SONOMA STATE UNIVERSITY

CLIMATE ACTION PLAN

2022

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LETTER FROM

THE PRESIDENT

We are living in a time like no other– a time when profound changes in the earth's climate are affecting our lives, our homes, our communities, and our vision of our own futures. How do we prepare ourselves and our students to live productive healthy lives even as the world changes around us?

Sonoma State is uniquely positioned to prepare our graduates to be resilient and thrive through these changes. By seeing the emerging needs of campus and North Bay communities as an opportunity for educational excellence and collaborative action, we can advance a new paradigm in higher education - one that creates exceptional high-impact educational experiences while it advances innovative solutions.

This Climate Action Plan sets into motion a pathway for students, faculty, staff and community to work together across disciplines and sectors on common concerns. It identifies the technical aspects of reaching a carbon neutral campus, steps to making our campus and communities resilient to extreme climate events, and ways to enhance student knowledge, skills and experience surrounding these complex issues.

The university's goals are ambitious, but ones that I know we can achieve. When I signed the Presidents' Climate Leadership Commitment in 2019, I committed our campus to preparing and implementing a Climate Action Plan that would identify a path forward for SSU. These changes cannot be made by one person, and will need the participation and perspectives of people from all backgrounds.

This Plan challenges us to connect, communicate and appreciate each other's strengths, creativity and ideas. Please consider what you can do within the sphere of your work, studies, and personal life to help achieve these goals. Together we can:

- Empower staff, faculty, students and community to implement the actions outlined in this Plan;
- Make sustainability and resilience part of our decision-making process and daily conversations on campus;
- Make authentic representation and inclusion of people from all backgrounds a guiding light in our efforts to build a better future.

Together we can become thoughtful, skilled and experienced climate leaders.

With gratitude,

Judy K. Sakaki

Judy K. Sakaki

LETTER FROM PSAC

As members of Sonoma State University's (SSU) President's Sustainability Advisory Council (PSAC), it is our honor to lead SSU's vision to build a more sustainable and resilient community on campus and beyond. In April 2020, President Judy Sakaki became the first SSU President to join the Presidents' Climate Leadership Council, committing the campus to developing and implementing a Climate Action Plan (CAP). The PSAC was charged with fulfilling the obligations of the commitment, and commissioned this inaugural Climate Action Plan to set SSU on a path towards carbon neutrality, community resilience and academic experiences that train students to excel and contribute to the healing of a changing world.

SSU's resulting Climate Action Plan is an actionable and transparent roadmap for achieving a series of ambitious but urgent sustainability and resilience goals. The ideas come from students, staff, faculty, partnering organizations and community members engaged in a multi-year planning effort. The plan summarizes this input into a suite of fully-integrated strategies and actions needed to achieve sustainability goals and that create exceptional learning experiences for our students as they help campus and community bring about meaningful change.

The goals of this Climate Action Plan can only be achieved by a collaborative community that crosses jurisdictional and disciplinary boundaries to find solutions and promote change. Our success as a community is dependent on our inclusivity; it is only when all voices are heard that we will find the viable solutions we seek.

The PSAC commits to serving as SSU's guiding body to ensure that the Climate Action Plan follows the funding and implementation schedule outlined in the following pages, and to coordinate our activities with the CSU Office of the Chancellor on policy reform, budgetary needs and CSU-wide sustainability commitments.

We know that time is short and commit wholeheartedly to the actions identified in this Climate Action Plan. These are ambitious goals that we need to get underway as soon as possible. By taking strong and immediate action today, we can leave a legacy of a sustainable, healthy, equitable planet for future generations.

Sincerely,

Claudia Luke, PhD
Sustainability Programs Director

Megan Varnadore
Director of Resiliency and Sustainability Operations

CLIMATE ACTION PLAN PARTICIPANTS

This CAP is a product of a three-year collaboration between technical experts, community members, students, faculty, staff, government agencies, environmental justice advocates, and many others who offered their time, expertise, and passion to plan for a thriving future.

The CAP builds on decades of work from students, faculty and staff who devoted exceptional effort and expertise to laying the foundation for this CAP. Their efforts include establishing working groups and committees (including the earlier Sustainability Executive Committee), sustainability-related centers, green infrastructure, and sustainability and environmental Inquiry as a strategic plan core value. Strategies and goals presented in this plan include ideas compiled from the 2017 sustainability and diversity World Cafes hosted during the SSU strategic planning process.

We acknowledge that the SSU campus and three preserves are on the traditional territory and homelands of Southern Pomo, Coast Miwok and Wappo People who have stewarded the land for generations. With this acknowledgement, we commit ourselves as a campus community to being allies to Native people and to the beings who inhabit this land.

ORGANIZATIONS

The North Bay Forward "Building Resilience" Lunch Series, led by the Center for Environmental Inquiry, Regional Climate Protection Authority, and the PSAC Regional Resilience Working Group, engaged organizations and the public in conversations with SSU administrators and faculty to identify opportunities for campus-community collaborations. Participating organizations and departments included:

