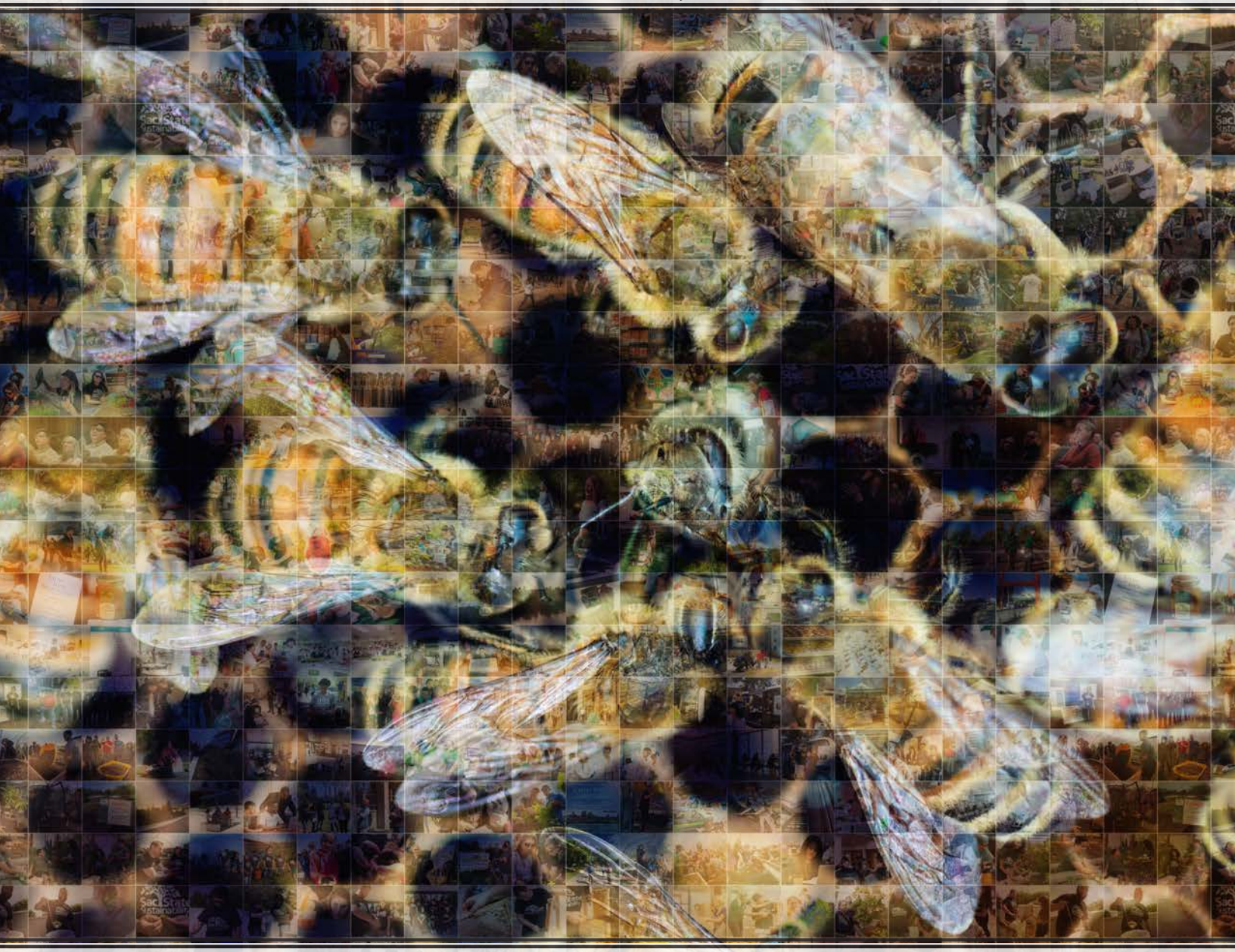
Sustainability Report



2019 - 2020

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Message from the Presidents

President Robert Nelsen

At Sacramento State, we are doing everything in our power to slow climate change and reduce our impact on the planet. In recent years, we have seen the disastrous effects climate change can have on our students, faculty, and staff, from droughts and floods to the wildfires that blazed across the state. In 2020 alone, more than 4 million acres of land burned in California. These fires displaced thousands of families, destroyed homes, and blackened the skies across the state for weeks.

In pursuit of reducing campus greenhouse gas emissions, our university established a 2040 Carbon Neutrality goal in 2016, along with incremental milestones along the way. Last year, our emissions were the lowest they have been in over 20 years but there is much more work to be done. More importantly, this work cannot be done alone. Climate change is a global issue that requires widespread collaboration and strong partnerships. As Sacramento's anchor institute, this means not only reducing our campus greenhouse gas emissions but doing our part to help reduce Sacramento's emissions as well.

In recognizing the need to slow climate change beyond our campus boundaries, Sacramento State partnered with the City of Sacramento and the City of West Sacramento, as well as a group of local businesses and non-profits, to establish the Mayors' Commission on Climate Change. As a member of this important commission, the Hornet Family helped to create a roadmap for Sacramento and West Sacramento to reach carbon neutrality by 2045. I was especially proud to see so many of our students share their vision for a carbon free city when our campus hosted the Mayors' Student Climate Change Summit.

Our campus will continue to build on the successful climate work that so many of our students, faculty, and staff have already done. I am confident we will not only reach carbon neutrality by 2040, but assist the Sacramento region with meeting their carbon goals as well.

Sac State is No. 1 in Sustainability, Stingers Up!

ASI President Noah Marty

Sustainability is one of the most important objectives to our students. As we begin our young careers, with our whole lives ahead of us, the future of our planet is of great concern. We have grown up understanding the damage that climate change will cause, and we could directly experience these damaging events in our lifetimes. Sacramento State's continued and expanded dedication to sustainability is a promise we are making today that is dedicated to our students, communities, and planet's future.

Our campus pledge to be carbon neutral by 2040 is of the utmost importance and through the further expansion of solar power on campus and various other sustainability measures, I am confident that we can achieve it. ASI has been a partner in these efforts, from previous boards supporting the Sustainability Institute and BAC Yard, and our amazing Green Team directing current and future initiatives. Our students have benefited greatly from these efforts with a cleaner river, fresh organic produce, a stronger understanding of sustainability, and a brighter future.

Sacramento State is continuing to grow in its ability to fulfil our obligation to become more sustainable, and as the campus grows, our students and communities will follow.

Stingers Up Hornets!

"Last year, our emissions were the lowest they have been in over 20 years but there is much more work to be done."

- President Robert Nelsen

Environmental Impact

Campus Footprint

In 2020 our emissions were the lowest they have been since 1998

2019

- Scope 1 Emissions - 6,526 Metric Tons
- Scope 2 Emissions - 8,898 Metric Tons
- Scope 3 Emissions - 3,608 Metric Tons
- Compost Created - 994 Metric Tons
- Renewable Energy Generated - 706,910 kWh
- Solid Waste - 1,456 Metric Tons
- Water Use - 131,755,981 Million Gallons
- Gas Use - 1,224,462 Million Therms
- Recycling - 784 Metric Tons
- Electricity Use - 42,359,697 Million kWh

2020

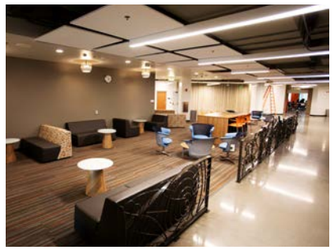
- Scope 1 Emissions - 6,591 Metric Tons
- Scope 2 Emissions - 8,077 Metric Tons
- Scope 3 Emissions - 710 Metric Tons
- Compost Created - 411 Metric Tons
- Renewable Energy Generated - 634,325 kWh
- Solid Waste - 1,320 Metric Tons
- Water Use - 168,090,929 Million Gallons
- Gas Use - 1,121,300 Million Therms
- Recycling - 665 Metric Tons
- Electricity Use - 41,204,673 Million kWh

Lighting Improvements

The U.S. Energy Information Administration has determined that lighting is the single largest consumer of energy in commercial buildings. In 2020 alone, 219 billion kWh of electricity was used for lighting in the United States.

University Union

As part of the recent Union expansion, pre-existing lighting was upgraded to LED lighting. This included state of the art features like daylight harvesting and motion sensors, as well as programmable scheduling software.



Library Lighting

In 2020, the University Library saw a complete lighting upgrade of the 275,000 square-foot building. The project took approximately eight months to complete and cut the lighting energy usage in the building by almost 55%. This project was the single largest lighting project Sac State has done and is expected to save the campus over $100,000 in electricity costs annually. Prior to the renovation, campus electricians were changing light bulbs weekly. Now, the new lights are expected to last anywhere from 20-50 years, saving an additional $750,000 in labor costs over the lifetime of the fixtures.

