senate Task Force on Sustainability (Task Force). The Task Force recommendations addressed integration of sustainability into the curriculum, faculty professional development, and research, and were

[127] Gabriela Boscio, *Higher Education's Role in Adapting to a Changing Climate*, Second Nature, p. 12, 3 Nov, 2011.
[128] "Mission Statement," *About Us*, Mt. San Antonio College, 17 Aug. 2016, http://mtsac.edu/about/overview/mission-and-goals.html
[129] Mt. SAC Outcomes Committee, "Institution Level Outcomes: Definitions and Examples," 2015, http://www.mtsac.edu/instruction/outcomes/ILOs_Defined.pdf

BACKGROUND *(cont.)*

voted on by the Academic Senate in June 2017.[130] The Task Force reviewed hundreds of Climate Action Plans via the Second Nature Reporting Platform, from various institutions, particularly community colleges, to learn what and how other campuses are addressing the integration of sustainability into curriculum and into professional development. The Task Force members found that there are many different methods used to address integration, depending on the size of the institution, support for the integration and programs, and where the college is in their overall climate action planning and work.

In addition to Climate Action Plans from multiple institutions, the Task Force reviewed several sources, including the text of the original American College and University Presidents' Climate Commitment (ACUPCC), the current Carbon Commitment, Second Nature reports from various colleges across the country, Second Nature documentation, including *Education for Climate Neutrality and Sustainability: Guidance for ACUPCC Institutions, The ACUPCC Implementation Guide, and Higher Education's Role in Adapting to a Changing Climate*. Email interviews of staff and faculty at other institutions were conducted by Task Force members. Task Force members also discussed the feasibility of recommendations with the appropriate administrators and coordinators.

There are many choices available to the College in creating a more sustainable campus that can function as both a welcoming respite and a stimulating cultural center for the community at the same time as it functions as a learning laboratory and an intentional community for our students, staff, and faculty. If Mt. SAC prioritizes sustainability so much can be possible—for the campus and the College's future. Experiences of other campuses demonstrate that Mt. SAC needs to have established mechanisms for the institutionalization of recommendations on curriculum, research, and professional development.

[130] "Senate Task Force on Sustainability Recommendations," Sustainability, Mt. San Antonio College, http://www.mtsac.edu/sustainability/programs-and-initiatives/sustainabilityrec.pdf; Academic Senate, "Minutes (unapproved)" Mt. San Antonio College Academic Senate, 1 June 1, 2017, https://www.mtsac.edu/governance/academicsenate/minutes/2016-2017/FullSenateMinutesJune12017unapproved.pdf

CURRICULUM AND OTHER EDUCATIONAL EXPERIENCES

CURRENT EDUCATIONAL ACTIVITIES

Mt. SAC has a long history of curricular and educational programming devoted to a range of environmental issues. This CAP incorporates past efforts with current planning to aggregate and focus curriculum and educational activities into a coherent and effective experience for students and faculty. A variety of disciplinary courses already include content related to the environment and sustainability, but a recent development aimed at focusing this effort and content for the benefit of students resulted in the creation of an environmental studies degree, which offers a carefully designed conceptual introduction to the many complex issues implicit in the idea of sustainability.

One such example of past and current efforts to aggregate and focus environmental curriculum and student educational activity is the Mt. SAC Wildlife Sanctuary, which was established in 1964 as a ten-acre reserve. With the cooperation of faculty, staff, and management, the reserve has since been expanded by over 20 acres. The goals of the Sanctuary are to "restore and maintain a habitat for wild plants and animals of the San Gabriel Valley; provide an outdoor laboratory so that students raised in an urban environment can experience hands-on learning about the natural world; and provide the College and community with an outdoor laboratory for hands-on learning in the natural sciences."[131] The Sanctuary is visited by over 12,000 people per year as part of biology courses and community outreach.[132]

Students have also played a vital role in the sustainability and environmental movement on campus. The Associated Students Senate includes a cabinet position for an "Environmental Senator," and the student club, Environmental Action Group for a Livable Earth (E.A.G.L.E.), founded in 1989, has acted to advance "awareness around campus of critical environmental issues" and has promoted action within the student body to protect and conserve natural resources."[133] Students have hosted fairs, events, workshops, and speakers for Earth Day beginning in the early 1990s. Since Spring 2010, Earth Day events have included the Jerry B. Allen Earth Day Lecture Series, which has addressed politics, climate, and environmental issues. Organizers include students from EAGLE and faculty from political science and the biological sciences.

A group of students, supervised by Professor James Stone and led by student Carol Martinez, developed a 60–90 minute Sustainability Tour of campus features in 2017. The tour includes a LEED-certified building, an on-campus dining hall, and drought-tolerant landscaping. Students conducted eight guided tours in Spring 2017.

[131] "Wildlife Sanctuary," Mt. San Antonio College, http://www.mtsac.edu/wildlife/

[132] Steve Scauzillo, "Mt. SAC Wildlife Sanctuary reaches 50-year milestone, preserves habitat for rare birds." San Gabriel Valley Tribune, 28 May 2017.

[133] E.A.G.L.E. Environmental Action Group for a Livable Earth, https://www.facebook.com/groups/mtsaceagle

CURRICULUM AND OTHER EDUCATIONAL EXPERIENCES *(cont.)*

DEPARTMENTAL AND PROGRAMMATIC PLANNING AND ACTIONS

Faculty across campus are working to incorporate sustainability into their curriculum development, as evidenced by the following planning initiatives articulated in Chapter 3: *Instructional Programs* of the *2018 Educational and Facilities Master Plan.*

Agriculture and Animal Sciences

Expand the curriculum to incorporate contemporary topics, such as perceptions about animal care, urban agriculture, sustainable agriculture, and land use management.

Air Conditioning and Refrigeration

Meet California's Zero Net Energy mandate, which will require retraining in solar energy as well as battery storage and safety.

Aircraft Maintenance Technology

Develop specialized training in battery and electronic technology for the electric airplane industry.

Architectural Technology

Collaborate with Ornamental Horticulture and other disciplines to develop degrees and certificates in Landscape and Architectural Design, Environmental and Sustainable Design, and Urban and Regional Planning.

Biological Sciences

- Develop new programs in areas such as sustainability, bioinformatics, and biotechnology
- Maximize the use of the expanded Wildlife Sanctuary by collaborating with other disciplines to develop a sustainability program for the Wildlife Sanctuary
- Collaborate with other Natural Sciences disciplines to develop an associate degree in Environmental Science (in the Senate Task Force that led to the creation of the Environmental Studies degree, Natural Science faculty voted to use counseling to tailor the existing Natural Science AA degree for students pursuing an Environmental Science major)

Earth Sciences

- Revise curriculum as needed to include sustainability and greater use of the Wildlife Sanctuary
- Collaborate with other Natural Sciences disciplines to develop an associate degree in Environmental Sciences

Environmental Science

Develop a career technical education program for students wishing to pursue entry-level positions in geotechnical, engineering geology, and environmental geology.

Electronics and Computer Engineering Technologies

Revise curriculum as needed to incorporate the uses of electronics in fields, such as biomedical electronics and avionics as well as in transportation, such as hybrid vehicles, electric buses, mechatronics, and alternative energy.

Graphic Design And Illustration

Collaborate to develop multi-disciplinary programs, such as Environmental Design, Interior Design for the Consumer, and Commercial Design.

Ornamental Horticulture

- Expand the curriculum to include new or revised topics/courses that incorporate contemporary topics, such as drought and water issues; pesticides and fertilizer regulations; and organic production and sustainable horticulture
- Use the Farm and its facilities to increase community awareness and experiences, such as completing the Agricultural Literacy Trail
- As an additional example, the *2015 Farm Addendum* to the Educational Master Plan states that "the Agricultural Sciences Department intends to review all course content and certificates to ensure that the curriculum is aligned with the current national focus on the environment"[134]

FUTURE ACTIONS

Incorporate Sustainability into the Educational Experience of all Students

Encourage students to take classes that incorporate sustainability by establishing Leaf-designated classes. Identifying classes that incorporate sustainability will have several benefits. Mt. SAC's faculty will see that it is possible to weave sustainability-related themes into many different subjects. Students will see that not all classes are the same, and may prefer taking a class that addresses sustainability. A robust list of classes will make it easier for students to take a Leaf-designated class while at Mt. SAC. Eventually, it may become so commonplace that most students take a Leaf-designated class by chance.

Guidelines for Sustainability-Related Leaf-designated Classes at Mt. SAC

The Leaf-designation is meant to facilitate the identification of courses or sections that integrate sustainability into its curriculum. These classes may either be courses for which every section is focused on environmental sustainability, (for example, Environmental Politics), or may be courses for which particular sections focus on an environmental topic and therefore that section is a Leaf class (for example, a section of college composition that uses readings on climate change and requires essays written on related topics). Leaf classes should be those that will intentionally contribute to students' understanding and practice of environmental sustainability. Interested departments or faculty may request designation, rather than having designation assigned to courses. Details regarding criteria and forms are given in *Appendix: Leaf Course Designation*.

A sustainability-related course section is one in which a particular instructor has chosen to integrate sustainability concepts into the course content. This does not indicate additional work for students. Sustainability is simply used as an intentional context for achieving the same learning goals as other course sections. These course offerings are appropriate for students learning about sustainability for the first time, or for enabling those more familiar with sustainability to see issues from a new perspective. Sustainability-related courses may include sustainability as a unique course component or module, or infuse

[134] *Mt. San Antonio College Educational Master Plan 2008-2009; 2015 Addendum: The Farm, 2015,* http://www.mtsac.edu/construction/reports-and-publications/images-pdfs/legacy-master-plans/MtSAC_Ed_Plan_Addendum_Revised-050815-Final.pdf

CURRICULUM AND OTHER EDUCATIONAL EXPERIENCES *(cont.)*

sustainability concepts as appropriate throughout the course.

Many classes currently offered at Mt. SAC meet the criteria for this designation. See the *Appendix* section on Sample Course Candidates for Leaf-Designation. Several community colleges have adopted similar designation systems, including the following schools, with their designation name: Delta College ("Sustainability Related" / "S-related"), Glendale Community College ("Environmental Awareness" / "eAwareness"), and Mesa Community College (Sustainability Immersion / "SU").

The Communications Department, in coordination with the Climate Commitment Implementation Committee, is currently investigating the possibility of integrating sustainability into Speech 1A. This is being piloted in one section in spring 2018, and discussions will continue following the pilot.

Support and encourage faculty in the integration of sustainability into existing curriculum
Faculty may be hesitant to alter or develop curriculum without support, therefore the Sustainability Coordinator and other participants will produce an online directory of faculty experts on campus and a repository of sustainability-related resources for incorporating such materials, designs, and practices into the curriculum.

Maintain and publicize the Mt. SAC President's Student Sustainability Awards
The President's Student Sustainability Awards provide an incentive for students to do work on sustainability and if there is an increase in faculty incorporating sustainability into their classes, their students will have more opportunities to win the awards.

Develop Sustainability-Related Professional Development for Faculty
(see below)

Maintain an Online List of Leaf-designated Classes
Reach out to divisions and departments to discover additional classes that currently merit designation. In addition to designation in the schedule, a public list of Leaf-designated classes will demonstrate Mt. SAC's commitment to sustainability. Faculty will be able to more easily see what is possible, and students will see what classes are available.

This is already part of many community college's Climate Action Plans, including Austin CC, Broome CC (>70 courses), Cabrillo College (>50 sections), Delta College (dozens of courses), Glendale Community College, Mesa Community College, Quinebaug Valley Community College, Skagit Valley College, and SUNY Orange County Community College (93 courses).