F.E.E.D. Cooperative

Sonoma County Transportation Authority

Sonoma County Resource Conservation District

Sonoma Clean Power

Sonoma County Economic Development Board

Latino Service Providers

Sonoma Water

County of Sonoma, Human Services Department

Zero Waste Sonoma

Permit Sonoma

City of Rohnert Park

UC Cooperative Extension

Providence Sonoma County

Community Urgent Response & Aid

Petaluma Wetlands Alliance

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INTRODUCTION

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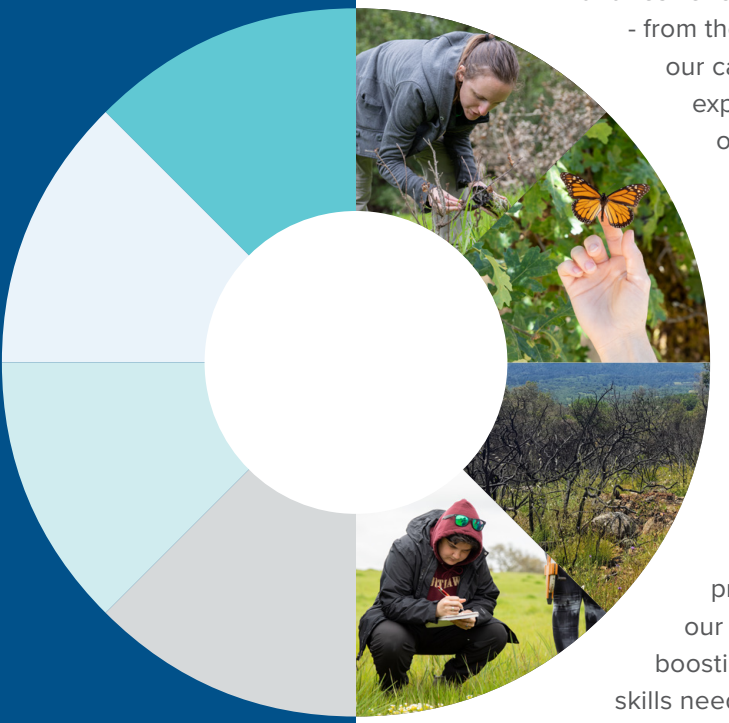

As our lives continue to be impacted by widespread changes in the earth's climate, it is more important than ever to authentically build sustainability and resilience into everything we do - from the way that we operate our campus to the learning experiences we provide for our students. We are at a crossroads where we need to dramatically and authentically align our everyday actions with our desire for a healthy and productive future on this planet. With this inaugural CAP, SSU identifies the goals, strategies, and actions needed to make significant progress toward reducing our impact on the earth and boosting the knowledge and skills needed to find and implement creative solutions.

As an institution of higher education, we have the opportunity to develop new approaches that better prepare students across disciplines for success in a changing world. Climate change can no longer be perceived only as the realm of science and technology, but rather must be addressed by professionals across all sectors of society: business and economics, social sciences, education, and arts and humanities. Providing a liberal arts and science education is no longer complete without a strong background in climate change knowledge and skills.

SSU is a liberal arts and sciences university and Hispanic Serving Institution in Sonoma County that offers degrees in 46 bachelor's and 15 master's degree programs within six schools: Arts & Humanities, Business & Economics, Education, Extended & International Education, Science & Technology and Social Sciences. The campus was ranked in 2021 by US News and World Report as 14th among top public schools in the U.S. and 48th among top performers on social mobility.

The campus lies in the City of Rohnert Park along Copeland Creek in the Russian River Watershed. Its eastern boundary lies at the wildland-urban interface at the foot of Sonoma Mountain. The 269-acre campus is one of the most residential campuses in the California State University system, with 34 percent of the 8,500 students living on campus. Notable facilities include the Wine Business Learning Center, the Cerent Engineering Science Laboratories, the Green Music Center, and the Schulz Information Center which houses one of the largest libraries in the state of California. Innovative sustainable construction and green infrastructure include the Environmental Technology Center and 4,200-acres of natural lands at three preserves. The campus is sometimes referred to as “Sonoma County’s 10th city” due to its economic and cultural influence.

As the only 4-year university in the North Bay, we realize that higher education has an important role to play in catalyzing the creativity, innovation, and collaboration needed to ensure a thriving future. This document lays the foundational framework for decades of action needed to make this vision a reality. As a campus, we have a strong desire to succeed but also a recognition of the reality of the challenges ahead. Implementation must be flexible if we are to face significant financial and logistic barriers and take advantage of opportunities as they arise.

CALL TO ACTION

According to the most recent report from the Intergovernmental Panel on Climate Change (IPCC), the Earth has warmed 1.09°C since 1850 and many changes such as sea-level rise and glacier and arctic ice melt are now irreversible. Global temperatures are likely to increase to a total of 1.5°C by the mid-2040s which will further stress our environmental systems and, at a local level, will result in more frequent and intense heatwaves, winter floods, drought, wildfire, and air pollution. As a global community, we are rushing to find ways to mitigate the worst of what is to come. As a local community, we are seeking ways to thrive despite the disruptions to our lives and well-being.

These impacts will not be felt equally. Some of us are more vulnerable to climate events because we lack the physical or mental ability to adapt to changing conditions. Isolated individuals have a more difficult time receiving warnings and emergency services and may depend on sources of food, water, and energy that are more subject to interruption. People without adequate financial resources may not be able to afford the rising costs of utilities, be more likely to lack sufficient health insurance, and have more restricted access to transportation and evacuation during emergencies. Outdoor workers have greater physical exposure to high temperatures and poor air quality. Language ability, citizenship status, or issues surrounding racism can increase social isolation, elevate barriers to using emergency or health services, decrease participation in planning and preparation, and slow responses to evacuation warnings.

Resilience to Environmental Threats

An extensive and exceptional body of work has been produced over the last decade by non-profits, agencies, and governments in Sonoma County, the San Francisco Bay Area, the State of California, and beyond. The seminal work of North Bay Climate Adaptation Initiative's "A Roadmap for Climate Resilience in Sonoma County" received White House recognition for excellence in climate planning and includes a detailed summary of climate projections for the County. This detailed summary informed SSU's Resilience Assessment, Appendix B, offering a snapshot of what the Climate Action Plan is designed to tackle.

Drought: Sonoma County will experience longer and more frequent droughts. Climate models predict that climatic water deficit (CWD), a measure of drought stress, will increase significantly, with some models predicting increases as much as 411% by mid-century. The greatest deficits are projected for the south and southeastern portions of the county.