Due to the increased efficiency of LED lighting, the number of light fixtures was also able to be reduced in the building by more than 50%, while still increasing the lighting levels by almost double. This resulted in additional energy savings, as well as a brighter, healthier space for students to study.

While the cost savings from the project are significant, the primary purpose of the project was to reduce greenhouse gas emissions. With a 2040 carbon neutrality goal, similar projects will be necessary for the campus to be successful in reaching carbon neutrality. This project alone is expected to reduce campus emissions by more than 300 metric tons annually and will be a roadmap for future large-scale lighting projects.


Library Lighting Before


Library Lighting After

Project Scale

The University Library lighting project removed or replaced almost 5,000 individual light fixtures with energy efficient, LED ones. To illustrate what this change looks like, the diagram below showcases a single floor in the two-building campus library. The green boxes indicate where fixtures were removed completely and the red boxes indicate where fixtures were replaced with LED lights.

Campuswide

The Facilities Management Electrical Shop works diligently to replace hundreds of inefficient, energy intensive light fixtures with energy efficient, LED ones on a yearly basis. These replacements are typically smaller scale projects, yet equally important, as they account for a significant amount of annual energy reduction. Some of the recent lighting projects have included: Mariposa Hall, Mendocino Hall, Solano Hall, Del Norte Hall, ASI Children's Center, Tahoe Hall, Capistrano Hall, and Yosemite Hall. These smaller projects play a critical role in reducing the campus energy use and taking steps toward Sac State's 2040 carbon neutrality goal.

Future lighting upgrades include Amador Hall, the AIRC, and Lassen Hall

Every Drop Counts

In 2015, 25 Low Impact Development (LID) sites were installed across the Sac State campus that include: bioretention planters, rain gardens, bioswales, roof drain disconnects, and porous pavement. Each of the sites serve the dual purpose of removing pollutants from the water that flows into the American River and recharging the local ground water, where all campus irrigation is sourced from. With an estimated 3.2 million gallons of rainwater collected annually, the campus has made a commitment to include LID sites in all new building construction.

Living Roofs

Living roofs, a new LID variety on campus, have been added to the Sac State landscape over the past couple of years. A living roof covers an existing roof with vegetation and not only collects and filters rainwater but also improves building insolation, provides habitat for local fauna, and reduces urban heat island effect.

Dry Wells

Dry wells, another new LID type for the campus, are located underground and while they function similarly to rain gardens and bioswales, they work faster and collect more water, which is then naturally filtered before it percolates into the local ground water.

Riverview Hall

The construction of Riverview Hall added the first living roof to campus, which supports local biodiversity with a variety of California native plant species.

Parking Structure 5

Parking Structure 5 added Sac State s first dry well, increasing the overall amount of water collected annually by the campus to recharge the local aquifer.

Science Complex

The Tschannen Science Complex added the first fully accessible living roof to the campus, with a pathway running alongside the vegetation.

Department of Water Resources Grant Project

In a effort to research methods to reduce water, energy, and total greenhouse gas (GHG) emissions on campus, Sac State Sustainability and Facilities Management partnered with students on a research project that resulted in an over $700k grant from the Department of Water Resources.

The initial goal of the student project was to replace manual faucets with automatic, infrared (IR) faucets throughout the campus. However, with a lack of non-biased research, the sustainability team worked with the student group to conduct a research study.

Over the course of four months and three separate phases, research was conducted in a heavily-used building on campus to compare manual faucets to automatic faucets with .05 and .35 aerators. The results showed a water reduction of between 30% and 50% when automatic faucets were used with a .35 aerator instead of manual faucets, creating the basis for the successful grant submission.

With the funding from the Department of Water Resources, the campus replaced approximately 600 faucets, 200 showerheads, 10 washing machines, 11 ice makers, a steam cooker, and countless other fixtures with Energy Star rated appliances. These replacements resulted in annual savings of $40,000 and over 5 million gallons of water, and in turn, Sac State students, faculty, and staff now contribute to reducing the campuses total GHG emissions by simply washing their hands and using other energy efficient water fixtures on campus.

Sustainability Student Assistants Christian Watt and Melissa DeCastro gathered water data during all three phases of the study.

40 Thousand

Dollars in annual cost savings

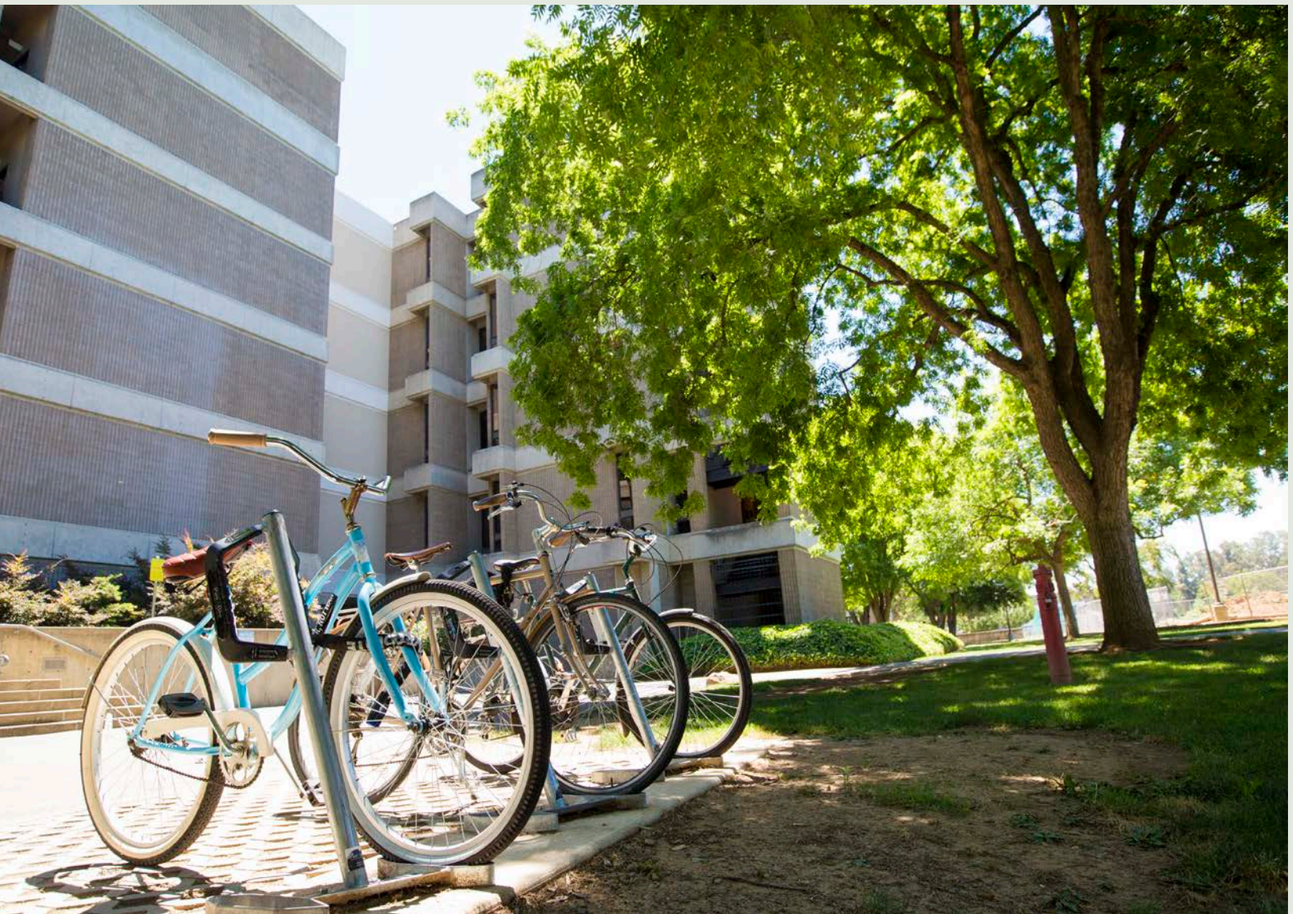
5 Million

Gallons in annual water savings

Transportation & Mobility

Many more miles to walk, bike, drive, scoot, bus, or carpool. No matter how you get to campus, we will get t o carbon neutrality!