Consider Incentivizing Students to Take Leaf-designated Classes
While knowledge of sustainability is generally intrinsically good, students may not take advantage of Leaf-designated courses without some incentive. Public recognition might also increase awareness of Leaf-designated classes.

Possibilities suggested by a review of other community college's Climate Action Plans include

an indicator on transcripts for each relevant class (Delta College), an endorsement on the transcript for Sustainability Studies after a certain number of classes (Tompkins Cortland Community College), and a green cord at graduation for 18 hours of courses in their sustainability pathway (Mountain View College).

Several community colleges aspire to establish either general-education requirements (Bellevue College, Cabrillo College) or graduation requirements (Bergen College) for sustainability. While these requirements have not yet been successfully implemented, Santa Monica College does have a broader Global Citizenship requirement for AA degrees, which can be fulfilled with an environmentally focused course.[135]

Integrate Sustainability into the Noncredit Curriculum

Students in the Mt. SAC School of Continuing Education (one of the largest noncredit programs at a California community college), represent nearly 20 percent of student FTES. Noncredit students are enrolled in noncredit courses, and need to be included in sustainability education. The goals of Mt. SAC's noncredit programs are to increase literacy skills, increase access to higher education and employment, and strengthen self-sufficiency. These goals are well matched with the goals of sustainability education. This will require documentation of current integration and support for further integration of sustainability into the noncredit curriculum and collaboration with non-credit faculty to ensure specific needs of their division are met through appropriate sustainability-related professional development offerings.

Provide an Early Introduction to Sustainability for New Students

Educational experiences to provide an early introduction to sustainability at Mt. SAC for students new to the campus may help them to incorporate these ideas in the future, encourage related coursework, and help shift the campus culture toward more awareness of sustainability.

Some institutions are making sustainability information available at their student orientations, including Austin Community College, Central Carolina Community College, Chandler-Gilbert Community College, and Des Moines Area Community College.

Institutionalize the Sustainability Tours

Mt. SAC's sustainability tours are currently being led by students, most of whom volunteer, but some of whom are employed officially as Student Assistants. Each tour requires preparation time in scheduling and confirming various presenters and guides, and the tour itself lasts an hour. To develop the tour, students reached out to campus experts, including Ruben Flores (Grounds) regarding landscaping, Mika Klein (Facilities Planning and Management) regarding LEED buildings, Danny Paz (Sodexo) regarding dining facilities, and Melissa Berkley (Technical Services) regarding the production of video clips. CCIC members and Carol Martinez (Student Tour Organizer and Director) have been meeting with Andi Sims (Director, Student Life) and Logan Snyder (Associated Students' Environmental Senator) since Fall 2017 to plan the institutionalization of sustainability tours.

[135] "Greening the Curriculum," *Sustainability at SMC*, Santa Monica College, 2017, http://www.smc.edu/AcademicAffairs/Sustainability/Pages/Greening-the-Curriculum.aspx

CURRICULUM AND OTHER EDUCATIONAL EXPERIENCES *(cont.)*

Create a user-friendly calendar on the sustainability website

Create a user-friendly calendar on the sustainability website where users can access tour dates and times, and schedule a group tour. Future tour guides will be part of the Green Ambassadors who are to be housed under Student Life following a successful institutionalization of the sustainability tours. The tour guide position will be a paid position.

Institutionalize the Mt. SAC President's Student Sustainability Awards

Students have some agency about the specific topics they address for assignments in various classes. Students could choose to address sustainability-related issues for essays, speeches, or other projects, and may be more likely to if initiating sustainability-related topics is encouraged or incentivized. The Mt. SAC President's Student Sustainability Awards offer monetary prizes for the best examples of student projects addressing sustainability issues as part of their classes or their broader engagement with campus and community life. In 2017, awards were given for projects involving sustainable dress design, a campus waste initiative, research on mealworms eating styrofoam, and creation of an elementary school garden project.[136]

These awards could be institutionalized by seating oversight of the awards with the Sustainability Coordinator. These awards have been offered and awarded twice so far, in 2017 and 2018. Jared Burton has chaired the committee that has juried these awards both years. If the awards are to persist over the long term, the work of administering the awards will need to have the responsibility clearly assigned.

Institutionalize Faculty Leadership Role by Creating a Sustainability Coordinator

To integrate sustainability into the curriculum, there must be an individual with responsibility for oversight and an institutionalized role. Among other duties, a faculty coordinator could guide the Leaf-designation process, sustainability professional development, and support other sustainability-related curricular developments.

Work must be done with the Academic Senate and Faculty Association to establish this Sustainability Coordinator reassignment position. In spring of 2017, the Senate Task Force on Sustainability made, and the Senate passed a recommendation calling for a Sustainability Coordinator. The Academic Senate included implementation of this recommendation in the Senate Goals for 2017–2018. Working towards this goal, the President of the Academic Senate has requested that the Faculty Association include the allocation of release time for a Sustainability Coordinator in their negotiation survey to faculty.

The Sustainability Coordinator shall do the following.

- Serve a two-year term
- Be responsible for representing the position of the Academic Senate on all Sustainability matters

[136] "2018 winners," *Mt. SAC President's Student Sustainability Awards, 2018*, http://mtsac.libguides.com/sustainabilityawards/winners

- Be the primary faculty contact for questions or concerns regarding the Carbon Commitment
- Serve as Chair of the Climate Commitment Implementation Committee

- Perform such functions as the President or the Executive Board assign to assist in carrying out the purposes and policies of the Academic Senate with regard to Sustainability and the Carbon Commitment
- Mentor and facilitate the College's integration of Sustainability into the curriculum, including maintaining the listing of Leaf-designated courses and classes
- Serve on a professional development governance committee and collaborate with the Faculty Professional Development Coordinator to implement professional development for faculty on sustainability, including identifying or developing materials or curriculum for faculty professional development
- Present an annual written report to the Academic Senate and write the curriculum component of annual reporting to Second Nature (oversees Carbon Commitment) documenting activities and outcomes
- Be responsible for seeing that the Mt. SAC President's Student Sustainability Awards are promoted and awarded annually. (The Coordinator could coordinate the awards themselves, or ensure that there is a faculty member in place to coordinate the process and jury)

As a faculty reassignment, this position must be negotiated between the District and the Faculty Association. The College's President has expressed support for the development of this reassigned position. Because it will be at least until the 2018–2019 academic year before this position is established, a request for funding through the President's Office for six Lecture Hour Equivalents (LHE) of release time has been made for this year.

Other campuses with Sustainability Coordinators include Allegheny College, Austin Community College, Ball State University, Chaffey College, San Antonio College, SUNY Broome Community College, and Wake Technical Community College. Several other campuses have established Directors of Sustainability, often as part of an Office of Sustainability. These campuses include CSU East Bay, Lewis and Clark Community College, Syracuse University, and The George Washington University.

Establish a Voluntary Online Sustainability Pledge

An online pledge available to students and employees could be a low-pressure way to track interest and to educate our community. Several community colleges do this, including Brookhaven College,[137] Delta College,[138] and Des Moines Area Community College.[139]

[137] "Do Something," *Sustainability*, Brookhaven College, 2018, https://www.brookhavencollege.edu/aboutbhc/sustainability/pages/do-something.aspx

[138] "Commit to Sustainability," *Sustainability*, Delta College, 2018, https://www.delta.edu/sustainability/commit-to-sustainability.html

[139] "DMACC Operation Green: Green Pledge," *Operation Green*, Des Moines Area Community College, 2018, https://www.dmacc.edu/green/Pages/welcome.aspx

CURRICULUM AND OTHER EDUCATIONAL EXPERIENCES *(cont.)*

CHALLENGES

The Carbon Commitment requires that the *Climate Action Plan* include "actions to make carbon neutrality and resilience a part of the curriculum and other educational experiences for all students." Mt. SAC's current CAP does not include actions to reach all students. Many students can be reached through Leaf-designated classes, sustainability tours, internships, research opportunities, and other means, but these methods are not as comprehensive as a graduation requirement or degree requirement. However, this recommendation was not approved by the Academic Senate because of concerns that adding a requirement could potentially reduce degree completion, and because local requirements cannot be put on transfer degrees—so this requirement could not be implemented across all degrees.

At the Fall 2015 Faculty Flex Day opening meeting, Chisa Uyeki and Chris Briggs gave a presentation related to the recognition of sustainability as an issue already concerning the entire campus. Deep questions about sustainability are at the core of all academic disciplines. For instance, political scientists ask "What sorts of governing institutions and policies can best promote sustainability?" Historians ask, "What can past, failed societies tell us about how to avoid a similar fate?" Various scientists ask, "How can agriculture feed everyone, and medicine keep everyone healthy?" Astronomers ask, "Why is our planet so unique? Is it unique? What happened to other planets to make them so inhospitable to life?"

The presentation seemed well-received, but some Mt. SAC employees (faculty, staff, and managers) still oppose many sustainability interventions. Sustainability work is often portrayed as a competitor with other causes, such as student equity or success. Thus, one major challenge is for Mt. SAC's work toward sustainability, climate neutrality, and resilience to be understood as an effort that is complementary to other causes on campus. Climate neutrality does not have to be an enemy of equity, for example. Yes, electric cars are expensive in some ways, but the economically-disadvantaged are likely to be paying the most for polluted air, by living near freeways and suffering health consequences.[140] [141] There are similar examples for any other cause on campus.

[140] "Infographic: Living Near Busy Roads or Traffic Pollution," USC Environmental Health Centers, http://envhealthcenters.usc.edu/infographics/infographic-living-near-busy-roads-or-traffic-pollution/references-living-near-busy-roads-or-traffic-pollution

[141] "L.A. keeps building near freeways, even though living there makes people sick," *Los Angeles Times*, 2 March, 2017, http://www.latimes.com/projects/la-me-freeway-pollution/

SECTION 11: CURRICULUM, PROFESSIONAL DEVELOPMENT, AND RESEARCH

PROFESSIONAL DEVELOPMENT

CURRENT ACTIVITIES

In fall 2016, an "Environmental Issues Pathway" was named as a track for the Faculty Flex Day offerings. The pathway included two sustainability-related sessions: "Collaborative Sustainability Planning," by Chisa Uyeki and Chris Briggs, and "Your Wildest Imagination: Outdoor Resources for Instruction," by Jared Burton and Chris Briggs. The pathway demonstrates some campus-wide adoption and institutionalization. Earlier Flex Day offerings included a presentation at the opening meeting (fall 2015), and sessions called "Getting to Zero" (fall 2015), and "Sustainability and Beyond" (spring 2016).

A website to increase communication and to orient adjunct faculty to Mt. SAC now includes information about sustainability efforts on campus. Adjunct faculty are directed to information on the Carbon Commitment and integrating sustainability into the curriculum.[142]

Members of the Climate Commitment Implementation Committee (CCIC) developed a sustainability component for the New Faculty Seminar, and presented it in spring 2018, in combination with an official Sustainability Tour led by students. The event was recorded and is now available as a podcast.[143] This sustainability component is now part of the New Faculty Seminar curriculum. The New Faculty Seminar is a broad introduction to Mt. SAC for all new full-time faculty. Integration of sustainability into this seminar affords the opportunity for an early introduction to Mt. SAC's Carbon Commitment and Leaf-designated courses, and will help establish a culture of sustainability on campus.

FUTURE ACTIONS

Broad Goal: Integrate sustainability into professional development.