Extreme Heat: By mid-century, Sonoma County will experience more "very hot days" (above 93 F) and generally higher temperatures over a longer warm season. Days on which the high temperature exceeds 93°F (considered an extreme event) on the Santa Rosa plain are projected to increase from 39 per year to 148 per year by the end of the century. Average high temperatures and low temperatures overall will also increase.

Rainfall / Flooding: Rainfall will likely be more intense during a shorter period of time resulting in more frequent and severe floods. Climate scenarios predict 19-25% increases in average annual rainfall falling during a shorter rainy season.

Extreme Winds and Wildfire: Diablo winds, hurricane-like warm winds that move from the Great Basin into California's coastal range, are anticipated to increase in frequency. As a consequence, large wildfires will likely continue to be more common and occur over a longer fire season. By the end of this century, chances of wildfire are projected to increase to 25–33% in the mountainous areas of the county.

CAP APPROACH

In April 2020, SSU joined the Presidents' Climate Leadership Council (PCLC), committing the campus to develop and implement a Climate Action Plan (CAP). To meet the obligations of the PCLC, SSU established the President's Sustainability Advisory Council (PSAC), a formal governance structure needed to develop and implement a comprehensive list of sustainability and resilience goals, strategies, and actions. The PSAC gathered information from previous campus-wide sustainability planning efforts and hosted 8 public workshops exploring opportunities for collaboration on regional sustainability initiatives. The information was compiled and goals, strategies, and actions and broadcast to students, faculty, staff, and community members for comment.

We have made a concerted effort in this CAP to fully integrate opportunities for high-impact educational experiences as we implement projects and programs needed for carbon neutrality and regional resilience. Woven throughout is the vision of personal resilience, diversity, equity, and inclusion. No solution will be lasting if it does not ensure that every student, staff, and faculty member feels safe and supported, both mentally and physically, and forms personal meaningful connections with local landscapes.

A key goal of the CAP was alignment with best practice guidelines, policies, and goals at local, state, national, and international levels. In 2018, the California governor Jerry Brown signed Senate Bill 100, committing California to 100 percent use of zero-carbon electricity by 2045, and encouraged cities and counties to consider greenhouse gas (GHG) emission reduction targets of at least 40% from 1990 levels by 2030 and 80% from 1990 levels by 2050. Executive order B-55-18 signed the same day committed California to total, economy-wide carbon neutrality by 2045. The CSU took the executive order as a call to action and called for carbon neutrality of all campuses by 2045. Currently, CSU's early action goal is an 80% reduction from 1990 emissions levels by 2040.

CAP APPROACH CONTINUED

In 2014, the California State University Office of the Chancellor passed CSU's Sustainability policy. This policy offers guiding principles for uniting all 23 campuses under a sustainability framework centered around all facets of the CSU, including academics, facilities operations, the built environment, and student life. Focus areas include integrating sustainability principles into strategic plans, collaborating to improve student learning and promote workforce preparation, increasing opportunities for directed research, and creating best practices to facilitate broader adoption of climate goals and partnerships with communities.

At a national level, this CAP meets the obligations of Second Nature's Presidents' Climate Leadership Commitment, a platform for higher education institutions to align efforts around carbon neutrality and resilience. Great strides have been made across the CSU system to institutionalize sustainability as a planning commitment using this platform. Similarly, SSU's planning process aligns with the United Nations' Sustainable Development Goals, international benchmarks addressing local climate solutions.

At a local level, the CAP is aligned with campus and county initiatives. The CAP was developed in alignment with SSU's core values identified in the campus Strategic Plan 2025 These values, integral to the SSU mission, are woven as a central focus throughout the planning process which prioritized ongoing stakeholder feedback from students, staff, and faculty. Regional resilience planning efforts also highlighted the opportunities for joint action and compliance with local county initiatives, such as Zero Waste Sonoma. Potential partnerships identified as part of this process have been folded into the planning process to strengthen the implementation and reporting of these mandates.

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BASELINE

BASELINE

Development of the CAP began with an assessment of existing conditions. In 2016, the campus began benchmarking progress using the Sustainability Tracking and Reporting System (STARS), a common framework used across universities in the United States. Over three years, SSU has been able to achieve a silver rating. Some of the highlights are listed below.

ENERGY

- **11.9%** of energy supplied by clean and renewable sources
- **161 kW** of solar photovoltaics installed on campus
- **22%** decrease in emissions per person since 2017

TRANSPORTATION

- **26** personal vehicles and **198,400 lbs** of CO removed through Car Share program
- **37,355 kg** GHG emissions avoided through EV charging
- **1026** responses to 2021 Transportation survey

WATER

- Tie into domestic city water systems as a backup for existing campus well and reclaimed water supplies during emergencies
- **Upgrade** vulnerable/failing water lines and valves

WASTE

- Compost bins installed at campus housing
- **4,335** pieces of paper avoided by using electronic system
- **52%** of solid waste is diverted from the landfill annually

CULINARY

- **12%** of dining and 100% of retail establishments offer vegan options
- **100%** of coffee pods are reusable
- Campus has put a ban on single use plastic