Tony Lucas, Associate Vice President for Business & Administrative Services, proudly supporting the partnership that brought Ollie to Sac State



Electric Vehicle Charging Infrastructure

Sac State is a leader in clean and renewable transportation. The campus has more charging stations than any other CSU, boasting over 70 stations for either electric vehicle or plug-in hybrids. Sac State is committed to a future with clean transportation and will be adding even more charging stations in the future.

Bike Campus USA

Bicycles are an important part of Sac State's transportation system. Numerous bike paths can be found across the entire 300-acre campus and there are safe, security-enforced bike compounds throughout cam-pus for students, faculty, and staff. Sac State is honored to be certified as a Bike Campus USA from the League of American Bicyclists.

Public Transportation

Sac State is an innovator in public transportation, recently piloting an autonomous, fully electric shuttle system (Ollie), as a sustainable mode of on-campus transportation. The campus also provides all current students with a commuter sleeve, allowing them access to unlimited public transit through SacRT's extensive bus routes and light rail system.

Celebrating
Our Urban Forest

With 152 unique species, Sac State's urban forest is home to over 3,500 trees, covering approximately 60 acres of campus with a lush canopy.

3,714 TREES ON CAMPUS

237 TONS OF OXYGEN PRODUCED

3,000 TONS OF CARBON STORED

1.7 TONS OF POLLUTION REMOVED

I-Tree Report

In late 2019, Grounds and Landscape Management began a partnership with West Coast Arborists to assist with the care and maintenance of the trees on campus. Through this partnership, the campus developed an in-depth tree report detailing the environmental and financial benefits of Sac State's lush canopy.

Local Partnership

Sac State also has many varieties of fruit trees on campus through a partnership with Soil Born Farms, a 55-acre organic, urban farm in Sacramento. In exchange for 5 yards of Sac State made compost, Soil Born Farms donates a fruit tree to the campus. This partnership highlights Sac State's commitment to being an anchor university, which connects the campus community with the local community to achieve lasting solutions and improvements through inclusive civic engagement.

Tree Campus USA

For the 8th consecutive year, the university was named a Tree Campus USA by the Arbor Day Foundation. In early Fall 2020, Sac State virtually celebrated Arbor Day on Instagram Live. With the help of the hornet family and off-campus partners, 250 new trees were planted as a part of a $123,000 Cool Parks Grant from the California Urban Forests Council and CalFire. The new trees, including Chinese pistache, valley oaks, camphor, and southern live oak, are resistant to drought, pests, and disease.

"Planting a tree is a gift for the future. Now more than ever, proper tree planting and management are crucial to ensuring the health of our planet and ourselves. I'm truly honored to witness Sac State meeting this challenge."

- Erik Skall, Manager of Grounds and Landscaping

Wildlife Recognition

In 2020, the campus was recognized for its natural resources by the National Wildlife Federation as a certified Wildlife Habitat and by the Xerces Society as a certifed Bee Campus USA.

CERTIFIED WILDLIFE HABITAT

The National Wildlife Federation recognizes Sac State for its natural environment for animals that has native plant sources, water for survival and habitat, shelter from predators, and a safe place to reproduce, protect, and nourish their young.

BEE CAMPUS USA

The Xerces Society for Invertebrate Conservation honors Sac State's commitment to conserve pollinators by increasing the abundance of native plants, providing nest sites, and reducing pesticide use on campus.

With a 300-acre campus sitting alongside the American River, which runs from the Sierra Nevada mountain range to its confluence with the Sacramento River in downtown Sacramento, Sac State has a thriving wildlife habitat.

The University qualified for both certifications by having more than 3,500 mature trees, scattered pockets of dense brush, rain gardens, water saving landscaping, thousands of native plants, and a natural water source and habitat for animals. These certifications honor the work that Sac State does to preserve and create gardens and landscapes that help revive the health of bees, butterflies, birds, and other pollinators.

"With the campus being less populated (by humans) in 2020 because of COVID-19, we're seeing an abundance of young turkeys, geese, squirrels, hawks, and the occasional coyote," said James Fox, a past student assistant in Sac State Sustainability and recent graduate who took the lead in documenting the campus' assets to land the NWF's wildlife certification."It makes me feel good that I'm attending and working at a school that is so passionate about preserving and protecting the environment."

Wild Turkeys

Wild turkeys and their young are not an uncommon sight on the Sac State campus.

Trees for habitat

The over 3,500 trees on campus provide habitat and shelter for all of the animals that call Sac State home.

Pollinators

Bees and other insects on campus collect pollen from campus and around Sacramento to take back to their hives.

"Our campus is not just rich in diversity and culture, but also in the plant life and tree species that provide the necessary habitat for wildlife."

- James Fox, Parks and Recreation, '21

Greenhouse Gas Emissions

Sources of Emissions

Sac State tracks all carbon dioxide emissions annually and fluctuations in emissions determine if the work being done on campus has been successful in meeting campus goals and state mandates. Sac State has four main sources of emissions: natural gas, used for heating and cooking; electricity, used for cooling and all other campus energy needs; transportation from students, faculty and staff; and waste disposal sourced from campus. The total emissions from these processes make up the campus carbon footprint.

A Brief History

Sac State began tracking annual carbon dioxide emissions in 1990, establishing a baseline that has been used for the past 30 years. In 2006, California Assembly Bill 32 (AB32) was approved, mandating that all state agencies reduce their Scope 1 and 2 emissions to 1990 levels by December 31st, 2020. Over the 20 years that followed, a variety of other state and campus goals were established, eventually leading to a 2040 carbon neutrality target date for Sac State.

Current Emissions

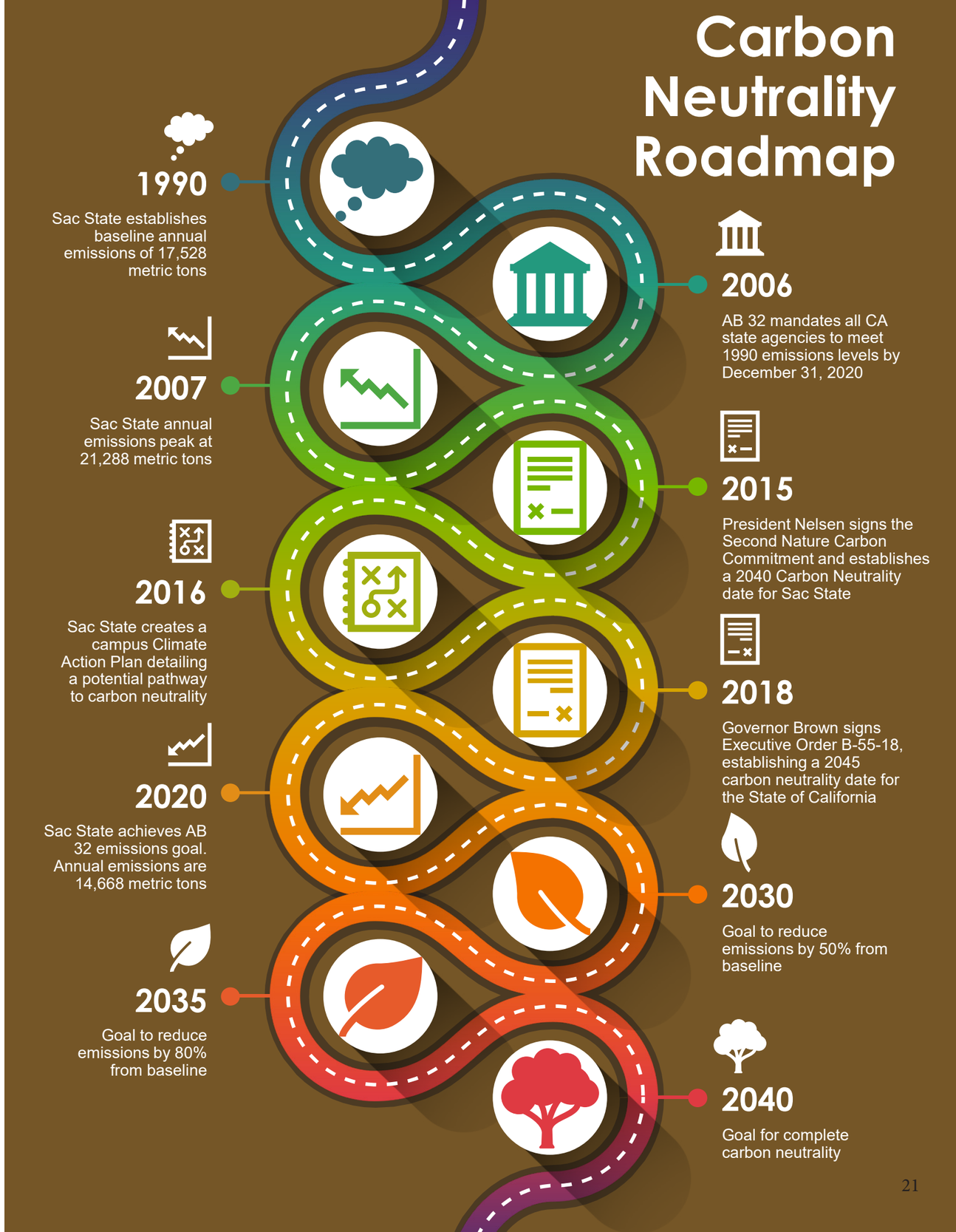
Following consecutive annual emissions reductions, Sac State dropped below the 1990 baseline level of approximately 17,000 metric tons in 2020. In 2020, Sac State emissions fell to approximately 14,000 metric tons, an improvement of 3,000 metric tons over 1990 levels. This achievement was accomplished despite the campus growing by more than 150% in square footage since 1990.