Rationale: Professional development provides skills building, growth, and learning opportunities for all employees as part of the College commitment to the continuous improvement of instruction, programs, and services. Sustainability is addressed in two areas of the *Mt. SAC Professional Development Plan 2016–2018—Employee Development: Civic Responsibility* and *Instructional Development: Sustainability*.[144] The breadth and complexity of professional development needs will be reflective of the complexity of the Climate Action Plan. Well-deployed professional development will help institutionalize sustainability and provide employees with the necessary educational opportunities to support behavior change and move the campus towards climate neutrality.

[142]"Climate Action Plan & Sustainability," *Adjunct Faculty Information Page: Mt. SAC's Policies & Laws*, Mt. San Antonio College Professional & Organizational Development, https://www.mtsac.edu/pod/resources/adjunctfaculty/sustainability/climateactionplan.html14

[143] "A Talk and a Tour: Faculty, Sustainability, and the Conundrum of Purple Pants," *Magic Mountie Podcast*, Episode 8, Mt. San Antonio College Professional & Organizational Development, 2018, Podcast, http://www.mtsac.edu/pod/magic-mountie-podcast/index.html

[144] "Mt. SAC Professional Development Plan 2016-2018," Mt. San Antonio College Professional & Organizational Development, 2016, http://mtsac.edu/pod/documents/pd_plan_6-7-16.pdf

PROFESSIONAL DEVELOPMENT *(cont.)*

Broad Action: Prioritize sustainability as a theme for professional development for all employees.

Rationale: The intent of the campus-wide *Professional Development Plan* is to reflect the professional development needs of all campus employees. As such, it is recommended that sustainability be included as a theme in the *2018–2020 Professional Development Plan* to ensure that the professional development opportunities needed to fulfill the actions detailed in this plan are provided.

Specific Action: Continue communication with Professional and Organizational Development (POD) and related committees to develop an understanding of professional development needs and to identify resources to fulfill these needs.

Specific Action: Create a link to sustainability web resources on the POD website.[145]

Broad Action: Develop training for classified staff.

Rationale: Many of the actions to improve campus sustainability depend upon classified staff for implementation. These actions will be met with more acceptance and enthusiasm if classified staff are provided opportunities to learn more about sustainability and the value of the changes being proposed. Sustainability professional development can also trigger innovation and bring new ideas, methods, and possible solutions.

Action: Classified staff and managers' professional development needs related to the campus sustainability initiatives will be identified through communication with the Classified Professional Development Committee (CPDC) and Management Professional Development Committee (MPDC).

Broad Action: Develop and provide professional development for faculty.

Rationale: This professional development can utilize the depth of expertise present in the current faculty to both inform and support Mt. SAC faculty in sustainability-related issues. This could include regular professional development opportunities to inform faculty about current sustainability-related activities in our community, or support for faculty in the development of curriculum which integrates sustainability and resilience. For example, in Fall 2018, a Flex Day session will be offered under the following description.

"Towards a Sustainable Campus: Introducing Mt. SAC's *Climate Action Plan*"

Exciting news! Our campus has its first Climate Action Plan, which articulates a path to carbon neutrality for Mt. SAC (as required by the Carbon Commitment we joined in 2014). Beyond mitigation of greenhouse gas emissions, the plan includes strategies for incorporating sustainability into professional development, curriculum, and community outreach. Support for faculty will

[145] "Mt. SAC Professional and Organizational Development," Mt. San Antonio College, http://www.mtsac.edu/pod/

include workshops on incorporating sustainability into your curriculum. Come hear about what is already happening on campus and how you can participate in these ambitious plans as we move forward towards becoming a sustainable campus.

Specific Action: Support faculty with the development of sustainability-related Student Learning Outcomes.

Rationale: Student Learning Outcomes (SLOs) are used across campus to motivate the teaching of particular ideas, and to assess student educational achievement. A search for existing SLOs related to sustainability may help illustrate how sustainability ideas are already distributed within our curriculum. A compilation of these examples can serve as templates for instructors seeking to develop new SLOs.

Specific Action: Develop curriculum for a Sustainability Certificate for faculty to be offered through Professional and Organizational Development.

Rationale: A Flex Day presentation on integrating sustainability into curriculum generated much interest and was well attended. There is continued interest, and a need to support faculty in reworking their classes to address sustainability. This faculty certificate is being developed to support faculty interested in integrating sustainability into the curriculum. The desired outcome of this program is for faculty to integrate sustainability and get their classes certified as Leaf-designated courses.

Action: Complete the development of this certificate course. The proposal for the certificate was developed in collaboration with the Faculty Professional Development Coordinator. This POD certificate course would introduce sustainability, the Carbon Commitment that Mt. SAC has made, Leaf courses, and SLOs for the Leaf courses. Workshops could follow where people could work with someone to meet the Leaf course criteria for their specific subject (only for people who need help). The Sustainability Coordinator would create the master list from the applications for Leaf courses. If it were done as a Google form, it would actually dump all the info into a sortable spreadsheet and compile everything in one place.

Action: Create a crowdsourced document that pulls together techniques that instructors utilize to integrate sustainability through various subjects. Some instructors on campus have already demonstrated this crowdsourcing function in Canvas courses. This collection of techniques could serve as a model for other professors and perhaps other campuses.

Action: Submit the Sustainability Certificate to the Salary and Leaves Committee for consideration for professional growth credit.

Rationale: POD provides learning opportunities for all employees. A Sustainability Certificate can help guide offerings so that faculty learn strategies for integrating sustainability into their classes. A certificate can also help justify allocating Conference and Travel funding.

SECTION 11: CURRICULUM, PROFESSIONAL DEVELOPMENT, AND RESEARCH

RESEARCH

Mt. SAC is a community college and its primary purpose is teaching lower-division college classes. While the scope for research is limited, there are a few areas where faculty and students can engage in research. Below, the broad goal of "supporting sustainability research" is broken into four sections: (1) for research in general, (2) by employees, (3) by students, and (4) for Facilities Planning and Management.

RATIONALE

As a community college Mt. SAC is not required to include research as a component of the CAP; however, Mt. SAC has affirmed the important role of student research in higher education, and has made a commitment to support student research on sustainability as part of the Carbon Commitment. Actions toward this goal to date include the following.

- In 2015, Academic Senate Resolution 2015–04 Support of Undergraduate Research was passed. This resolution called for the establishment of an undergraduate research office and a faculty coordinator position to support student research activities.[146] These actions have not yet been implemented; however, the passage of the resolution established faculty support for undergraduate research

  Stated support for undergraduate research in this resolution applies to the inclusion of research as an educational component in campus climate actions. "Students who engage in 'high impact' educational practices, especially undergraduate research, show significantly greater learning outcomes than similar students without those opportunities."[147] The establishment of an Office of Undergraduate Research and a Research Coordinator can contribute to this CAP goal by supporting and encouraging participation of faculty and students in research on sustainability through coordinating research opportunities, mentoring student research, and assisting faculty in incorporating undergraduate sustainability research into their curriculum, (this recommendation has not been operationalized to date). In addition, as the City of Walnut develops its own Climate Action Plan, the city will be gathering information that will be useful for Mt. SAC's resilience assessment, and this may provide research projects for students

- Establishment of the Mt. SAC President's Student Sustainability Awards

- In April 2017, the Academic Senate voted on the recommendations of the Senate Task Force on Sustainability. The Academic Senate accepted most of these recommendations, including recommendation #4: "Support sustainability research"

[146] Rebecca Hatch, "Resolution 2015 – 04 Support of Undergraduate Research," 8 June 2015, http://mtsac.edu/governance/academicsenate/resolutions/15-04%20Support%20of%20Undergraduate%20Research.pdf

[147] G.D. Kuh, *High-impact Educational Practices: What they are, who has access to them, and why do they matter*, 2008, Washington, DC: Association of American Colleges and Universities. J.E. Brownell and L.E. Swaner, *Five High-Impact Practices: Research on Learning Outcomes, Completion, and Quality*, 2010, Washington, DC: Association of American Colleges and Universities.

FUTURE ACTIONS

RESEARCH IN GENERAL

Goal: Complete an initial campus-community resilience assessment including initial indicators and current vulnerability.

Rationale: The Climate Commitment from Second Nature is broader than the Carbon Commitment, and includes this assessment. It usually includes several sections, including analysis of resilience of social, human, natural, financial, and physical attributes of our campus and community.

Action: Outline a plan for completion of this assessment.

Goal: Work with the Center of Excellence to utilize labor market data to identify economic and workforce needs as related to sustainability and to inform curriculum development and planning for Mt. SAC and community colleges regionally.

Rationale: The Center of Excellence at Mt. SAC is a regional resource, serving 28 community colleges in Los Angeles and Orange Counties and funded by the Chancellor's Office to support labor market analysis for community colleges.[148] These analyses can be used to enable data-driven decision making and curriculum development.

Renewable-energy technologies change rapidly, and are widely considered part of a growth industry. Training students to work in these fields fulfills part of Mt. SAC's mission to serve its community. For example, Cabrillo College runs a month-long laboratory course for students interested in hands-on learning who want to gain the skills needed for work in the booming solar, wind, and other renewable and efficient energy fields. If supported by data from the Center of Excellence, it may make sense to support the development of certificate programs around sustainability, in areas such as engineering and solar power.

Actions:

- Review Standard Occupational Codes to identify occupations that relate to "green" jobs, and decide other criteria for analysis
- Cross-reference state data on the growth of "green" jobs to do a similar local analysis
- Continue discussions with staff at the Center of Excellence to determine other opportunities to incorporate their expertise in support of CAP activities

Goal: Develop partnerships with other institutions of higher learning and continue to seek opportunities to partner on sustainable research initiatives whenever possible.

Rationale: Interactions with other institutions may allow Mt. SAC's students to find opportunities they might not otherwise encounter. This is also a goal of the College of Marin.

Action: Reach out to Cal Poly Pomona and other local schools.

Goal: Connect students, staff, and faculty interested in collaborating on campus sustainability projects and develop tools for faculty and students to use in their classes and research.

[148] "Centers of Excellence," Business Division, Mt. San Antonio College, http://www.mtsac.edu/business/coe/

FUTURE ACTIONS *(cont.)*

Rationale: Various members of the campus community may share interests, but be unaware. Connecting these parties can catalyze them to follow through on their goals.

Action: Improve existing websites containing information regarding sustainability courses, research, internships, and other opportunities on campus. This also fulfills objectives in the Education section of CAP.

Sub-Action: Fund a student intern to collect relevant information and update various webpages, similar to what Jonathan Davila did as an intern with Energize Colleges over the summer of 2017.

Action: Work with the Research and Institutional Effectiveness (RIE) Office to develop tools to track and measure sustainability research projects and funding for these projects.

Sub-Action: Contact RIE, the Grants Office, and Fiscal Services regarding their current tracking of sustainability-related funding sources on campus.

Sub-Action (if needed): Develop a definition for "sustainability research projects."

Goal: Establish a Sustainability Center as a campus hub to promote, store, and display research activities as well as to inform the community regarding actions and progress toward the campus' net-zero climate goal. This facility could serve as the center for the campus—understood as a sustainability learning laboratory—putting learning into action.

Rationale: Publicizing research activities can lead to added awareness of projects on campus, and cultivate interest among current students.

Action: Encourage the campus to establish such a center. Compile information about examples from other campuses. Begin discussions with appropriate departments and have interested departments include the Center in their departmental PIE. Collaborate with Facilities Planning and Management to determine the best physical location for the Sustainability Center, whether it is integrated into a new facility or a remodel area of an existing building.

RESEARCH BY FACULTY

Goal: Encourage faculty to include sustainability in their research during sabbaticals.

Rationale: In 2016, Biology Professor Dr. Tim Revell completed a survey of Mt. SAC's Wildlife Sanctuary during a sabbatical, and other professors could follow suit. This research could inform other parts of the campus community of unique issues on campus, local resources, or local experts. Another campus that supports sustainability-themed sabbaticals is Glendale Community College.