BUILT ENVIRONMENT

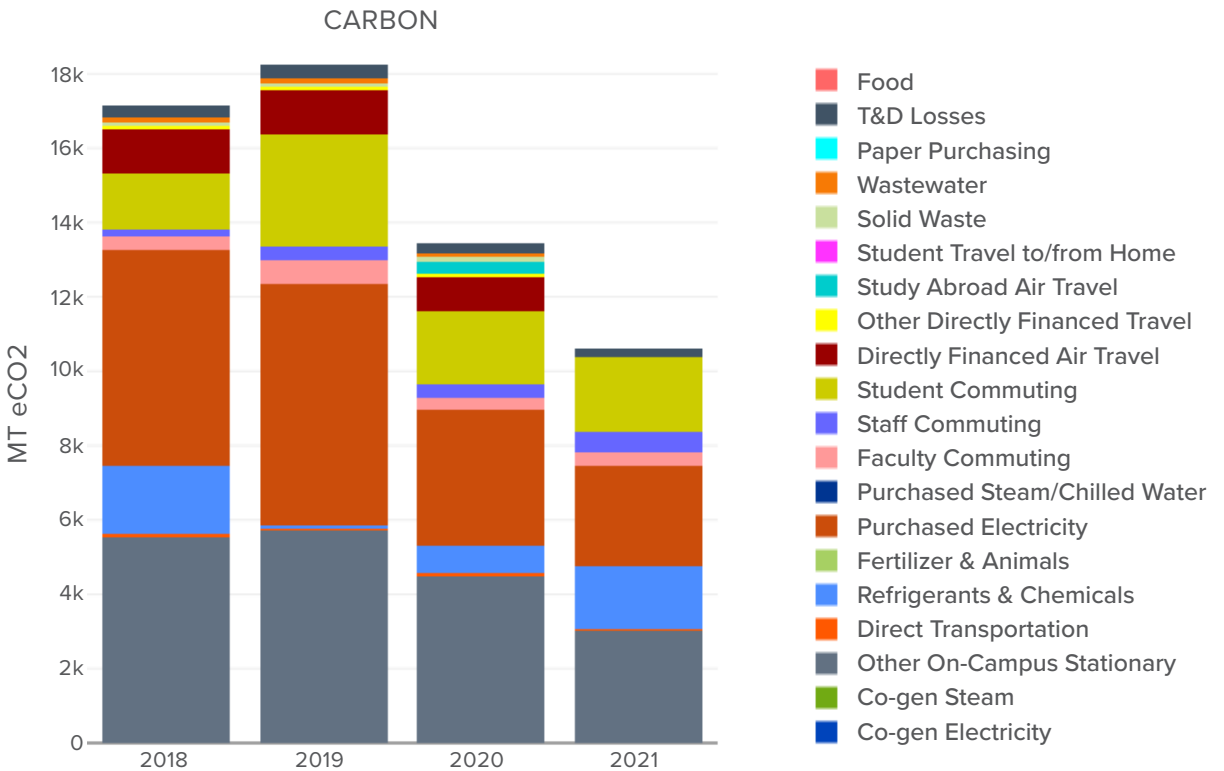
- **54%** (average reduction in bathroom water use from low-flow toilet upgrades)
- **20%** (average reduced water usage from low-flow showerhead upgrades)
- **32%** (average reduced water usage from water-saving faucet upgrades)

GROUNDS AND PRESERVES

- **0%** use of RoundUp™ herbicide
- **45%** reduction in chemical inventory
- **80%** of all the eucalyptus (invasive species) have been removed for fire safety
- **4,160** acres at three preserve for use as outdoor classrooms

BASELINE CONTINUED

We augmented STARS reporting with a thorough assessment of campus carbon emissions to document baseline conditions. Carbon emissions at SSU have been in decline since 2019, largely due to COVID-related lock downs and campus policies related to the pandemic. This comes after a slight uptick in emissions between 2018 and 2019. The overall emission totals have fallen from about 18,000 metric tons of carbon emissions (MTCO2e) in 2019 (when the campus was at full operations for the entire year), to about 13,500 MTCO2e, in 2020, to about 10,500 in 2021. The largest emitting activities during all three years remained natural gas use on campus (Scope 1), purchased electricity (Scope 2), and student commuting (Scope 3). It is anticipated that 2022 emissions will rise year on year, as the campus fully opens its doors.



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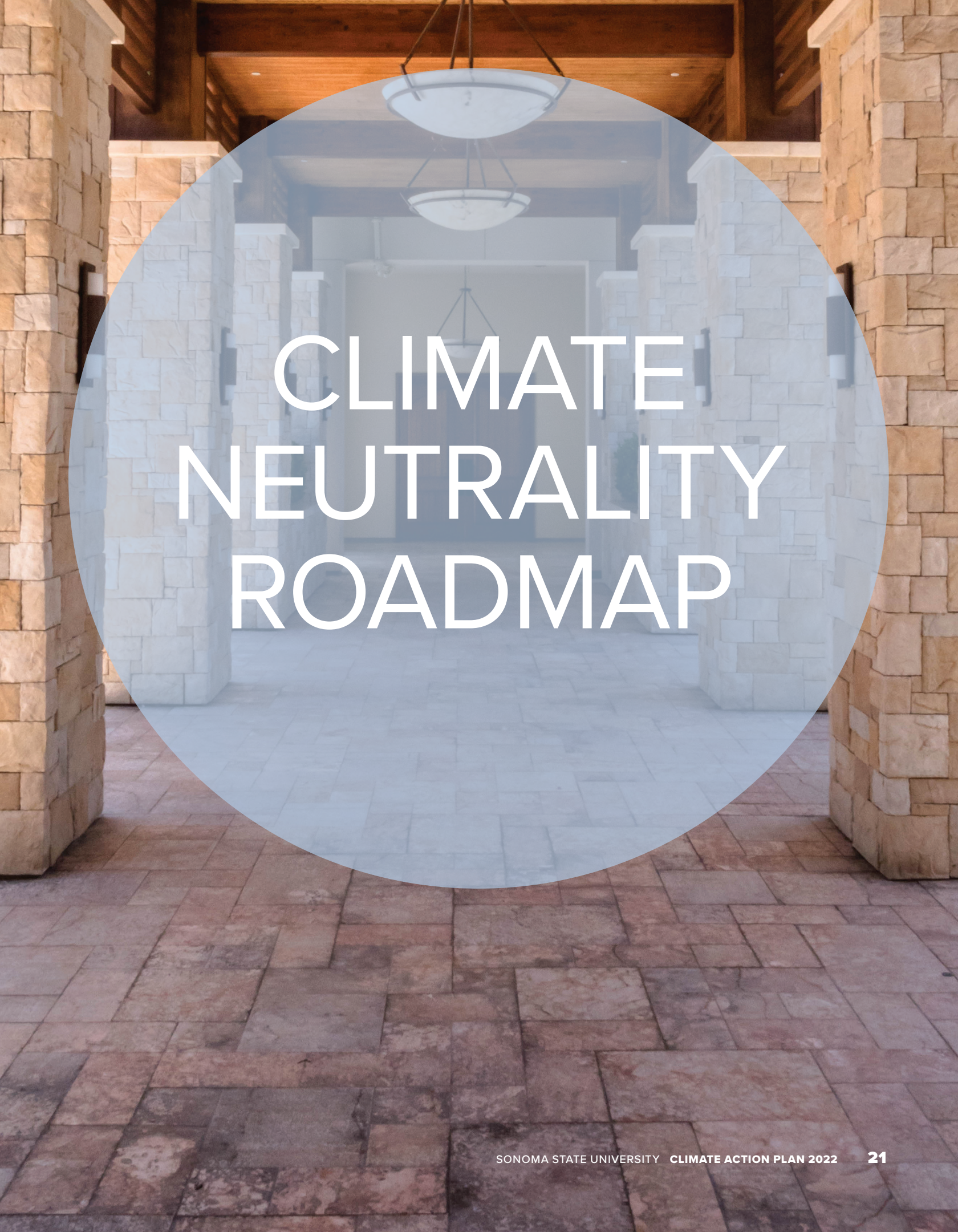