The Road Ahead

As outdated inefficient systems are regularly replaced, annual emissions are expected to continue to decline. New solar arrays will be added to the campus energy grid, decreasing reliance on energy sources that produce emissions. Inefficient lighting will continue to be replaced by LED lighting with smart controls and new environmentally friendly buildings will continue to replace older ones. The campus is also in the final stages of developing a Strategic Energy Plan, which will detail specific energy improvements that must be taken in order to achieve future emissions goals and ultimate carbon neutrality.

Recent, notable projects that led to a substantial decrease in emissions:

- Solar on the WELL and the University Library
- Exterior Campus Lighting Improvements
- University Library Lighting Improvements
- Mendocino Hall Lighting Improvements
- Central Plant Efficiencies
- Campuswide Appliance replacements



Buildings

OUR BUILDINGS

Every Hornet Needs a Hive...

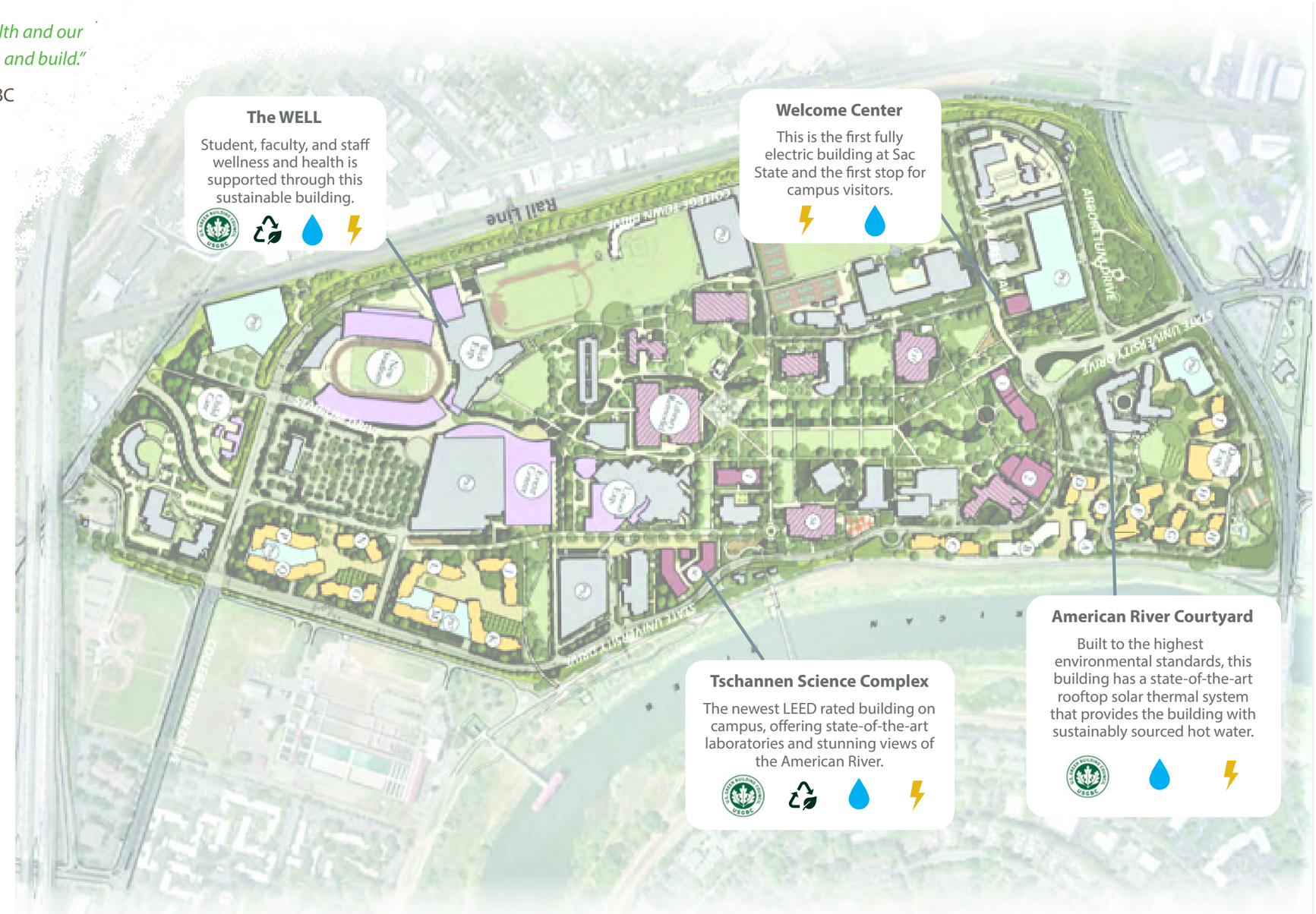
The building sector accounts for 76% of total electricity use and 40% of U.S. GHG emissions

"If we are to rebuild an economy that supports our health and our planet, we must lead with changing the way we design and build."

- Mahesh Ramanujam, President and CEO of USGBC

The operations and new construction of campus buildings are critical for reducing water, waste, energy, and greenhouse gas emissions at Sac State. For this reason, a significant portion of the campus decarbonization plan is focused on reduction strategies in these areas. Projects such as LED lighting retrofits, electrification of appliances, and HVAC equipment have been critical for emissions reductions. Some recent successful projects in these areas have been the lighting retrofit at the University Library, the installation of a high-efficiency chiller at Public Safety, the installation of campuswide automatic low-flow faucets, and the construction of the first fully electric building on campus, the Welcome Center.

California State University, Sacramento was established as an institution in 1947 with 235 students. Now, the average enrollment stands at over 31,000 students per semester and the campus has grown substantially. Throughout those 73 years of growth, successful conservation measures have managed to minimize the environmental impact the campus has. Recent certifications as a certified Wildlife Habitat and Bee Friendly Campus show that these many years of constant environmental stewardship have been successful.



Certified as a Leader in Energy and Environmentally Designed (LEED) building by the U.S. Green Building Council

Energy-conscious design using rooftop solar and/or highly efficient LED lighting

Reused materials that reflect a lower level of embodied carbon when evaluating materials from a life-cycle analysis

Designed with low-impact development sites and bioswales for groundwater recharge. Building also boasts low-flow shower heads and IR faucets for reduced water consumption.

Tschannen
Science Complex

The Tschannen Science Complex is currently the most energy efficient science building in the CSU, beating California's stringent Title 24 requirements by 31%.

Our Gold Standard

The Tschannen Science Complex is the newest LEED Gold building to join the Sac State campus. Opening its doors in Fall 2019, the Science Complex includes a plethora of sustainability features that have made it one of the most sustainable science buildings in the CSU system. Every aspect of the building was carefully designed with sustainability in mind, from the native landscaping outside, to the power saving outlets in the office spaces. Visitors can even take a sustainability tour of the building, using integrated signage located at various features inside and outside of the complex.

We Speak for the Trees

Sacramento State has a deep appreciation for the trees on campus, as shown by our 10-year recognition as a Tree Campus USA. It was this love of the trees that led to a partnership with the Sacramento Tree Foundation to save, mill, and dry more than 15,000-feet of wood from fallen trees at Sac State. This wood was then used in lieu of virgin lumber throughout the building.

Science on Display

One of the most unique energy saving features of the building was the design of the laboratory spaces. With natural lighting in mind, the spaces were constructed with glass interior walls to allow daylight to penetrate deep into the building, reducing the need for artificial light. This feature also allows for visitors to see the learning process firsthand.