Action: Publicize relevant sabbaticals from the past, and advocate for including them as examples in sabbatical application materials.

RESEARCH BY STUDENTS

Goal: Encourage the use of sustainability issues in student research projects.

Rationale: Students have some agency about the specific topics they address for assignments in various classes. Students could choose to address sustainability-related issues for essays, speeches, or other projects.

For example, science students who conduct research for classes can collect and analyze data on local water quality or biodiversity, or research the feasibility of solar power or bottled water bans. Design students can conduct energy audits or research the impact of purchased materials.

Action: Publicize the relevant research efforts of current students.

Rationale: Students may be unaware that it is possible to connect their interests in sustainability to current coursework. Seeing examples from other students may motivate them to undertake projects that they might not otherwise.

Action: Publicize the Mt. SAC President's Student Sustainability Awards.

Rationale: Currently, Mt. SAC's President's Student Sustainability Awards encourage students to engage in research on sustainability topics. The stated mission of the awards is as follows.

"The Mt. SAC President's Student Sustainability Awards are intended to encourage Mt. SAC students to engage in the study and exploration of topics related to sustainability leading to the development of solutions to environmental and interrelated social problems confronting Mt. San Antonio College and the larger society."[149]

Both Bellevue College (Bellevue College student project fund[150]) and Glendale Community College have similar awards.

Goal: Involve students in research that aids campus sustainability efforts.

Action: Involve student interns in collecting greenhouse gas (GHG) emissions data.

Rationale: The baseline GHG emissions study was performed by interns from Mt. SAC, and that research needs to be done annually as part of the CAP requirements.

Similarly, Cabrillo College awarded work-experience units to students who participated in their emissions inventory, and to students who continue to participate in developing and implementing their CAP. Centralia College also uses interns to help collect GHG data.

Sub-Action: Prepare a proposal to secure annual funding for students to act as interns in collecting GHG data.

Sub-Action: Establish a training program or training manual to help new interns collect the required data.

[149] "Mt. SAC President's Student Sustainability Awards," Mt. San Antonio College, 2018, http://mtsac.libguides.com/sustainabilityawards/home

[150] "Get Your Project Funded," *Sustainability at Bellevue College*, Bellevue College, 25 July, 2018, https://www.bellevuecollege.edu/sustainability/you/fund/

FUTURE ACTIONS *(cont.)*

Action: Establish internships for students participating in developing and implementing the *Climate Action Plan*.

Rationale: Some students have chosen to be involved in the Sustainability Committee and Climate Commitment Implementation Committee. However, the time commitment involved in the implementation of CAPs may be more than students can justify without a formal recognition of their time and energy. Internships or some other award may suffice. One student intern has proven helpful in gathering research materials for writing this CAP, and future assistance will be of continued value.

Goal: Enable student participation in the installation of sustainability-related facilities projects on campus, such as landscaping and solar panels.

Rationale: Students often learn the most while completing real-world projects and research. At Cabrillo College, instructors are working on a proposal for student participation in the installation of working, grid-tied PV panels. Students in their Horticulture Department helped install a paver patio, rain gardens to reduce stormwater runoff, living wall panels, and rainwater catchments. Their farm has recently begun to supply organic food to on-campus food vendors.

Action: Explore an agreement with the Farm and with the Facilities Planning and Management Department to allow students to volunteer with particular sustainability-related building, grounds, and maintenance projects.

Goal: Have students perform energy audits of several of the older buildings on campus.

Rationale: Students can use their knowledge of physics, thermal principles, unit conversions, and architecture to perform an energy audit. This report can then be used to prioritize the maintenance and remodeling priorities for the building. Centralia College has done this with student groups for several years.

Action: Recommend this project possibility to faculty in physics, architecture, interior design, and mathematics.

Action: Work with the Facilities Planning and Management Department to facilitate student access to campus energy-use data.

RESEARCH BY FACILITIES PLANNING AND MANAGEMENT

Goal: Have each of Mt. SAC's buildings used as learning/living laboratories, where students, staff, faculty, and community members may see the energy usage and savings taking place.

Rationale: Seeing live or at least recent data on how a building is used and performs can lead to rapid improvements in efficiency. This data is also a potential resource for student projects, such as projects to increase the efficiency of current operating procedures for the building. Colorado Mountain College uses this monitoring and data sharing for these purposes.

Action: Encourage the Facilities Planning and Management Department to implement monitoring and dissemination of each building's energy data.

Action: Create a database populated with actual campus sustainability data. The database should be accessible, transparent, and easy to use.

CHALLENGES

Mt. SAC is a large campus with many stakeholders. Encouraging any particular behavior can thus be difficult. Research may be a relatively low priority for students and faculty, but can be invaluable for all groups on campus, especially for tracking campus progress toward our sustainability goals.

SECTION 12: OUTREACH

OVERVIEW

The Climate Leadership Statement compellingly illustrates the reason that the requirement for signatory colleges and universities to reach out beyond their own walls and borders to the residents and organizations that make up the communities of which they are a part is one of the four central pillars of the commitment that signatory schools make. For clearly climate change is a collective action problem writ large. Ultimately global action will be required to successfully address it. The actions of one institution, state, or nation alone will not save the world from the catastrophic effects of runaway climate change.

Yet, it is simultaneously true that there is an important role for leadership in addressing the climate challenge. That has been one of the important lessons of history, whether the challenge was winning collective bargaining rights for organized labor, the right to vote for women, expanding civil rights for African Americans and other minority groups, or developing regulations to limit environmental pollution.

The Climate Leadership Commitment, which is the preamble to the American College and University Presidents' Commitment on Climate that President Scroggins signed in the fall of 2014 and the Carbon Commitment that Mt. SAC is now a signatory to contains the following language:

"We believe colleges and universities must exercise leadership in their communities and throughout society by providing the knowledge, research, practice, and informed graduates to create a positive and sustainable future. Along with other aspects of sustainability, campuses that address the climate challenge by reducing greenhouse gas emissions and by integrating resilience into their curriculum, research, and campus operations will better serve their students and meet their social mandate to help create a vital, ethical, and prosperous civil society… We urge others to join us in transforming society towards a sustainable, healthy, and more prosperous future."[151]

This section examines the role that Mt. SAC currently plays in the broader community it inhabits as well as the policies, institutions and practices that other schools have put in place to foster more robust and sustained relations with their communities. The aim of this comparative case study analysis will be to determine if there are lessons that Mt. SAC can learn from the practices and institutions put in place at other schools that will enable it to deepen and enhance its own efforts to engage with, to serve, and to work in partnership with the broader community it is part of in the areas of climate change and sustainability. It is vital that the College enhance its efforts in these areas, not only to prepare itself and the communities it serves to manage those effects of climate change that cannot be avoided and to avoid those effects that cannot be managed, but also to prepare for the considerable opportunities and benefits that the transition to sustainable societies and economies around the world promises.

[151] "The Presidents' Climate Leadership Commitments: Climate Leadership Statement," Second Nature, https://secondnature.org/climate-guidance/the-commitments/

SECTION 12: OUTREACH

CURRENT ACTIVITIES

There are currently three key areas in which Mt. SAC is engaging community members and pursuing partnerships related to sustainability in the community.

1. Educational programs for students and the community

2. Vocational training and research directly related to supporting green businesses and jobs

3. Building partnerships to undertake projects related to sustainability

EDUCATIONAL PROGRAMS FOR STUDENTS AND THE COMMUNITY

Mt. SAC has sponsored seven annual Earth Day lectures to date, which are promoted to the larger Walnut community as well as to the campus community. These lectures have featured speakers such as Noel Perry, founder of Next Ten, and Tim Carter, President of Second Nature, as well as faculty from UCLA and other area schools and members of local government.

Dr. Deborah Boroch Discovery Day is an annual event sponsored by Mt. SAC that provides an opportunity for fourth- through seventh-grade students to explore areas of science and math in organized activities on campus. In 2017 the event theme was "Water Is Life," emphasizing the use of science and math to preserve natural resources. Students were taken to the College's Wildlife Sanctuary to learn about the role of water in its six ecosystems: Meadow, Riparian, Woodland, Swamp, Lake and Pond. They also visited other campus locations to learn about water conservation. In 2016 the theme was Sustainability, and all of the breakout sessions addressed this theme.

Another way that Mt. SAC has promoted education regarding campus practices and design that incorporate sustainability is by creating Campus Sustainability Tours for new and current students, as well as for faculty. In the spring of 2017 President Scroggins provided funding for the development and implementation of these tours. Developed by students, the mission of the Campus Sustainability Tours is to promote awareness of Mt. SAC's current achievements in sustainability, as well as to encourage members of the campus community to become more involved in sustainability-related initiatives. The tours also encourage faculty to utilize sustainability features and initiatives as learning laboratories for their classes. The tours currently take students, classes, faculty groups, and clubs to three different locations on campus.

1. The Mountie Café, where tour guides speak about the campus dining facilities sustainable kitchen, recycling, and water usage

2. The new Student Success Center building, where tour guides talk about L.E.E.D. architecture and energy efficiency

3. An area that serves as an example of drought tolerant landscaping on campus where student tour guides speak about California native plants and drought-deciduous landscaping, as well as water conservation

The Environmental Action Group for a Livable Earth (EAGLE) club also organized a 50th anniversary celebration for the Wildlife Sanctuary in the spring of 2017, which was marked by President Scroggins' announcement that the College is setting aside additional land to be preserved in perpetuity as part of the Wildlife Sanctuary. The event also honored Craig Petersen, the director of the Wildlife Sanctuary for the past 37 years.

Tours of Mt. SAC's working Farm are another form of education that the College provides to local schools that features a significant amount of information about sustainability. The tours are organized through the Agriculture Student Ambassadors and District 48. According to Joyce Ellison, an Administrative Specialist in the School of Continuing Education, the farm hosted 22 different schools or organizations with 1,262 students and 243 adults in 2015. It hosted 17 different schools or organizations with 973 students and 154 adults in 2016. It hosted 12 different schools or organizations with 345 students and 150 adults in 2017.

Tours of Mt. SAC's Wildlife Sanctuary, as already mentioned, are another form of sustainability education that the College provides to local schools. The tours are also organized through the Office of Continuing Education by Joyce Ellison. According to Ms. Ellison the Wildlife Sanctuary hosted 19 schools or organizations with 755 students and 140 adults in 2015. It hosted 14 different schools or organizations with 441 students and 134 adults in 2016. It hosted 12 different schools or organizations with 345 students and 150 adults in 2017.

TRAINING AND RESEARCH TO SUPPORT GREEN BUSINESSES AND GREEN JOBS

In the spring of 2017, Mt. SAC began working with Strategic Energy Innovations, which partners with Southern California Edison and Southern California Gas. Strategic Energy Innovations sponsors the Energize Colleges program, which creates fellowships and internships related to energy conservation and climate, on college and university campuses across the State. These internships provide substantive work experience to students who are studying and considering energy career pathways, while also significantly reducing energy use through intern-led projects on campus and (where feasible) in the community. The internships also often involve meeting climate-related goals. At Mt. SAC, for example, the Energize Colleges Fellow and interns have been working on gathering data to complete the College's 2016 greenhouse gas inventory. They have also been assisting HMC Architects, the firm hired to author the greenhouse gas mitigation portion of Mt. SAC's *Climate Action Plan*, to collect data on greenhouse gas emissions in the campus' transportation sector on updating the College's Sustainability Webpage, promoting increased recylcing and composting on campus, and several other projects.