CLIMATE NEUTRALITY ROADMAP

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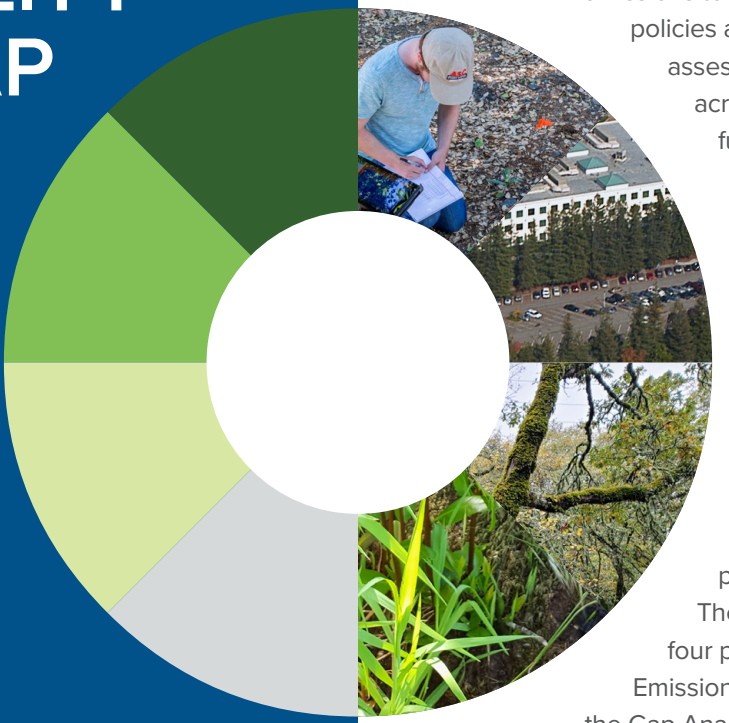
CLIMATE NEUTRALITY ROADMAP



The most urgent need for climate action planning is the reduction of GHG emissions. Achieving carbon neutrality (i.e., reducing net campus GHG emissions to zero) necessitates ambitious policies and programs, an intensive assessment of campus operations across all levels, and strategic funding approaches.

The Carbon Neutrality Roadmap (Appendix A) is a standalone document that outlines a plan to achieve carbon neutrality by 2043. An accompanying Climate and Energy Scenario Analysis (CESA) tool allows the campus to track efforts and quantitatively assess progress towards this goal. The Roadmap is divided into four phases: Phase 1: Baseline and Emission Forecast; Phase 2: Framing the Gap Analysis Phase; 3: Scenarios and Individual Strategies for Implementation; and Phase 4: Implementation Timeline and Budget Scope.

Phases 1-3 identify four strategies needed for SSU to achieve carbon neutrality: reducing building electricity consumption with energy efficiency, achieving 100% building electrification, replacing fossil-fueled vehicles with electric options, and implementing behavior change actions with a conscious focus on social and environmental impacts.

Recommended scenarios were determined using specific, measurable, achievable, relevant, and timely (SMART) considerations. These specific measurements allow SSU to follow a concrete time frame for strategy completion driven by the feasibility and costs of each action. The CESA was used to test and create three scenarios for carbon reduction that align growth, phasing, and infrastructure investment over various time horizons and can be adjusted as market trends change or to account for budgetary uncertainty.

The Climate Neutrality Roadmap includes a thorough breakdown of costs associated with individual projects and each scenario, over a 21-year time horizon. Depending on the scenario, capital costs range from an average of $1.4 million per year to $2.5 million per year.

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INTEGRATED GOALS, STRATEGIES & ACTIONS

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INTEGRATED GOALS, STRATEGIES & ACTIONS

Climate neutrality goals from the Climate Neutrality Roadmap were integrated with resilience and curricular goals via a series of goals, strategies, and actions across key sectors. Here we describe the approach used to guide the development of these actions which simultaneously create exceptional learning experiences for our students.