Energy Efficiency

Some energy efficient features include LED lighting, daylight harvesting, exterior shading and highly efficient fume hoods.

Salvaged Wood

Fallen campus trees were milled, dried, and used in the main lobby, study areas, and for exterior benches.

Living Roof

The building includes a living roof to help with storm water run-off and improve thermal insolation.

Water Conservation

All bathroom fixtures are low flow and all new landscape around the building has drought tolerant CA native plants.

LEED Gold Certified

Riverview Hall

"Research shows that students who live on campus earn better grades, graduate faster, and have a richer college experience. The overall mission is to graduate more students in less time, and student housing on campus is a step in that direction."

-Dr. Justin Reginato, Associate Vice President for Facilities Management

Emissions Reduction Strategy

With a long-known reputation as a commuter school, Sac State has high transportation emissions associated with students traveling to and from campus each day. These transportation emissions, Scope 3 emissions, are one of the largest and least controlled portions of the university's carbon footprint. New student housing projects such as Riverview Hall allow students the option to live on campus, which reduces emissions from daily commuting. Transforming the campus from a commuter school to a destination university will not only benefit students, but is also a critical step in our path toward carbon neutrality.

Passive Solar

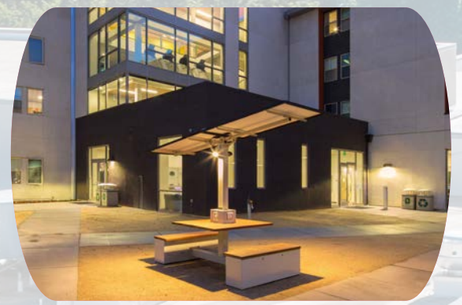
Passive solar design strategies use recessed windows, horizontal sun shades, and a reflective roof that help minimize solar heat gain.

Low Water Use

Low water use landscaping and native plants reduce exterior irrigation needs, while low-flow fixtures minimize interior water demand.

Natural Light

Multi-purpose spaces with floor to ceiling windows increase natural light, enhance river views and promote personal health and well-being.



Tables in the courtyard feature solar powered charging stations

Built to LEED Gold standards, this 416-bed residential housing complex strives to capture the essence of university life. Large, open communal spaces encourage the use of outdoor spaces and inspire conversation among residents that share this home away from home. The complex gives freshmen and sophomore students a place to call home as they begin their college experience. Boasting its own fitness center and exceptional views of the winding American River, Riverview Hall provides its occupants an experience with health and well-being in mind.

The building also has a variety of sustainable features such as LED lighting throughout, water bottle filling stations to help reduce the use of plastic bottles, and even a living roof.

This addition of a new housing complex is the first at Sac State in more than 10 years, but will not be the last as the campus continues to improve the student experience and pursue carbon neutrality.

Bringing Sac State students together through sustainable design

Riverview Hall was carefully designed to draw students into areas with large windows and natural light. Large study areas and the fitness center are strategically placed in these locations to facilitate student interactions. The spaces not only reduce the need for artificial light, but also promote student health and a connection to nature.

Parking Structure 5

Brightly colored biophilic art, designed by Sac State students can be found on each floor. This art work features nature commonly seen throughout campus.

Since it's opening in Spring 2018, Parking Structure 5 has won a number of awards for both its sustainable design and its unique precast construction method. The six-story structure was built to be solar ready and with a multitude of sustainable features, such as LED lighting, electric vehicle charging stations, a tire inflation station, and a parking count system. In November 2020, the structure received Parksmart Gold certification by the Green Building Certification Institute (GBCI), making it the first parking structure at any university in the country to receive a gold rating.

In summer 2022, approximately 1,800 solar panels will be added to the structure, producing over 1,000,000 kWh of clean renewable energy each year. These solar panels will produce more energy than the structure uses on an annual basis and will help the campus take another step towards carbon neutrality.

Parksmart

Sac State is the first university in the country to receive Parksmart Gold

Charging Stations

57 electric vehicle charging stations are located throughout the structure and 120 reserved spaces are available for clean air and carpool vehicles.

Energy Efficiency

Parking Structure 5 features LED lighting with motion sensors and daylight harvesting. This feature reduces the amount of artificial light needed and uses natural daylight to illuminate the structure.

Parking Count System

Sensors throughout the structure track available parking spaces and send the information to a digital board on the ground floor. This allows visitors to avoid floors without available spaces and reduces vehicle emissions.

Bicycle Friendly

Parking Structure 5 features a bike share program, as well as secure bicycle parking for all students, faculty, and staff.

Precast Construction

A precast construction method was used to form many of the structures walls. Precast blocks were created offsite, then trucked to campus and installed. The precast system reduced both construction waste and time.

Why All-Electric?

Taking advantage of fully electric appliances and HVAC equipment allows the user to utilize renewably-sourced energy, rather than carbon-based fuels such as natural gas, to provide heating of air and water in our buildings.

Welcome Center

The newly-constructed Welcome Center is Sac State's first all-electric building

A First of its Kind

The recently completed Welcome Center tackles the campus carbon reduction goals head on. Most campus buildings use electricity in the summer for cooling and natural gas in the winter for heating. The Welcome Center does not use any natural gas, which is a significant accomplishment as the building does not add to the campus carbon footprint.

While the campus and our local electricity provider, SMUD, are able to provide clean carbon-free energy options for electricity, no carbon-free options currently exist for natural gas. This means that the only way Sac State will reach carbon neutrality is through the complete electrification of the campus.

It also means new campus buildings cannot include natural gas-powered heating systems. The Welcome Center was the university's first example of how this can be done. The building uses electric heat pumps in place of traditional gas-powered heating systems, which work by absorbing energy from outside air and transferring that energy into the building as heat through a refrigeration process. This is different from traditional gas powered heating systems in that the heat is not generated, but simply transferred from one place to another, even on cold days.

This building is an example of the Sac State of tomorrow, welcoming visitors and the campus to a carbon free future.

Not to be Forgotten

The building was also constructed to LEED Gold standards, with other sustainable features such as LED interior and exterior lighting, water saving fixtures throughout, and drought tolerant landscaping.

The Welcome Center is the new home of UTAPS

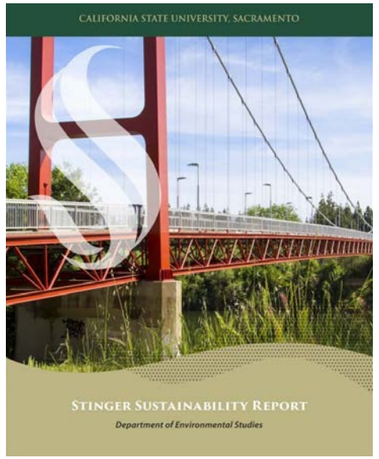
18,400
Square Feet of new space

100
Space bicycle compound promotes sustainable transportation

Sustainability in Academics

Course Integration

Each semester, Sac State Sustainability works with students and faculty on projects that integrate campus sustainability into their curriculum. These projects have proven to increase sustainability knowledge and make the campus a more sustainable place.



Students in Dr. Ajay Singh's ENVS 144 course performed a survey to determine Sac State students' knowledge, attitudes, and behaviors towards sustainability and carbon neutrality. The results of this study can be found on the Sac State Sustainability homepage.

Sac state has a plethora of world class sustainability features and programs, from more than 25 individual Low Impact Development sites, to the first Parksmart certified parking structure at any university in the country. These unique attributes make Sac State the perfect living laboratory to take the curriculum taught in the classroom out into the real world. Over the years, countless students have worked with Sac State Sustainability to either experience real tangible examples of what they are learning in the classroom or to apply what they have learned in the classroom to make a lasting and meaningful impact on campus.

Recent course integration has included sustainability surveys, carbon sequestration measurement in the over 3,500 campus trees, and the development of solutions to reduce plastic waste on campus.

Stinger Sustainability Survey

Sac State Sustainability worked with Dr. Ajay Singh's ENVS 144 class to design and administer a sustainability survey that would give campus leadership better insight into Sac State students' knowledge, attitude, and behavior towards sustainability. The survey was sent to over 8,000 Sac State students and had over 1,000 responses. Questions covered basic knowledge of sustainability topics, as well as more specific topics such as commuting distance/modes of transportation and understanding the idea of carbon neutrality. Results from the survey have been used to guide recent campus sustainability projects and outreach campaigns.

Plastic Reduction

After gathering information on waste and other sustainability issues the campus faces, professor Kenichiro Chinen worked with his IBUS 180 course to develop a plan to reduce plastic bottles on campus. If implemented, this plan could assist the campus with meeting the recent systemwide plastic ban, the CSU Single-use Plastics Policy, and take the campus one step closer towards our zero waste goal.