Mt. SAC's School of Continuing Education is also developing non-credit certificates in the fields of solar panel installation and green construction. The solar panel installation certificate is expected to be in the curriculum by the Fall 2019 semester. Professor Ignacio Sardinas, Chairman of the Architecture Department, is currently working with Dr. Pablo La Roche of California Polytechnic

CURRENT ACTIVITIES *(cont.)*

State University, Pomona to develop a certificate in Environmental and Sustainable Design, with the aim of strengthening ties between Mt. SAC and Cal Poly Pomona in this area. To support this initiative, the Architecture Department is currently in the process of adding the new course Architecture 180: "Science Concepts for Environmental and Sustainable Design."

SUSTAINABILITY PARTNERSHIPS WITH THE COMMUNITY

In the spring 2017 semester, EAGLE president Rene Jiminez spearheaded an initiative by EAGLE, which joined together with members of other student groups to undertake a park clean-up project. The park clean-up project included students from over 10 student clubs, political science and biology classes, faculty, and Walnut City Council Member Andrew Rodriguez. Altogether nearly 50 people attended the park clean-up project. All eleven parks were cleaned in the City of Walnut as a result of this project. Rene Jiminez has reported that he has organized a park clean-up for La Puente for the 2018-2019 academic year.

The Rhodes Elementary School garden revival project was a volunteer project done as part of a community outreach and support initiative from the Mt. SAC Agriculture Sciences Department. This project came through Agriculture Department Chair, Professor Brian Scott. The project was a volunteer team effort between the Agriculture Student Ambassadors, the Horticulture Club and alumni at Mt. SAC. The goal was to kindle awareness regarding the importance of plants among elementary school children through the renewal of their garden. The project team had four to twelve members over the course of its work on the project. The work involved various tasks from coordination, consultation, project design, and estimation, to weeding, mulching, and turning on the existing irrigation, as well as the transformation of a nonfunctional pond area at the school to a drought tolerant planter. The completed school garden was handed over to the school for maintenance.

SECTION 12: OUTREACH

WHAT OTHER ACADEMIC INSTITUTIONS ARE DOING

PITZER COLLEGE, CLAREMONT, CALIFORNIA

Pitzer College has partnered with the Ontario, California-based community organization Huerta del Valle (HdV) in an effort to reduce the greenhouse gas emissions associated with the College's food waste. Now, instead of generating food waste in the College's dining hall and sending it to the landfill, the waste is collected and transported to Huerta del Valle, where the food is composted. The finished compost is then applied to the campus garden. Pitzer students also recently founded a chapter of the Food Recovery Network on campus, and partnered with the Salvation Army to donate leftover food from the dining hall twice a week. Students have donated over 2,500 pounds of food since the chapter opened in the spring of 2016.[152]

Pitzer College's Redford Conservancy is committed to a vision "that connects undergraduate students with faculty, alumni, scientists, policy-makers, artists, and other members of the local and regional community, to engage in interdisciplinary and team-based ventures for the wellbeing of the natural and social world." Some examples of Pitzer College's initiatives include the following.

- The ReRoom Program, a student-led initiative that aims to promote a culture of sustainability on campus through the collection and reuse of used items donated by Pitzer College residents at the end of each semester. All proceeds from ReRoom sales go toward supporting student sustainability initiatives
- The ReSource Program, a no-cost drying rack and compost bucket checkout program available to students, staff and faculty
- The PowerDown Program, an annual, three-week energy reduction competition that occurs on all five Claremont College campuses
- The TRIP program, administered by the Office of Human Resources, which is a rideshare program for eligible faculty and staff designed to encourage employees to use alternative modes of transportation that reduce greenhouse gases and particulate pollution on campus and in the surrounding community[153]

Pitzer College has also demonstrated engagement in public policy advocacy through its decision to divest its endowment of fossil fuel company stocks. Pitzer was the first higher education institution in Southern California to commit to divesting its endowment of fossil fuel stocks[154]

CALIFORNIA STATE UNIVERSITY, LONG BEACH, CALIFORNIA

CSULB's Center for Community Engagement (CCE) works to connect students and faculty with opportunities to participate in community engagement through service learning projects that meet societal needs, many of which relate to sustainability. For example, the CCE and the "Climate Action & Sustainability at CSULB" course have worked closely with local Long Beach non-profit organizations such as East Yard Communities

[152] "A Talk and a Tour: Faculty, Sustainability, and the Conundrum of Purple Pants," *Magic Mountie Podcast*, Episode 8, Mt. San Antonio College Professional & Organizational Development, 2018, Podcast, http://www.mtsac.edu/pod/magic-mountie-podcast/index.html

[153] "Reporting," Second Nature, http://reporting.secondnature.org/

[154] "Reporting," Second Nature.

WHAT OTHER ACADEMIC INSTITUTIONS ARE DOING *(cont.)*

for Environmental Justice (EYCEJ). Projects engage local communities and raise awareness about the impacts of climate change—particularly for under-represented communities of color—so that those communities are empowered to be part of the decision-making processes that directly impact their health and quality of life. Students are also working with the City of Long Beach to support efforts related to resilience planning and research. Expansion of these efforts has primarily been focused on building stronger ties with the CCE and Sustainability Office in order to foster collaboration between the university and the Long Beach community.[155]

HARPER COLLEGE, PALATINE, ILLINOIS

Harper College is a member of the Illinois Green Economy Network (IGEN), an organization of 48 community colleges in Illinois working together to grow a greener economy. As part of this organization Harper College is able to participate in IGEN-funded initiatives and programs. It also has the opportunity to collaborate with other member colleges and it receives and can contribute news stories to the network's newsletter which is helping to increase visibility for college sustainability successes statewide and nationally. Harper College has also joined the Chicagoland Network for Sustainability in Higher Education (CNSHE), a network of Chicago area colleges and universities working to advance sustainability in higher education through collaboration and sharing best practices. Harper College participates in quarterly meetings, shares successes in sustainability at Harper College and contributes to regional sustainability advances.[156]

SACRAMENTO STATE UNIVERSITY, SACRAMENTO, CA

Sacramento State Sustainability has developed a partnership with the Capital Region Academies for the Next Economy (CRANE). CRANE is comprised of 17 high schools in the Sacramento and Greater Sacramento Region. CRANE is Career Technical Education, with avenues of learning such as Construction, Manufacturing, Health & Biology, Agriculture & Food Production, IT, and Engineering. The mission of CRANE is to provide students in the Capitol Region rigorous academic and career pathways, which are linked to economic and labor market needs and trends, thus helping students become the next leading entrepreneurial workforce for the green economy. Sac State Sustainability has partnered with schools participating in the CRANE program to provide students with an opportunity to visit the Sac State campus in person and participate in a guided tour throughout campus led by the Sac State Sustainability team to explore various sustainability projects in action.[157]

Since Agriculture & Food Production is a significant area of interest for the CRANE students visiting Sac State, seeing the university's aquaponics project shows them how to cultivate sustainable agriculture in a closed-loop, zero-waste system,

[155] AASHE, "Campus Sustainability Hub," 2018, https://hub.aashe.org/
[156] "Reporting," Second Nature, http://reporting.secondnature.org/
[157] "Reporting," Second Nature.

while learning how to grow food with minimal water impact. The Capital Public Radio garden teaches students about organic farming in small, urban areas such as a back yard, and how it's possible to grow in all seasons in small planter beds. The LID project teaches students that rain-water capture systems help support thriving ecosystems and natural resources, such as the university's river, by keeping contaminated run-off to a minimum, while replenishing groundwater supply and aiding in water conservation efforts. The composting yard and closed-loop food to fuel the Hornet Shuttle system teach students that even waste is a valuable resource. All of this is applicable to learning pathways through the CRANE program and shows that sustainability is not just an idea, it is an applied approach to operations and can be applicable in various settings, business models, and industries.[158]

[158] "Reporting," Second Nature.

SECTION 12: OUTREACH

RECOMMENDATIONS TO ENHANCE COMMUNITY OUTREACH EFFORTS

Based on the preceding comparative analysis of community outreach efforts at Mt. SAC and other schools, it is clear that, although Mt. SAC is doing a considerable amount in the area of community outreach around issues of sustainability, there is a demonstrable need as well as the potential to do more. Though the College's efforts have been rapidly increasing in recent years, efforts have often been sporadic rather than sustained and continuous, and driven by individual initiative rather than by a coordinated plan or strategy. Consequently, it is recommended that Mt. SAC work with municipal government and community organizations to build institutions to support further engagement with the broader community in each of the three key areas examined above: educational programs, vocational training and research, and project partnerships.

COMMUNITY OUTREACH PROGRAMS

For educational outreach to the community, the College should seek, where feasible, to model its institutions on the CRANE network of schools in the Greater Sacramento Region.

Specific recommended actions include designating staff and office to handle organization of all sustainability-related educational programs on campus so that there is one point of contact for these programs and that is all they do. While the office of Continuing Education has done a good job of scheduling tours of the Wildlife Sanctuary with the resources they have had, it is likely that its staff has been overburdened with trying to organize these tours along with performing other duties. Also the Farm tours are supposed to be handled by a different office and staff than the Wildlife Sanctuary tours presently, which seems like a recipe for confusion.

Vocational Training and Research

Similarly, the Illinois Green Economy Network illustrates the potential for community colleges to work together to speed the transition to the green economy by providing training for green jobs and for entrepreneurs interested in creating green businesses.

Specific recommended actions include tasking the Mt. SAC Business Division with conducting an inventory of all green businesses in the Mt. SAC region and surveying them regarding labor force needs that Mt. SAC can provide. Also an office or department on campus could be tasked with contacting other schools in the region and exploring possible opportunities for collaboration with regard to meeting training, labor force, and research needs of green businesses. Mt. SAC might also consider further study of the Illinois Green Economy Network to glean lessons concerning the creation of a consortium of regional schools and businesses that can work together with policy makers to develop the green economy and sustainable society of the 21st century.

PROJECT PARTNERSHIPS

Finally, the Center for Community Engagement at CSULB illustrates the potential for building partnerships between academia and community organizations working on issues of sustainability and environmental justice. Pitzer College's Redford Conservancy provides another model in this area.

Specific recommended actions include hiring a Sustainability Director and tasking them with regularly meeting with municipal sustainability officers in the Mt. SAC region (e.g. Melissa Barcelo and Chris Vasquez in Walnut Municipal government and Marlene Carney in the Irwindale Chamber of Commerce).

SUSTAINABILITY CENTER

We propose that Mt. SAC establish a Sustainability Center on campus. The Center would be responsible for assisting ongoing work coordinating educational tours on campus (such as Sustainability Tours and the Agricultural Literacy Trail) and doing community outreach for sustainability-related events (such as Earth Day events and the Dr. Deborah Boroch Science Discovery Day). The Center could continue the work currently being done by Joyce Ellison in the School of Continuing Education and by student clubs to ensure better organization and a single point of contact for all schools and organizations wishing to schedule Sustainability Tours. This Center should also play a proactive role in publicizing tours and educational programs to area schools, organizations, and members of the community.

The creation of a Sustainability Center on campus and the hiring of a full time Sustainability Director can be used to build relationships with municipal government and community partners over time in the areas of green jobs and joint sustainability projects. By defining the Sustainability Director's duties to include sitting on community boards related to sustainability and meeting regularly with Sustainability Directors at other schools with an interest in partnering on sustainability projects, Mt. SAC might begin to lay the foundation for an institutional infrastructure in the future that would enable it to play a more robust role in educating the broader community, building the green economy, and working on local sustainability projects with other community partners. By laying the foundation for this institutional infrastructure in the five year period after the completion of its first *Climate Action Plan* Mt. SAC can play the pivotal role in facilitating the transition to the just and sustainable society that the American College and University Presidents' Climate Commitment envisions for it.