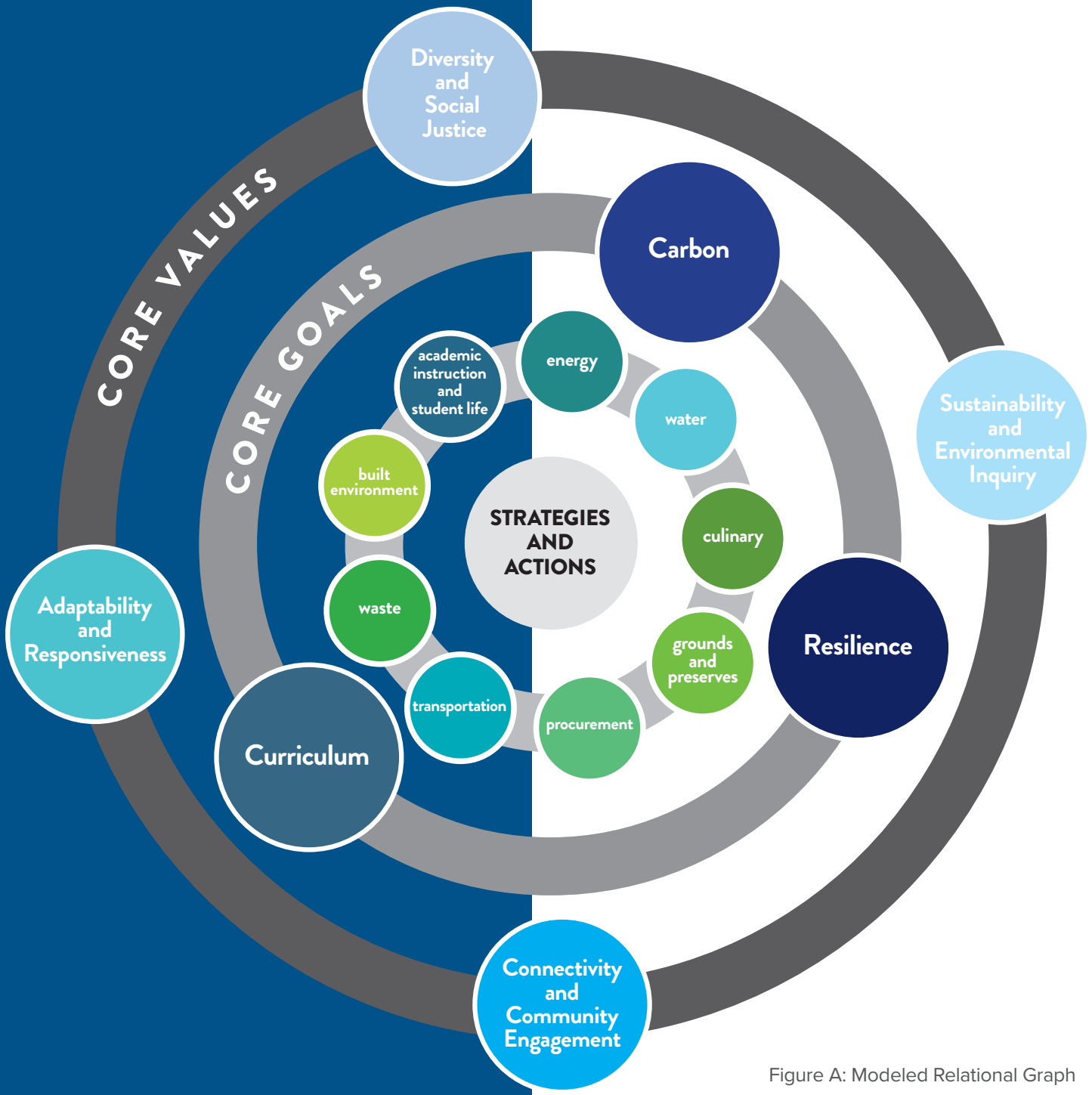


Figure A: Modeled Relational Graph

CORE VALUES

This CAP was developed in alignment with SSU's core values identified in the campus Strategic Plan 2025. These values, integral to the SSU mission, are the overarching guides (outer ring in Figure A) for CAP development woven as a central focus throughout the planning process. The only way we can be effective in combating climate impact is by building a collaborative, inclusive approach to reducing GHG emissions and mitigating their impact. Throughout the implementation of this plan, SSU commits to:

Diversity and Social Justice

The development of sustainability and resilience practices require that the needs and points of view of everyone are considered, especially those from disproportionately impacted populations. As we implement this plan, we must find solutions that build equity and rectify inequality. A key tenet of this value is **authentic representation**. The more diverse a network, the greater its ability to respond to change. Resilient responses require that the needs and points of view of everyone - especially vulnerable populations - are considered in disaster and recovery plans and in building equity needed to enhance resilience. We believe that resilience can only be achieved through planning processes that are inclusive of all stakeholders, iterative, flexible, and transparent.

CORE VALUES CONTINUED

Sustainability and Environmental Inquiry
This SSU core value links our goals for a sustainable planet with academic excellence. Three primary mechanisms for integrating inquiry with sustainability goals are presented throughout this plan: **1)** develop innovative, interdisciplinary research opportunities for students and faculty to engage in inquiry, **2)** incentivize and support faculty in incorporating sustainability and resilience content and themes into curricula and research across disciplines, and **3)** continue to identify funding to expand sustainability offerings in the curriculum.

Connectivity and Community Engagement
The goals of this CAP can only be achieved by a collaborative community that crosses jurisdictional and disciplinary boundaries to find solutions and promote change. This CAP focuses on how SSU can collaborate in community initiatives and leverage those efforts for state and national funding. A key approach in this CAP is **multi-stakeholder collaboration**: Communities that collaborate can anticipate threats, limit their effects, and rapidly restore functionality after a crisis. Collaboration is needed for effective response to extreme events and achieving meaningful regional resilience goals. Collaborative efforts include leveraging efforts of state and national organizations engaged in resilience.

Adaptability and Responsiveness
We address the adaptability of students and staff through a focus on individual resilience and reduction in stressors and barriers. A core theme of this CAP is the adoption of wellness and outdoor focus and a commitment to providing outdoor learning areas and opportunities for students to connect with nature in support of mental health, wellness, and educational benefit. In addition, emphasis is placed on building disaster response and recovery initiatives that protect students in need and lend special attention to our communities' vulnerable populations.