Carbon Stored in Campus Trees

Using the more than 3,000 trees on campus as a teaching tool, students in Dr. Michelle Steven's ENVS 121 class worked with Sac State Sustainability to measure the amount of carbon sequestered in Sac State's urban forest. Students used specialized tools to measure the Diameter at Breast Height (DBH) of a representative sample of Sac State trees. The measurements were then categorized by tree species and a corresponding carbon sequestration total was calculated.

Sustainability Dashboard

Using metering and monthly billing data, Sac State Sustainability recently launched a public facing sustainability dashboard. This dashboard is designed for Sac State students and faculty to analyze campus water, energy, and gas data. The dashboard will be used as a teaching tool for classes analyzing campus energy trends and by anyone curious about Sac State's environmental footprint. The dashboard can be found at www.csus.edu/sustainability.

Student Involvement

Engaging the Sac State student body through community service work, educational efforts, and environmental activism

The Environmental Student Organization is a nonpartisan, student-run club at Sacramento State that was established in 1998

Students that are in the Environmental Student Organization (ESO) are passionate about the environment, spreading the message of sustainability, and encouring community action. They provide a welcoming platform for students at Sac State to not only act upon their passions but to meet and befriend like-minded individuals.

Some notable works and partnerships of ESO with local organizations include: Sacramento Tree Foundation, American River Parkway Foundation, Sacramento Valley Conservancy, Animal Place, GRID Alternatives, Sac State's ASI Peak Adventures, and Sac State's ASI Green Team, which advises the university on source reduction, recycling, and other environmental activities.

Student leaders in ESO actively work to connect its club members to the local community. Students participated in the Mayor's Climate Summit, which invited members from the Sacramento

community to collaborate on solutions to solving the climate crisis. ESO students not only attended the event but also led workshops throughout the day.

Additionally, ESO students have attended numerous peaceful climate strikes and rallies throughout the City of Sacramento.

Want to join ESO?

For an opportunity to take part in environmental activism, learn about environmental justice, and how to live a more environmentally conscientious life, email esoenvs@gmail.com.

Alternative Energy

ESO partners with GRID Alternatives, a non-profit organization that builds solutions to advance economic and environmental justice through renewable energy. Student volunteers place solar panels on low-income houses and educate about alternative energy.

Tree Planting

The club has worked closely with the Sacramento Tree Foundation to plant trees in the underserved communities of South Sacramento. Additionally, they planted over 200 native oak trees in Stone Lakes National Wildlife Refuge during a single event.

Adopt a Parkway

In 2020, ESO became an official adopter of Mile 7 on the American River through the American River Parkway Foundation. Their first river cleanup after the adoption collected 15 pounds of trash that would have ended up in the river otherwise.

Student Sustainability Fund

Each year students submit project ideas to Sac State Sustainability to apply for funding through the Student Sustainability Fund. Funding typically ranges from $100 - $2,000 and projects focus on topics such as: renewable energy, energy reduction, water, waste, and greenhouse gas emissions. Previous student projects have included the conversion of a campus golf cart to run on solar power, a trommel system for filtering compost, and a solar powered aquaponics system. Recent projects have included a bio-diesel generator, reusable camera batteries, a solar and wind turbine powered light, and a Tiny House Control Module.

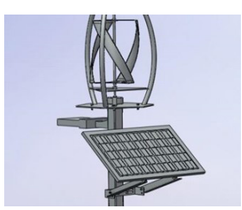
This fund was established through a partnership with Keep America Beautiful and annual contributions are received through the work of ENVS professor Christine Flowers. Additional information about the Student Sustainability Fund can be found on our website.

Biodiesel Generator

This biodiesel generator project was designed and built by a group of Mechanical Engineering students. The team took a 7000-watt gasoline generator, converted it to run entirely on biodiesel, and the generator is currently used on campus.

Rechargeable Batteries

Film students proposed a project that would replace disposable batteries with reusable batteries for their department cameras. The project was successful in ultimately reducing the overall number of batteries in the campus waste stream.



Solar & Wind Light

Seeing a need for additional lighting at the BAC yard, a group of Engineering students designed and built an off-the-grid solar & wind powered LED light. This light provided an added level of safety for the BAC yard, while highlighting renewable energy technology.

Control Module

Following the construction of the campus Tiny House, the project team quickly realized a control module would help the building operate more efficiently. The system also allowed for additional research opportunities.

Have a great idea for a sustainability project?
Apply at: www.csus.edu/sustainability

Students who are interested in applying for project funding can complete the application found on the home page of the sustainability website. Applications are accepted year round.

HORNET BREWING

— EST. 2018 —

Students in Dr. Kelly Thompson's Food Production and Sustainability class brewed the first batch of Sac State's very own Hornet Brew. In partnership with Sac State Sustainability, Dr. Thompson's students learned about the complete brewing process from planting hops to bottling.

Students began by working with sustainability staff to plant and care for a variety of hops at Sac State's BAC Yard. Once ready, students harvested the hops and stored them for later use. The students then extracted honey from the campus beehives, a main ingredient in what would become Hornet Honey Blonde Ale.

Once all of the ingredients were in place, a local professional brewer assisted with the brewing process. Over the course of three days, students got hands-on experience converting the raw ingredients they had harvested into two unique beers.

Throughout the three-day living beer lab, students learned about the intricacies of brewing beer, from grain milling and extracting wort, to filtration and fermentation. Once the brewing process was complete, students bottled the finished product and applied the Hornet Brewing labels.

The beer was unveiled to the campus community later that semester at the annual Farm-to-Fork Dinner on the Bridge. Attendees of the event had the opportunity to sample Hornet Honey Blonde Ale and Hornet Hazy IPA, while they enjoyed local bites also made by Sac State students.

Hornet Honey Blonde Ale

A light Blonde Ale, brewed with honey harvested from bee hives at Sac State's BAC Yard. The honey is combined with Sac State hops grown in 100% Sac State made compost. The end product is a light refreshing beer, buzzing with flavor.

Hornet Hazy IPA

An unfiltered, New England-Style India Pale Ale, brewed with Nugget and Cascade hops grown at Sac State's BAC yard. This Hazy IPA has the punch of a traditional IPA, with a lighter and less bitter flavor.

Growing & Harvesting

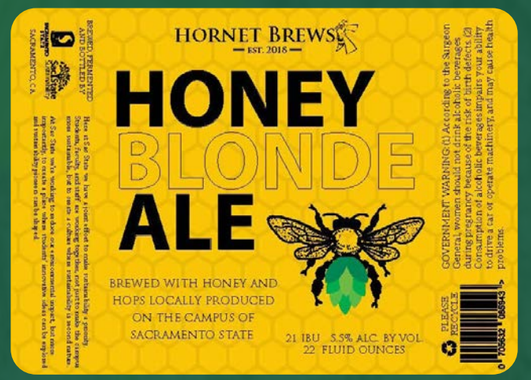
Students grew and harvested all of the hops and honey used in the beer production at Sac State's BAC yard

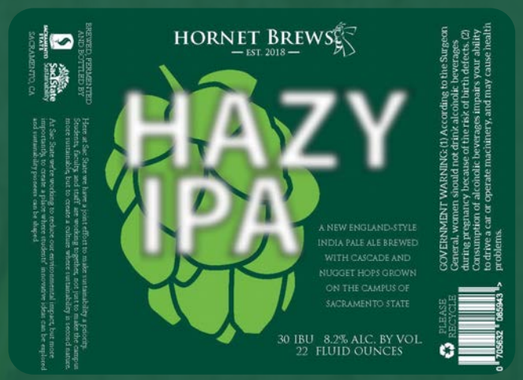
Brewing

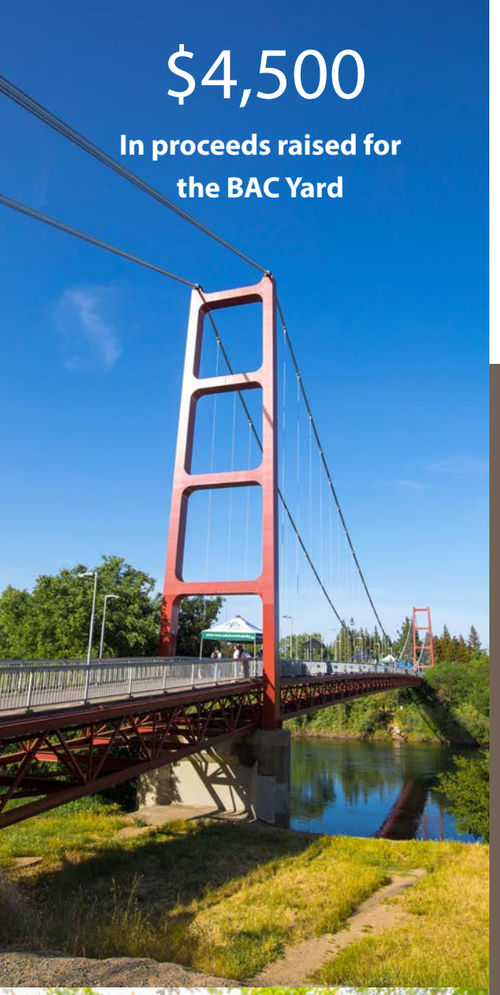
Working with local professional brewer Michael Lambruchini, students learned about the complete brewing process and created the first batch of Hornet Brew

Bottling & Labeling

After the brewing and fermentation process was complete, students bottled and labeled the finished unique, campus-made beer







Farm to Fork

Dinner on the Bridge

Professor Kelly Thompson and her students led the effort to create a unique dining experience atop Sac State's signature Guy West Bridge.