SECTION 13: MEASURE AND REPORT PERFORMANCE

INTRODUCTION

As with any successful program, the ongoing progress and performance of *Climate Action Plan* activities must be monitored and compared to goals to assess progress. This will require hiring of the Sustainability Director and release time for the Sustainability Coordinator, as well as the continuous participation of the Climate Commitment Implementation Committee, College staff, and other participants in the process. To communicate results and ensure transparency and accountability, the results of CAP activities will be communicated to the larger campus community on a regular basis.

The following section describes the planned process for measuring and reporting sustainability activities and achievements.

SECTION 13: MEASURE AND REPORT PERFORMANCE

MEASURING PERFORMANCE

To monitor Mt. SAC's progress towards its sustainability goals, the CCIC plans to the following key metrics at the regular intervals described below.

Component	Performance Metric	Frequency
Total Energy Use	Change in total annual electricity and gas use.	Annual
Energy Use Intensity	Change in total annual electricity and gas use per student/staff/ faculty and/or per conditioned square foot.	Annual
Renewable Energy Use	Change in total annual renewable energy use and/or percent of total annual energy use that is generated from renewable sources.	Annual
Water Use	Change in total annual water use.	Annual
Water Use Intensity	Change in total annual water use per student/staff/faculty.	Annual
Waste Diversion and Management	Percentage of waste diverted and increase or decrease from the previous year.	Annual
Transportation Efficiency	Total VMT reduced or number of single occupancy vehicles reduced.	Bi-Annual
Greenhouse Gas Emissions	Total and change in annual campus GHG emissions in tonnes CO2e.	Bi-Annual
Greenhouse Gas Emission Intensity	Total and change in campus GHG emissions in tonnes CO2e per student.	Bi-Annual
Green Curriculum	Number of Leaf-designated courses. Number of students enrolled in Leaf-designated courses. Number of faculty in sustainability-related trainings. Number of students using online sustainability pledge (if established).	Annual
Avoided Costs	Total dollars saved as a result of sustainability actions. 98.5	Annual*

*Only after establishing a system (such as GRITS[159]) for tracking savings.

[159] GRITS (Green Revolving Investment Tracking System), "Sustainable Project Management Made Easy." Sustainable Endowments Institute, http://www.gogrits.org/

SECTION 13: MEASURE AND REPORT PERFORMANCE

REPORTING PERFORMANCE

In order to keep the campus community informed of the progress of the CAP activities, the CCIC will post events, progress, and links to submitted reports on the Mt. SAC sustainability website at http://mtsac.edu/sustainability. Additionally, the Sustainability Director will summarize activities, metrics, and progress towards goals in a bi-annual report, which will also be available publicly on the sustainability website.

Mt. SAC will submit the campus GHG inventory and *Climate Action Plan* to the Second Nature reporting system. To increase transparency, Mt. SAC will also seek to participate in the Sustainability Tracking, Assessment, and Rating System (STARS) to evaluate the overall campus sustainability.

APPENDIX

CALIFORNIA STATE CLIMATE REGULATIONS

STATE OF CALIFORNIA EXECUTIVE ORDER S-3-05

Executive Order S-3-05 was signed by the Governor of California in 2005, thereby identifying the California Environmental Protection Agency (Cal/EPA) as the primary state agency responsible for establishing climate change emission reduction targets throughout the State. The Climate Action Team, a multi-agency group comprised of various state agencies, was formed to implement the Executive Order S-3-05. Shortly thereafter in 2006, the team introduced GHG emission reduction strategies and practices to reduce global warming. These measures are aimed at meeting the Executive Order's long-term goal of reducing GHG emission to 80 percent below 1990 levels by 2050.

ASSEMBLY BILL 1493 (THE PAVLEY BILL)

Assembly Bill 1493, widely known as "The Pavley Bill," was passed in 2002 and authorizes CARB to establish regulations to reduce the GHG emissions from passenger cars and light trucks by 18 percent by 2020 and 27 percent by 2030 from 2002 levels. This aggressive bill was temporarily blocked by the U.S. EPA in March 2008 and later received a waiver of approval for implementation throughout California in June 2009.

LOW CARBON FUEL STANDARD (LCFS)

The Low Carbon Fuel Standard (LCFS) was established in January 2007 by Executive Order S-01-07 and requires California fuel providers to decrease lifecycle fuel carbon intensity of transportation fuels by 10 percent from 2007 levels by 2020.

CALIFORNIA RENEWABLES PORTFOLIO STANDARD

The California Renewables Portfolio Standard (RPS) was established in 2002 under Senate Bill 1078 and mandated that electrical corporations increase its total procurement of eligible renewable resources by at least 1 percent a year to reach a goal of 20 percent electricity generation from renewable resources. These goals were accelerated in 2006 under Senate Bill 107, which mandated that at least 20 percent of the total electricity sold be generated from renewable resources by the end of 2010. The RPS was further extended in 2008 by Executive Order S-14-08, which required that 33 percent of total electricity sales be generated from renewable resources by 2020. In April of 2011, this RPS standard of 33 percent renewable by 2020 was enacted into law through final passage of Senate Bill X 1-2 (Simitian) and extended to apply to both public and investor owned utilities.

SENATE BILL 97

Senate Bill 97, passed in 2007, required the Governor's Office of Planning and Research (OPR) to develop and recommend amendments to the California Environmental Quality Act (CEQA) Guidelines for addressing GHG emissions related to land use planning. The amendments to CEQA were approved and became effective in March 2010, thereafter requiring all CEQA documentation to include and comply with the new amendments established for addressing greenhouse gas emissions.

APPENDIX

CALIFORNIA STATE CLIMATE REGULATIONS *(cont.)*

SENATE BILL 375

Senate Bill 375 was passed in 2008 to reduce GHG emissions caused indirectly by urban sprawl throughout California. The bill offers incentives for local governments to execute planned growth and development patterns around public transportation in addition to revitalizing existing communities. Metropolitan Planning Organizations (MPOs) work with CARB to reduce vehicle miles traveled by creating sustainable urban plans with a comprehensive focus on housing, transportation, and land use. Urban projects consistent with the MPO's Sustainable Community Strategy (SCS) can bypass the CEQA's GHG emission environmental review. This provides developers with an incentive to comply with local planning strategies which support the State's greater effort for overall emission reduction in the land use and transportation sector.

ASSEMBLY BILL 341

Starting July 1, 2012, businesses and public entities, including schools and school districts that generate four cubic yards or more of waste per week and multifamily units of five or more will be required to recycle, if they are not already doing so. AB 341 also establishes a statewide goal of 75 percent diversion of solid waste to landfills. The purpose of this new law is to reduce greenhouse gas emissions by diverting commercial solid waste to recycling efforts and expand opportunities for additional recycling services and recycling manufacturing facilities in California.

REGIONAL AIR POLLUTION CONTROL DISTRICTS (APCD) AND AIR QUALITY MANAGEMENT DISTRICTS (AQMD)

In 1947, the California Air Pollution Control Act was passed and authorized the creation of Air Pollution Control Districts (APCDs) and Air Quality Management Districts (AQMDs) in every county. APCDs and AQMDs are tasked with meeting federal and state air pollution requirements set by the Clean Air Act and can develop regulations to achieve the necessary public health standards, though these regulations need approval from CARB and the US EPA. APCDs and AQMDs have jurisdiction over businesses and stationary sources of emissions and can offer varying levels of outreach, grants, and CEQA review and technical assistance to interested public and private parties. The APCDs and AQMDs do not have the authority to regulate mobile air pollution sources, which is the responsibility of CARB, and must defer to state or federal regulations provided by the California Air Resources Board and the U.S. Environmental Protection Agency.

APPENDIX

LEAF COURSE DESIGNATION

BACKGROUND

Mt. SAC is committed to sustainability. In 2014 President Scroggins signed the American College and University Presidents' Climate Commitment; part of this pledge calls for integrating sustainability into the curriculum and making it a part of the educational experience for all students.

Colleges and universities have the unique opportunity and responsibility to advance knowledge, understanding, and commitment among students who will be future leaders. As such, Mt. SAC has a crucial role in the development of a sustainable society.

GUIDELINES FOR SUSTAINABILITY-RELATED ("LEAF-DESIGNATED") CLASSES AT MT. SAC

A sustainability-related course section is one in which a particular instructor has chosen to integrate sustainability concepts into the course content. This does not indicate additional work for students. Sustainability is used as context for achieving the same learning goals that the other course sections are also working towards. Additionally there may be a sustainability-related student learning outcome established for this section. These offerings are appropriate for students learning about sustainability for the first time or for those more familiar, to see it from a new perspective.

Sustainability-related classes may include sustainability as a unique course component or module, or infuse sustainability concepts as appropriate throughout the course.

Sustainability education is more than just transferring knowledge about sustainability issues and how to tackle them. It has a focus on changing mindsets, developing skills in critical and systemic thinking, and enhancing capacity for facilitating change. It is about giving people, communities and organizations, new sets of skills and knowledge, so that they can identify and respond to sustainability challenges, in ways which lead to long-term and sustained change.

A widely accepted definition of sustainable development was given by the World Commission on Environment and Development in 1987. The Commission defined sustainable development as "forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs."

The American Association for Sustainability in Higher Education (AASHE) further identifies three elements of sustainability.

1. Economic sustainability
2. Social sustainability
3. Environmental sustainability

The relationships among these three elements must be considered to ensure the long-term viability of our communities and our planet.

APPENDIX

LEAF COURSE DESIGNATION *(cont.)*

Ideally, a Sustainability-related class would advance each of the three components; however, including a single component is also sufficient. The course instructor need not teach specific content in the component areas, but it can help to introduce and emphasize the interconnectedness among them.

1. **Environmental sustainability** is a state in which the demands placed on the environment can be met without reducing the environment's capacity to allow all people and supporting ecosystems to flourish indefinitely. This includes the ability to manage the use of renewable and non-renewable resources so that we will continue to have natural resources necessary to support a healthy life and healthy environment in the future.

2. **Social sustainability** is the ability of a social system, such as a community or a country, to satisfy human needs and to function at an acceptable level of social well-being and satisfaction indefinitely. It involves the harmonious evolution of a civil society with culturally- and socially-diverse groups seeking improvements in the quality of life for all segments of the population.

3. **Economic sustainability** is the state in which individuals, corporations, and political units take actions related to natural, human, and financial resources so that responsible decisions are made regarding long-term social and environmental impact.

It is difficult to discuss one aspect of sustainability without recognizing the interdependencies among the three components described above. The following list provides examples of sustainability issues that might be addressed in classes at Mt. SAC. Many other topics could also be relevant to courses. One should consider how each topic on this list includes aspects of environmental, social, and economic sustainability.

- Urban regeneration and community development
- Cultural diversity
- Alternative energy sources
- Water safety and water scarcity
- Transportation
- Ecology, ecosystems, and biodiversity
- Pollution and waste
- Climate change
- Peak oil and other non-renewable resources
- Carbon footprinting
- Education systems and workforce development
- Corporate responsibility
- Employee health and safety
- Human rights, social justice, and race and gender equity
- Social support systems
- Labor rights
- Civic engagement, community involvement, and governance
- Globalization, consumerism, and ethical trade
- Wellbeing and health equity
- Natural resource depletion
- Sustainable agriculture and food security

How can environmental sustainability, social sustainability, and economic sustainability be interconnected in the classroom? Examples include the following.

CONNECTIONS AMONG PEOPLE, PLANET, AND PROFIT

Show this six-minute video: "Sustainability at Delta College." https://youtu.be/2RzqCv2UZJs (Permission granted by Donna Giuliani.)