CORE GOALS

The core goals of this CAP are developed through the lens of SSU's core values (Figure A). The CAP is the result of an integrated planning process that considers how the campus' core values can be distilled into actionable core goals, representing the campus' overarching commitment. The following three core goals frame CAP actions.

1) Carbon
Achieve climate neutrality by 2043

2) Resilience
Increase community resilience to climate change through our actions

3) Curriculum
Build curriculum and co-curriculum learning for students in sustainability and resilience

CARBON

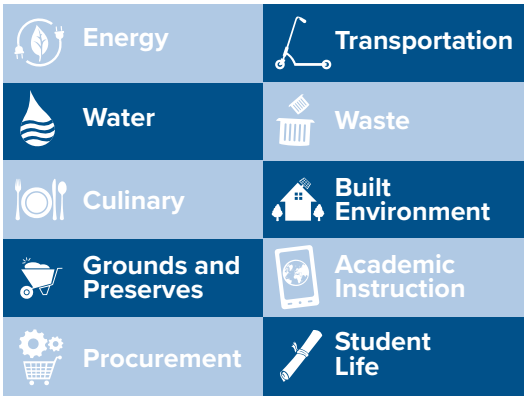
Based on the SSU's current and forecasted GHG emissions, SSU has elected to pursue a goal of Carbon Neutrality by 2043. This goal aligns us with the latest science and puts us on a path to a sustainable, equitable, healthy future. However, it will take the entire campus and a commitment from the President's office to ensure that the proper funding and staff support are available. The campus will need to remain vigilant and flexible, adjusting the roadmap as new technology emerges. The Carbon Neutrality Roadmap (Appendix A) outlines specific steps and funding needed annually to propel the campus toward its goal.

RESILIENCE

SSU recognizes its role as a stakeholder in building regional resilience to climate change. As a 4-year university, SSU can bring a wealth of academic resources – neutral convening spaces, faculty expertise, student research, and operation partnerships – to work collaboratively on improving resilience on campus, preserves and across Sonoma County communities. The 2020 Resilience Assessment (Appendix B) identifies and guides CAP opportunities to strengthen regional public-private partnerships in ways that build mental, physical, and environmental health across the North Bay.

CURRICULUM

SSU prioritizes student success as a key driver in shaping an interdisciplinary approach to academics. Success involves igniting innovation, cultivating leadership skills, and transforming students' lives by providing unique experiences, insight, and workforce development opportunities. The SSU 2025 Strategic Plan outlines a vision for preparing students "to meet the challenges of the 21st century and to make an impact in the community and the world."



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FRAMING

SECTORS, STRATEGIES, AND ACTIONS

To enhance the coordination of CAP, the implementation by staff, faculty, student, and the community have divided the cap into 10 sectors (Figure A). Within each sector, we identified sector goals, strategies, and actions to meet CAP core goals.

ENERGY GOALS

CARBON

A. Improve energy measurement and tracking systems

B. Reduce total energy consumption per gross square foot to 50% of 2018 baseline

C. Improve Building performance

REGIONAL RESILIENCE

D. Increase renewable energy

ACADEMICS AND STUDENT LIFE

E. Engage students and faculty in projects needed to achieve carbon neutrality

ENERGY

STRATEGIES	ACTIONS
A.1 Develop electrical systems in ways that allow easy sharing of building-specific energy	**A.1.1** Evaluate what energy systems are being monitored currently. **A.1.2** Add monitoring to remaining energy systems for compliance with CSU Energy Metering Guidelines. **A.1.3** Use existing energy management software to analyze, report, and forecast energy consumption. **A.1.4** Document energy savings over time, correlated with energy efficiency improvements.
B.1 Implement energy conservation measures in existing buildings and infrastructure	**B.1.1** Conduct an ASHRAE Level 1 or Level 2 energy efficiency audit as part of the RCx program (see C.1.3 below). **B.1.2** Implement energy conservation measures (ECMs) recommended in the audit report. **B.1.3** Evaluate effectiveness of ECMs and document energy savings over time. **B.1.4** Update Facilities O&M policy with best management practices for energy efficiency.
B.2 Improve the energy efficiency of newly constructed buildings	**B.2.1** Establish Basis of Design and Owner's Project Requirements to meet and exceed the CSU goal of 10% better overall than T24-2019 using the performance approach. **B.2.2** Incorporate advanced energy design features where possible and practical, including daylighting, passive solar heating and shading, natural ventilation,
B.3 Pursue campus-wide energy efficiency projects	**B.3.1** Implement a geothermal heat exchange system in Athletic Village if deemed feasible in D.4 below.
C.1 Establish a campus energy efficiency (EE) program to reduce energy demand	**C.1.1** Hire a full-time energy manager and establish an annual energy investment plan **C.1.2** Complete a campus LED lighting retrofit program **C.1.3** Establish a campus RCx / continuous commissioning program **C.1.4** Identify optimal HVAC upgrade projects (see B.1.2 above) and establish funding & financing source
C.2 Transition to an all-electric, fossil fuel free campus	**C.2.1** Implement a no-new gas policy and update campus design standards to support electrification **C.2.2** Replace natural gas system during building retrofit projects and at equipment failure **C.2.3** Electrify existing heating and DHW systems, as outlined in the CESA tool
C.3 Electrify Central Plant	**C.3.1** Complete a CUP electrification study and establish a long-term implementation plan **C.3.2** Implement base heating system upgrades to reduce HW temperatures **C.3.3** Implement Phase 1 (partial electrification) **C.3.4** Implement Phase 2 (full electrification)
D.1 Complete Development of Currently Contracted Solar + Storage Project with SunPower	**D.1.1** Complete contract signing **D.1.2** Implement agreed-upon site improvements prior to construction **D.1.3** Monitor system construction performed by SunPower
D.2 Complete feasibility analysis, procure and install additional on-site carport and/or ground mount solar projects at 1-5 locations on the SSU campus	**D.2.1** Complete a financial and technical feasibility study, assessing multiple financing options, for each potential project included in the CESA tool **D.2.2** Engage with PG&E to gain a complete understanding of electricity export limits
D.3 Identify backup power for Lobo's Pantry	**D.3.1** Analyze the feasibility of tying into energy storage project or creating a similar solution
D.4 Explore geothermal heat exchange system for Athletic Village	**D.4.1** Include a geothermal feasibility study for student team as part of Campus as a Living Lab **D.4.2** Engage a geothermal design consultant to estimate costs based on a student feasibility study.