In 2019, the annual Sacramento State Farm-to-Fork Dinner on the Bridge focused on sustainability and highlighted a variety of campus environmental initiatives. Patrons had the opportunity to see student sustainability projects, learn about campus environmental programs such as the Bioconversion & Agricultural Collaborative (BAC) Yard, and even see an active bee hive up close. All proceeds from the event, totaling $4,500, went to support student hands-on learning such as aquaponics and apiary programs as well as a permaculture garden.

The event drew 250 people and guests enjoyed local bites prepared and served by Professor Kelly Thompson's Food Production & Sustainability class, within the Department of Family and Consumer Sciences. Students prepared the dishes with organic produce and herbs grown from the BAC yard on campus. In further support of the event's sustainability theme, Sac State's home-brewed Hornet Hazy IPA and Hornet Honey Blonde Ale, made with hops grown at the BAC yard and honey from Sac State's bees, were served on tap. Guests even took home their own jar of Hornet Honey at the end of the evening.

Sustainability Institute

Mission

Serve as a catalyst for student, faculty, and community collaboration for the education, research, and advancement of sustainability in the Sacramento region.

Birth of an Institute

On November 24, 2018, the Associated Students Incorporated (ASI) Board of Directors passed Resolution #2018/2019-10-58, initiating the creation of a campus Sustainability Institute. In the months that followed, campus stakeholders developed the framework, mission, and goals of the institute, beginning the formal final approval process, which is expected during the Fall 2021 semester.

The Purpose

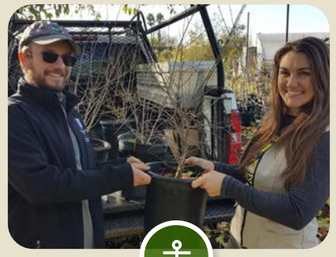
The institute aims to provide an organized structure to advance Sac State's strong sustainability reputation and support campus-wide sustainability initiatives. The Institute will serve as a catalyst for interdisciplinary collaboration and community engagement and education, as well as research projects and grants.

Interested in learning more?

Students and faculty interested in learning more about the Sustainability Institute can contact Sac State Sustainability at sustainability@csus.edu

Sustainability Curriculum

Provide faculty support for the integration of sustainability into campus curriculum and pursue creation of a sustainability certificate program.



Community Partnerships

Foster community partnerships and influence decision making at the state and local level, in an effort to address climate change and mitigate its effects in the Sacramento region.

Common Goal

Unite faculty, staff, and students under a single umbrella with a common goal of increasing education, research, and awareness of sustainability.

Anchor Institute

Student
Climate Change Summit

Student Leadership

The Student Climate Change summit brought together Sac State and other local students with representatives from the Sacramento Mayor's Climate Commission to discuss Climate Change in Sacramento and what students would like to see in the City's Climate Action Plan. The day was divided into two sections: morning small group sessions and an afternoon question and answer session with Mayor Darrell Steinberg. Under the joint leadership of the campus Associated Students Green Team Chair Rachael Del Porto, and the Environmental Students Organization Chair Moiz Mir, the event was successfully planned and executed in partnership with the Mayor's Climate Commission.

Shared Ideas

Representatives from the Climate Commission hosted small group sessions and students shared ideas and input on topics that were of most importance to them. Students and Climate Commission representatives collaborated to determine action items to be included in the plan. Following the event, Rachel and Moiz presented the student's ideas and feedback to the full commission and many of the recommendations were included in the final plan. The afternoon question and answer session with the Mayor also gave students an opportunity to engage with him directly and share their most pressing concerns and priorities.

Long Term Impact

This event helped shape the future of climate action in Sacramento by giving students an opportunity to provide feedback on a plan that will guide the region for years to come. During the event, students discussed topics such as the built environment, mobility, community health and resiliency, equity, financing climate investment, community and youth engagement, and green jobs. Many of these issues have, or will, impact the majority of Sac State students now and for many years into the future.

Following the event the City of Sacramento established a 2045 Carbon Neutrality goal

Sac State

Honey Bees *Stingers Up*

All in our BAC Yard

After a series of successful projects at the BAC yard, such as composting, aquaponics, and urban gardens, it became clear to Sac State Sustainability that the addition of pollinators to the site would increase food production and be an overall benefit to the campus landscape. So, in 2018, the sustainability team began beekeeping and introduced an educational component to the program. The introduction of honeybees came with an added benefit of honey production and after three successful seasons of beekeeping, there are now eight active hives that the teamcares for.

Buzzing with Community Engagement

One of the most exciting components of bringing honeybees to campus has been the opportunity to educate K-12 students from the local community. Busloads of energetic students have come to campus over the past few years to engage in hands-on sustainable learning projects at the BAC yard. For many them, seeing thousands of bees up close and personal in an observation beehive is a unique first-time experience. The young, future Hornets leave campus with important learning outcomes like understanding the importance of pollinators in our environment as well as the dangers of pesticides in our food supply.

Sac State Students are Beekeeping Too

While the sustainability team takes care of the honeybees on a regular basis, the beehives provide Sac State students from various disciplines a number of opportunities to get involved. From Education students developing pollinator curriculum for school-age visitors, to Food and Nutrition students harvesting honey to use in their recipes, there is something for everyone.

Hornet Honey *Fun Facts*

Sac State Sustainability harvests honey from the hives at both the Capital Public Radio Garden and BAC Yard locations up to two times each year. Honey seems to taste even sweeter when it comes right from the campus we all love so much!

Honey Gives Back

Honey harvested from the bees at Sac State are bottled right on campus and then sold in the local community, with all proceeds going back into the beekeeping and apiary program at the BAC Yard.

Partnerships as Sweet as Honey

Many academic departments such as Environmental Studies, Family and Consumer Sciences, and even the College of Education's future teachers-in-training have built curriculum and hands-on learning around the apiary program and the honey harvesting process.

As They Grow, We Grow

As the apiary program continues to develop and grow, so does the education and outreach about the importance of pollinators. Sac State Sustainability has plans for future workshops and collaborations both on campus and in the local community.

Bushy Lake Eco-Cultural Restoration Project

Dr. Michelle Stevens leads the campus community in restoring a resilient landscape with a holistic approach

The Bushy Lake restoration project, located along the American River and adjacent to Cal Expo, has been a multi-year effort for Dr. Stevens. The project has three main objectives:

1. Protect, enhance, and restore a sustainable habitat refuge for Western Pond Turtles.
2. Enhance fire resilient habitat for diverse native flora and fauna.
3. Enhance the education and interpretation of resources in the Parkway, specifically showcasing tribal and cultural use of the area.

Through the work of Dr. Stevens, a variety of on and off campus partners have been able participate in this important work. Some recent partners include Sac State Sustainability, Sacramento State's Science Education Equity program, and the River City Science project.

As a reward for her work, Dr. Stevens was recently awarded a $350,000 grant to fund ongoing and future efforts for research and restoration at Bushy Lake over the next ten years.

With wetlands covering as little as 5% of the Earths surface, they contain an estimated 20-30% of the planet's overall carbon balance

Did you know...

◊ **Moiz Mir (pictured far left) received last year's Sacramento Environmental Council Sustainability Award for his research on companion planting to restore native vegetation at the Bushy Lake site.**

An Anchor In Our BAC Yard

"An anchor university is the opposite of the Ivory Tower. It aims to connect its students, faculty, and staff with the community and, in turn, help build and heal that community, achieving lasting solutions and improvements through inclusive civic engagement."