HEALTH EQUITY, CONSUMERISM, FOOD SECURITY, POLLUTION, AND WASTE

Although many people do not think they have a voice when it comes to the foods that are produced and the prices that are associated with those foods when they enter a grocery store, they are misled. When one goes to the grocery store and purchase a food item they are voting for the food when it gets scanned (wellbeing and health equity). It is no secret that many Americans are voting strongly for fast and unhealthy foods. When the demands for these foods are apparent, the prices for food produced in large quantities can be reduced. This makes it difficult for healthy foods with a shorter shelf-life to remain at a lower cost (consumerism). It is increasingly difficult for areas of poverty to have access to healthy foods as well (food security). When faced with feeding a family, a person might opt for the $1 menu versus higher-priced produce because of the quantity of food they are able to purchase. When food is mass-produced, it also has an effect on our environment. These effects include waste run off (pollution and waste) from large animal feeding operations.[160]

NATURAL RESOURCE DEPLETION, CORPORATE RESPONSIBILITY, AND SOCIAL JUSTICE

Overfishing in North Atlantic led to depletion of cod and Canadian law banning cod fishing for 10 years (environmental). Large corporate trawlers had disturbed spawning grounds in efforts to get all the fish for immediate profit, ignoring the fact that when the fish were gone, profits would disappear (corporate responsibility). Local families that fished sustainably for generations were denied their livelihood and way of life (social).[161]

Courses designated as sustainability-related may contain the following components.

- Integration of basic and applied knowledge from multiple disciplines, including the natural and social sciences, to analyze human-environment interactions
- Analysis of the tradeoffs or benefits involved in managing resources for the social, economic, and environmental welfare of current and future generations
- Development of alternative strategies for the use of natural, human, and fiscal resources that are compatible with the constraints on these resources
- Implementation of practical solutions to socioeconomic and environmental challenges, including those that relate to energy, technology, ecosystems, social transformations, food systems, policy, and governance

[160] Renée Hoppe, "Health Equity, Consumerism, Food Security, Pollution, and Waste," Delta College.
[161] Janis Kendziorski, "Natural Resource Depletion, Corporate Responsibility, and Social Justice, Delta College.

APPENDIX

LEAF COURSE DESIGNATION *(cont.)*

Sustainability-related classes may seek to achieve the following, where applicable.

- Enable students to identify and articulate existing sustainability threats and challenges related to the course subject area
- Promote critical thinking and problem solving as responses to existing and potential sustainability issues related to the course subject area
- Encourage students to make cross-disciplinary connections among the environmental, social, and/or financial aspects of sustainability as they pertain to the course subject area
- Advance discussion about sustainability topics within the students' field of study and their future careers
- Encourage examination and reflection on personal attitudes and habits, and inspire students to integrate sustainability concepts into their own personal actions.

The form on the opposing page is used by faculty requesting sustainability-related Leaf-designation. Leaf-designation will apply only to the specific course sections requested and will continue for these sections until an instructor requests that it be removed.

Instructor name: _____

Instructor email: _____

Semester and Year Leaf-designation should begin: _____

Division: _____

Course name: _____

Indicate in the appropriate box below which course sections should receive the Leaf-designation:

- o All sections taught by ALL instructors
- o All sections taught only by the instructors listed (include yourself):
- o Other (please explain):

Sustainable actions allow people to meet the needs of the present without compromising the ability of future generations to meet their own needs. Actions can have environmental, social, and/or economic impact.

Which of the following components of sustainability will be included in your course? (Check all that apply):

- o Environmental: (ecosystems, natural resources, etc.)
- o Social: (social well-being, civil society, etc.)
- o Economic: (long-term impacts of financial decisions, etc.)

Describe specific sustainability issues that relate to your course content:

How will you integrate sustainability into your course?

Will you incorporate consequences of unsustainable practices into your course? If so, how?

Describe or provide at least one meaningful assignment related to sustainability that you will include in your course. Explain your method for assessing the students' grasp of the concepts.

If you have questions, please contact our Sustainability Coordinator.

APPENDIX

LEAF COURSE DESIGNATION *(cont.)*

SIDE NOTES REGARDING THE LEAF-DESIGNATION FORM

Delta College initiates designation by means of an online form submitted by the instructor to an Academic Sustainability Coordinator. Formal designation as "Sustainability Related" continues until the instructor requests that the designation end. This designation is also section-specific.

The designation process is designed to encourage legitimate compliance. An instructor seeking designation completes the form themselves, and receives no benefit for the designation, and therefore has little incentive to falsely claim the designation. If the designation becomes less meaningful in the future, the definition of significant may merit more discussion.

APPENDIX

SAMPLE COURSE CANDIDATES FOR LEAF-DESIGNATION

The classes listed here are examples that could get Leaf-designation as they are, but would require department initiative to do so.

- **AGAG 1: Food, Land Use, & Politics:** "Surveys the world's food producing systems in terms of economic, political, and cultural forces. Emphasizes ethical, sustainable food producing agriculture."
- **AGOR 35: Plants for Southwest Climates:** "Identification, growth habits, culture and ornamental use of annuals, perennials, groundcovers, shrubs, trees, cacti, and succulents which are native to California and the Southwest, or drought tolerant in Southern California."
- **AGOR 62: Irrigation Principles and Design:** "Special emphasis is given to water conservation."
- **AGOR 63: Irrigation Systems Management:** "Systematic approach to water conservation in landscapes."
- **AGOR 64: Irrigation - Drip and Low Volume:** "Conservation of water in landscapes by utilization of drip and low-flow irrigation practices."
- **AIRC 67: Energy Management:** "Includes theory for sustainable Green Building Technologies with introduction to Energy Star Buildings and LEED programs."
- **ARCH 202: Design Level 4 - Advanced Project:** "Fourth level architectural design studio focusing on sustainability, energy efficiency and environmental conservation. Emphasis is on critical thinking and problem solving involving material selection, envelope design, advance space planning and the development of designs from complex building programs."
- **BIOL 1: General Biology:** "Major principles and concepts, including cellular biology, energy relationships, biological systems, heredity, evolution and ecology for non-science majors." (Some sections emphasize sustainability issues.)
- **BIOL 3: Ecology and Field Biology:** "Emphasizes evolutionary relationships; ecology including animal behavior, communities, ecosystems, wilderness and wildlife preservation, and population dynamics."
- **BIOL 6: Humans and the Environment:** "Ecological concepts to aid understanding the Earth's environmental crisis and determining courses of action to correct the problem. Emphasis will be placed on specific problems of population, pollution, preservation of wildlife and wilderness, and open space. A historical appraisal of human attitudes toward the land and of the necessity of developing a new land ethic."

APPENDIX

SAMPLE COURSE CANDIDATES FOR LEAF-DESIGNATION *(cont.)*

- **BIOL 6L: Humans and the Environment Lab:** "Investigates major principles and problems of humans and the environment in the field and in the biological science laboratory."
- **BIOL 25: Conservation Biology:** "Concepts of conservation biology for natural resources, including biogeography, biodiversity and extinction, environmental law, public lands, and conservation organizations. Emphasis on strategies important to addressing biological conservation and sustainable management of natural and managed ecosystems."
- **ECT 70: Elements of Construction Management:** "Construction processes, terminology, and procedures. Topics include construction careers, building systems, sustainability, quality control, management, and scheduling of resources."
- **ENGL 1A: Freshman Composition:** Some sections that utilize sustainability-related readings and research topics.
- **GEOG 1: Physical Geography:** "Study of the natural processes creating the Earth's physical environments with emphasis on the inter-relationships of natural processes and systems."
- **GEOG 2: Human Geography:** "Human geography with emphasis on critical areas of inquiry and research. Focus on the interconnections of place and process in several sites around the globe."
- **GEOG 8: The Urban World:** "Geographical analysis of past and current patterns of world urbanization. Emphasis is on city origins, growth, development, and current problems."
- **GEOG 30: California Geography:** "Includes an examination of the physical processes that shape the landscapes of California, the interaction of humans with these physical processes (particularly the importance of water), and the cultural and social landscapes that have evolved as a result of this human-environment interface."
- **GEOL 9: Environmental Geology:** "Human interactions with the geological environment for non-science majors. Relevant aspects of the geological environment and the problems currently caused by humans as they use the earth and its resources. Geologic hazards, including earthquakes, volcanoes, landslides, floods, subsidence. Emphasis on geological viewpoints concerning waste disposal, pollution, geothermal energy, fossil fuels, and mining. Geologic practices related to sound land management, conservation of resources, and protection of the environment."
- **HIST 1: History of the United States:** Some sections that utilize sustainability-related readings and research topics.
- **ID 29: Interior Design Studio I:** "Analysis and application of design concepts to interior environments. Focuses on the creative process of identifying, evaluating, and solving design

problems while incorporating universal and sustainable design in a studio environment."

- **ID 39: Interior Design Studio II:** "Focuses on the creative process of identifying and solving design problems incorporating universal and sustainable design."

- **LIBR 1: Information Resources and Research Methods:** Some sections that utilize sustainability-related readings and research topics.

- **POLI 10: Environmental Politics:** "Global environmental problems including an analysis of political theories and comparative policies in the emerging field of environmental politics."

- **VOC AGG 01: Food Production, Land use & Politics - A Global Perspective:** "Surveys the world's food producing systems in terms of economic, political and cultural forces. Emphasizes ethical, sustainable food producing agriculture."

APPENDIX

CCIC PURPOSE AND FUNCTION

Climate Commitment Implementation Committee (CCIC) is a Governance Committee that Reports to President's Advisory Council.

PURPOSE

The Climate Commitment Implementation Committee exists for the purpose of: (1) providing education about the Climate Commitment (formerly known as the American College and University Presidents' Commitment on Climate – ACUPCC) and (2) overseeing the sustainable implementation of the requirements of the ACUPCC Carbon Commitment, which Mt. SAC is a signatory to (below).

- Raising awareness within the campus community and the broader community about climate change and the institutional and cultural changes that need to be made to adapt to unavoidable climate change, on the one hand, and prevent unmanageable climate change, on the other
- Supporting the incorporation of sustainability and climate change across the curriculum
- To work with the Mt. SAC Sustainability Committee to increase awareness about sustainable lifestyles, forms of economic production, and development
- Promoting compliance with laws and regulations affecting greenhouse gas emissions and sustainable use of resources

FUNCTION

The Climate Commitment Implementation Committee reports to the campus President and chief academic and business officers and is responsible for overall development, coordination, and supervision of regular greenhouse gas inventories as well as the development and implementation of a climate action plan which will serve as a blueprint for Mt. SAC's achievement of neutrality in greenhouse gas emissions over a specified period of time. The committee will also recommend steps to meet other requirements of the ACUPCC.

- To serve as the primary advisory body to the President's Advisory Council regarding the American College and University Presidents' Climate Commitment
- To ensure completion of a greenhouse gas emissions inventory within one year of signing the ACUPCC and at least every other year thereafter
- To develop a climate action plan that will make recommendations regarding the development, implementation, and facilitation of: (1) the achievement of zero net greenhouse gas emissions; (2) integration of sustainability into the curriculum and research and professional development; and (3) sustainable use of resources
- To facilitate communication and study of best practices in the area of sustainability and rapid and widespread assimilation of this knowledge

- To make greenhouse gas inventories, the climate action plan and progress reports publicly available

- To promote economic practices on campus and within the broader community, including purchasing and investment policies that are in alignment with sustainability and the goal of net neutrality in greenhouse gas emissions

- To promote outreach to the broader community on issues of climate change, greenhouse gas emissions reduction, and sustainability

APPENDIX

RECOMMENDATIONS REGARDING DIVESTMENT

DEVELOPMENT OF A MT. SAC INVESTMENT POLICY ON SUSTAINABILITY

The American College and University Presidents' Climate Commitment, which President Scroggins signed in the fall of 2014, includes the following requirement: "Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution's endowment is invested." Schools around the country, including Harvard University, Duke University, and many others, have developed comprehensive socially-responsible investment policies that include environmental sustainability as one factor.