- President Nelsen

Sac State Sustainability embraces our role as an anchor university through regular community engagement, outreach, and collaboration.

Compost Donations

Over the last few years, efforts at Sac State to divert organics from the waste stream have developed into a robust composting program. This has enabled the university to utilize fallen leaves and grass clippings as the primary input in our BAC Yard compost systems. The finished compost is used on campus for planting new trees and vegetation across the 300-acre university grounds. Surplus compost is distributed to local partners for use in community gardens and at elementary schools. Collaborating with Sac State's department of Grounds and Landscaping, Sac State Sustainability has been able to provide compost to community partners such as Yisrael Community Farms, David Lubin Elementary School, and Soil Born Farms. These donations help generate healthy food and foster resilient communities.

Aquaponics

The BAC Yard has a small solar-powered aquaponics unit as well as a larger system that produces leafy greens and herbs. Aquaponics is a combination of aquaculture and hydroponics in a closed-loop biological system. This urban growing practice uses 90% less water than conventional farming methods and has increased production rates due to the lack of competition for nutrients associated with soil-based agriculture. It also dramatically reduces the number of weeds that grow in the system. Each year, local K-12 students visit Sac State's BAC Yard to learn about the science of aquaponics and how this sustainable growing method can help reduce global food scarcity.

Tours & Outreach

Each year thousands of K-12 students visit campus for sustainability tours. These tours focus on composting, sustainable food systems, pollinators, and the campus water, energy, waste and emissions programs. Sac State Sustainability also regularly works with students and faculty from campus to give topic specific tours that directly relate to course content, such as renewable energy or urban agriculture.

Permaculture

The principles of permaculture focus on creating permanent agriculture that has the diversity, stability, and resilience of a natural ecosystem. Due to the fact that permaculture mimics natural ecosystems, they require very little human intervention once established. The BAC Yard is now a proud display of a thriving permaculture demonstration garden thanks to Sac State student assistant James Fox. This garden will be used as an additional teaching tool during BAC yard tours and contains a variety of pollinator friendly plants.

California International Marathon Goes Green

The California International Marathon (CIM) is one of the largest and most popular running events in the country, largely due to its reputation as a premiere Boston marathon-qualifier. Since 2017, Sac State Sustainability has partnered with the Sacramento Running Association (SRA) to make the event as sustainable as possible. These efforts have led to the race receiving a Gold Level Sustainability Certification through the Council for Responsible Sports for producing a socially and environmentally responsible event. Led by Environmental Studies professor Christine Flowers, in partnership with Sac State Sustainability and SRA, more than 300 student volunteers are trained annually to be on-site green ambassadors, assisting and educating event-goers on how to properly dispose of their trash, compost, and recyclables throughout the event. While the marathon had over 20,000 participants in 2019, the pre-event expo hosted 40,000 people and the festival at the finish line on race day had over 50,000 people in attendance. As a result of these green ambassadors, the diversion rate at CIM increased from 38% in 2015, to 77% in 2018, and 85% in 2019. Organic waste collection went from zero in 2015, to over 28 tons in 2018, and reaching 30 tons in 2019, with organic waste now accounting for over 50% of all CIM's event waste. In 2019, CIM earned Gold Level Certification from the Council of Responsible Sport, a Clean Air Award from Breathe California, and "Environmental Innovator of the Year" award from the Green Sports Alliance.

Professor Flowers leads student community engagement efforts in one of the largest running events in the world.

85%

Diversion from landfill

100%

Increase in food waste collection

Alternative Spring Break

Sac State's Alternative Break offers opportunities for students to volunteer with local, community-based organizations to help strengthen communities, improve lives, and transform their own lives in the process.

Since 2007, the Community Engagement Center has hosted Alternative Break, a community service program for students, faculty, and staff to spend their spring break volunteering on various projects on campus and in the community. In recent years, Sac State Sustainability and ASI have partnered with the Community Engagement Center to offer unique volunteer opportunities on and off campus. Some of these projects included: landscape mulching and composting at the more than 25 Low Impact Development (LID) sites around campus, weeding and planting at the Bioconversion and Agricultural Yard (BAC Yard) student garden, picking up trash along the American River, and working on a sustainable building project on campus.

Living Building Challenge

Built in 2015, the Living Building was originally constructed for the U.S. Department of Energy's Solar Decathlon by a team of 80 Sac State faculty, students, and alumni from Construction Management, Mechanical Engineering, Interior Architecture, and Communication Studies. "It was a fantastic learning opportunity for everyone involved," said Construction Management Professor Gareth Figgess, who was the lead faculty advisor to the team and hands-on construction manager for the project.

Now residing in the University's Arboretum, the home is a part of the Living Building Challenge, the world's most rigorous standard for green buildings. A certified living building must generate more energy than it uses, be free of toxic chemicals, and dramatically diminish its energy footprint. Some features of the home include: solar panels, a rainwater collection system, energy efficient lighting fixtures, and an electric charging station in the carport. When the home is completed, it will serve as a sustainability-research lab.

American River Cleanup

Students cleaning up trash along the American River.

Low Impact Development Sites

Volunteers perform much-needed maintenance of Sac State's LID sites.

BAC Yard Student Garden

Gardening and weeding in the Bioconversion and Agricultural Collaborative yard.

"Experiences like this can be incredibly transformative for Sac State Students."

- Dana Kivel, Director, Community Engagement Center

Awards & Recognition

Sustainability is woven into all aspects of Sac State, from new construction and renovation projects, to transportation, academics, and student life. Over the last two years, Sac State has been recognized for these efforts by a number of local and international organizations. The following are some of the most notable:

CHESC

At the 2019 and 2020 California Higher Education Sustainability Conference (CHESC), Sac State was honored to receive awards for Water Efficiency, Waste Reduction, Student Sustainability Leadership, Sustainable Design in New Construction, and Sustainable Transportation.

Sierra Cool Schools

The Sierra Club's Cool Schools list, which is based on a wide range of factors from research and curriculum, to campus energy use, transportation, and fossil fuel divestment, placed Sac State in 56th place amongst 282 universities in North America.

UI World Green Rating

The UI GreenMetric, an annual international sustainability ranking system for universities, placed Sac State at 108 out of 780 universities worldwide.

Sacramento Environmental Commission

In 2019, the Sacramento Environmental Commission awarded Sac State the "Outstanding Environmental Leadership Award" for sustainability work done in the Sacramento Region.

AASHE STARS

The Sustainability, Tracking, Assessment, and Rating System (STARS), a program of the Association of the Advancement of Sustainability in Higher Education (AASHE) for universities to measure their sustainability performance every three years, has given Sac State a STARS Gold rating for the second consecutive time.

CSU Facilities Management Conference

At the Biennial CSU Facilities Management Conference, Sac State received awards for "Best Practice in Construction Delivery", "Student Achievement", and "Best Overall Project".

CHEC Conference

The California Higher Education Collaborative (CHEC) conference, a joint endeavor of the CSU, UC, and CCC systems that improves overall campus performance, service, and outcomes, gave Sac State an award for reducing organic waste from campus while alleviating student food insecurity and an award for leveraging student research to reduce campus water use.

Association of Energy Engineers

The Association of Energy Engineers awarded Sac State the "2019 Innovative Sustainability Award for work done to reduce energy, waste, and greenhouse gas emissions in the Sacramento area.

What's Next...

CapRadio Garden

After a fruitful, multi-year partnership between Sac State Sustainability and Capital Public Radio, the CapRadio Garden is transitioning to campus ownership. The CapRadio Garden, a ¾ acre community space with raised planter beds, bee hives, and fruit trees, will be managed jointly by Sac State Sustainability and Grounds and Landscaping Services. The change brings fresh opportunities in the garden for increased campus engagement and course integration as well as continued community involvement. All the produce from the garden will be harvested by Sac State hands and will be donated to the campus food pantry.

Solar Expansion

This year the campus renewable energy portfolio will see a five fold increase in the amount of solar produced on campus. With a 2040 carbon neutrality goal in mind, Sac State is focused on both energy reduction and renewable energy production. In the coming months an additional 4.1 Million kWh of solar energy will be added to the campus grid. This project is expected to increase renewable energy to 20% of the campus total, and decrease emissions by 900 Metric Tons per year. The current plan sees lot 10, parking structure 5, and parking structure 3 receiving solar.

Solar panel installation at lot 10

4.1
Million more kWh of clean energy produced annually

6,865
More solar panels

Acknowledgements

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Sac State Sustainability