What follows is a short survey of what other California schools have done in this area.

FOOTHILL-DE ANZA FOSSIL FUEL DIVESTMENT POLICY

Resolution

Environmental Sustainability is critically important to the Foothill-De Anza Community College District, the State of California, and the nation. Reducing carbon dioxide emissions from the burning of fossil fuels is central to this objective. The District is committed to stewardship of the environment and to reducing the District's dependence on nonrenewable energy sources.

As an auxiliary organization of the Foothill-De Anza Community College District, the Foothill-De Anza Foundation Board of Directors is committed to sustainability. As such, the Foundation Board will cease any new direct investments in fossil fuel companies. Furthermore, the finance company will direct the Foundation's current asset managers to minimize investments in commingled assets that include fossil fuel companies. Finally, the Foundation will divest from any current fossil fuel holdings by the end of the current fiscal year, June 30, 2014. "Fossil fuel companies" are defined as companies with the greatest holdings of unburned carbon reserves of coal, oil and gas. In practice, we currently are using the top 200 companies on the Carbon Tracker list as published by the Fossil Free website.

UNIVERSITY OF CALIFORNIA SYSTEM

On September 10, 2014 the University of California announced a series of measures to make UC a national leader in sustainability. Among the measures are the following recommendations.

- Allocate $1 billion over five years for direct investments in solutions to climate change
- Adhere to the United Nations-supported Principles for Responsible Investment (PRI), the largest university and the first public American university to do so
- Establish and implement a framework for sustainable investment with the goal of completion by the end of the current fiscal year
- Integrate environmental, social and governance factors as a core component of portfolio optimization and risk management. Evaluate all strategies for achieving these goals as soon as practical, including whether to use divestment

CALIFORNIA STATE ASSEMBLY

In September of 2015 the California Assembly passed SB 185 calling on CALSTRS and CALPERS to divest holdings in coal-related financial assets. It is expected that legislation calling for divestment from all fossil fuel stocks will be introduced in the State Senate in 2018.

STUDENT SENATE FOR CALIFORNIA COMMUNITY COLLEGES

At its Fall 2015 General Assembly the Student Senate for California Community Colleges passed a resolution calling on the California Community Colleges system to divest from fossil fuel companies. The resolution reads as follows.

- Resolved, That the SSCCC calls upon the California Community Colleges system to divest from the 200 worst polluters as compiled by the Fossil Free Indexes and to invest in clean, renewable energy instead

- Resolved, That the SSCCC calls upon local student senates to pass full fossil fuel divestment resolutions asking their local California Community College Boards of Trustees or Foundations to divest

- Resolved, That the SSCCC calls upon the California Community Colleges Chancellor's Office and the California Community College Board of Governors to fully divest from fossil fuels and implement a position directly related to sustainability.

- Resolved, That the SSCCC create and champion a new campaign to realize a "Fossil Free CCC"

RELEVANT MT. SAC INSTITUTIONAL VALUES

The revised College Mission Statement reads: Mt. San Antonio College is committed to providing quality education, services, and workforce training to students who aspire to become productive members of a diverse, sustainable global society… Mt. San Antonio College is committed to serving those in our community to improve economic achievement, advance civic engagement, and enrich aesthetic and cultural experiences.

Institutional Learning Outcomes: Recognizing and respecting the beliefs, opinions, and values of other individuals and cultures. Being informed about and participating in local, state, national, and global communities. Evaluating environmental conservation and sustainability.

PROPOSED SUSTAINABLE INVESTING POLICY

- Whereas the fossil fuel divestment movement has become the largest divestment movement in history with over $6 trillion in assets currently pledged to be divested from fossil fuel companies;[162]

- Whereas San Francisco, Oakland, and six other cities and counties in California in addition to New York City have announced that they have filed lawsuits against fossil fuel companies to sue for damages related to climate change, and Paris, Los Angeles, and other cities have

[162] Fossil Free, "We Can Build a Fossil Free World," https://gofossilfree.org

APPENDIX

RECOMMENDATIONS REGARDING DIVESTMENT *(cont.)*

announced that they are also considering suing fossil fuel companies for damages related climate change;

- Whereas the International Renewable Energy Agency (IRENA) released a study in January 2018 showing that renewable prices will be "on par with – or even cheaper than – the cost of fossil fuel-generated electricity by 2020"; and

- Whereas the Carbon Tracker Initiative raised the possibility that fossil fuel investments could become stranded assets due to the declining costs of renewable forms of energy or increasing regulatory costs imposed on fossil fuels, the Climate Commitment Implementation Committee recommends the adoption of the following policy; now, therefore, be it

- Resolved, that the Mt. SAC Foundation will seek to invest in a manner consistent with its professed values of global environmental sustainability and civic engagement as an institution of higher education. Specifically, it will seek to address the issue of social responsibility in its investment decisions by balancing its fiduciary responsibility to maximize returns on its investments with ethical and social stewardship of its investments. The Foundation Board will be sensitive to the issue of social responsibility when making investment decisions. It will monitor and take into account a wide variety of information and consult with other campus stakeholders when appropriate to help it to determine what investments should be considered socially responsible. In carrying out its socially responsible investment policy, the Board will continue to give specific instructions to its investment managers about investing or not investing in particular products, companies, and countries.

In accordance with this policy, the Foundation will not invest in companies that pursue production in an egregiously environmentally destructive manner or that pose a clear existential threat to the sustainability of ecosystems. As an expression of that commitment, the Foundation will not invest in fossil fuel stocks unless or until fossil fuel companies cease drilling and mining for new fossil fuels and begin to commit the majority of their monies to intensive research and development in as well as rapid building of renewable energy capacity. This policy is consistent with the findings of the U.N. International Panel on Climate Change fifth assessment report which states that 80 percent of existing fossil fuel reserves must remain in the ground if socially-destabilizing climate change is to be avoided. It is also consistent with the call from the Sierra Club and a host of other environmental organizations that maintain that a shift to 100 percent renewable energy is possible and is necessary to avoid socially destabilizing climate change.

Transition to this sustainable investment policy will take some time, and therefore is likely to occur in stages. Local decisions regarding local funds are simplest to make, and should occur first. Larger actions, such as working to eliminate fossil-fuel investments within employee retirement systems (CALPERS and CALSTRS), are likely to take a bit longer, and will benefit from thorough analysis.

APPENDIX

CARBON CALCULATIONS SPREADSHEETS, 2014–2016

MT. SAC OVERVIEW OF ANNUAL EMISSIONS (2014)

	Energy Consumption (MMBtu)	CO_2 (kg)	CH_4 (kg)	N_2O (kg)	$_eCO_2$ (Metric Tonnes)
SCOPE 1					
Co-gen Electricity	-	-	-	-	-
Other On-Campus Stationary	310,386.0	16,456,665.7	1,470.9	29.4	16,502
Direct Transportation	5,023.0	361,560.9	64.0	22.0	370
Refrigerants & Chemicals	-	-	-	-	285
Agriculture	-	-	3,527.9	42.4	101
SCOPE 2					
Purchased Electricity	57,173.0	9,373,433.2	129.9	183.1	9,431
SCOPE 3					
Faculty / Staff Commuting	16,395.4	1,177,057.0	222.5	75.8	1,205
Student Commuting	398,143.7	28,583,513.6	5,403.5	1,839.6	29,267
Study Abroad Air Travel	177.9	34,701.2	0.3	0.4	35
Solid Waste	-	-	332,568.0	-	8,314
Scope 2 T&D Losses	5,197.0	852,048.9	11.8	16.6	857
OFFSETS					
Additional					(134)
TOTALS					
Scope 1	315,409.0	16,818,226.6	5,062.9	93.8	17,258
Scope 2	57,173.0	9,373,433.2	129.9	183.1	9,431
Scope 3	419,914.1	30,647,320.7	338,206.2	1,932.4	40,723
All Scopes	792,496.1	56,838,980.5	343,399.0	2,209.3	67,413
All Offsets					(134)
				NET EMISSIONS	**67,279**

APPENDIX

CARBON CALCULATIONS SPREADSHEETS, 2014–2016 *(cont.)*

MT. SAC OVERVIEW OF ANNUAL EMISSIONS (2015)

	Energy Consumption (MMBtu)	CO_2 (kg)	CH_4 (kg)	N_2O (kg)	$_eCO_2$ (Metric Tonnes)
SCOPE 1					
Co-gen Electricity	-	-	-	-	-
Other On-Campus Stationary	279,272.4	14,807,022.6	1,323.5	26.5	14,848
Direct Transportation	4,757.7	341,276.5	65.9	22.4	350
Agriculture	-	-	4,296.8	46.9	121
SCOPE 2					
Purchased Electricity	48,623.1	7,971,692.2	110.5	155.7	8,021
SCOPE 3					
Faculty / Staff Commuting	16,440.4	1,180,433.6	222.6	75.8	1,209
Student Commuting	402,924.2	28,930,302.6	5,455.8	1,858.1	29,620
Study Abroad Air Travel	620.1	120,946.1	1.2	1.4	121
Solid Waste	-	-	332,568.0	-	8,314
Scope 2 T&D Losses	4,419.9	724,630.1	10.0	14.2	729
OFFSETS					
Additional					(124)
TOTALS					
Scope 1	284,030.1	15,148,299.1	5,686.2	95.7	15,319
Scope 2	48,623.1	7,971,692.2	110.5	155.7	8,021
Scope 3	424,404.6	30,956,312.4	338,257.7	1,949.5	39,994
All Scopes	757,057.9	54,076,303.7	344,054.3	2,200.9	63,334
All Offsets					(124)
				NET EMISSIONS	**63,209**

MT. SAC OVERVIEW OF ANNUAL EMISSIONS (2016)

	Energy Consumption (MMBtu)	CO_2 (kg)	CH_4 (kg)	N_2O (kg)	$_eCO_2$ (Metric Tonnes)
SCOPE 1					
Co-gen Electricity	-	-	-	-	-
Other On-Campus Stationary	346,389.6	18,365,576.6	1,641.6	32.8	18,416
Direct Transportation	4,757.7	341,276.5	65.9	22.4	350
Agriculture	-	-	3,540.7	43.3	101
SCOPE 2					
Purchased Electricity	68,269.1	11,192,628.3	155.1	218.6	11,262
SCOPE 3					
Faculty / Staff Commuting	17,220.9	1,236,517.5	233.0	79.4	1,266
Student Commuting	418,406.5	30,042,971.2	5,660.9	1,928.2	30,759
Study Abroad Air Travel	119.5	23,298.8	0.2	0.3	23
Solid Waste	-	-	332,568.0	-	8,314
Scope 2 T&D Losses	6,205.7	1,017,414.5	14.1	19.9	1,024
OFFSETS					
Additional					(120)
TOTALS					
Scope 1	351,147.3	18,706,853.0	5,248.1	98.5	18,867
Scope 2	68,269.1	11,192,628.3	155.1	218.6	11,262
Scope 3	441,952.5	32,320,202.0	338,476.3	2,027.7	41,386
All Scopes	861,368.9	62,219,683.3	343,879.5	2,344.8	71,515
All Offsets					(120)
				NET EMISSIONS	**71,396**