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ENERGY

STRATEGIES	ACTIONS
E.1 Create a funded annual research challenge that focuses on carbon neutrality goals.	**E.1.1** Conceptualize research projects based on goals in the Carbon Neutrality Roadmap and Climate Action Plan. Consider past research projects, current priorities for energy upgrades, and future projects being planned. **E.1.2** Prioritize entrepreneurship in environmental challenges. **E.1.3** Advertise challenge including a list of concepts to faculty **E.1.4** Review applications and select finalists **E.1.5** Solicit sponsors to fund finalists **E.1.6** Award research funding based on sponsorship received
E.2 Engage classes across disciplines in service-learning projects related to energy	**E.2.1** Conceptualize service-learning projects based on goals in the Carbon Neutrality Roadmap and Climate Action Plan. Consider past service-learning projects, current priorities for energy upgrades, and future projects being planned. **E.2.2** Distribute list to faculty with service-learning courses each semester and encourage participation. Request a presentation of students' findings when projects are complete.
E.3 Organize and support a student-led energy-use training and monitoring program	**E.3.1** Include presenting a summary report of campus and building-specific energy use in the list of responsibilities for the Facilities Department Student Intern. *See Strategy F.1 in the Built Environment section.* **E.3.2** Advertise the presentation to student groups including sustainability-oriented clubs and courses. **E.3.3** Recruit the next Facilities Department Student Intern at the presentation.

WATER GOALS

CARBON

A. Reduce water use 5% from 2019 baseline levels by 2023

B. Pilot novel water conservation strategies through regional partnerships

C. Develop water systems in ways that allow easy sharing of building-specific data

REGIONAL RESILIENCE

D. Protect and conserve water resources

E. Align campus goals and reporting with regional water resource management strategies

F. Collaborate on regional initiatives that decrease risk of flooding and enhance groundwater replenishment

ACADEMICS AND STUDENT LIFE

G. Infuse examples of local water challenges into curriculum across disciplines

H. Engage students and faculty in research, creative inquiry, and monitoring programs surrounding water

WATER

STRATEGIES	ACTIONS
A.1 Expand low flow infrastructure in all campus buildings	**A.1.1** Research cost and implementation **A.1.2** Specify maximum flow rates of fixtures and fittings based on LEED O+M **A.1.3** Update campus Facilities O&M policy with maximum flow rates
A.2 Reduce carbon needed for irrigation on campus *(See also Grounds & Preserves)*	**A.2.1** Remove water-intensive landscaping where possible and replace with native and drought-tolerant plants
A.3 Update policy and technical standards for Low Impact Development	**A.3.1** Create water efficiency guidelines for small projects that do not fall within the scope of the CSU policy
B.1 Partner with Applied Solutions to test sustainable water and energy technology	**B.1.1** Assess the effectiveness of condensate capture from air handlers and estimate the daily volume generated
B.2 Assess the viability of rainwater capture for irrigation use	**B.2.1** Identify site locations and distribution network
C.1 Improve water measurement, tracking and enforcement systems	**C.1.1** Partner with Sonoma Water to update metering infrastructure **C.1.2** Track total annual volume of wastewater generated in partnership with Sonoma Valley County Sanitation District
D.1 Expand recycled water distribution to buildings	**D.1.1** Conduct a feasibility study for retrofitting existing buildings with recycled water for toilet flushing **D.1.2** Update Basis of Design and Owners Project Requirement documents for new construction project to specify separate plumbing for recycled water. **D.2.3** Include recycled water distribution in plans for updated infrastructure.
D.2 Improve biodiversity and water quality while preserving flood capacity of Copeland Creek	**D.2.1** Draft an integrated stormwater management plan for campus **D.2.2** Draft comprehensive Copeland Creek Restoration Plan
E.1 Align SSU water goals with regional plans	**E.1.1** Actively participate in Sonoma Water's Regional Integrated Water Resource Management Strategy **E.1.2** Actively participate in Santa Rosa Plain Groundwater Management Plan and Santa Rosa Plain Groundwater Sustainability Plans
F.1 Collaborate on the Copeland Creek Watershed Enhancement and Restoration with Sonoma Water, City of Rohnert Park, and others	**F.1.1** Contact project partners and actively participate in planning efforts.
G.1. Support faculty to bring examples of regional water challenges into the course curriculum	**G.1.1** Make disciplinary-specific information on Russian River Watershed (especially Copeland Creek) easily available to all faculty and provide field trip tours
H.1. Engage students and faculty in inquiry with community partners into water-related challenges	**H.1.1** Increase support for Rising Waters to expand annual water research challenge that engages faculty and students with campus and cross-sector community leaders **H.1.2** Prioritize entrepreneurship in environmental challenges. **H.1.3** Build on WATERS Collaborative to increase funding for faculty and student research and creative inquiry on water-related challenges **H.1.4** Engage classes across disciplines in service-learning projects surrounding water challenges
H.2 Engage students and faculty in monitoring and training to reduce water use on campus	**H.2.1** Organize and support a student-led water training and monitoring program that includes annual electricity reduction competitions in the dorms

CULINARY

GOALS

CARBON

A. Reduce carbon footprint of foods sold on campus

REGIONAL RESILIENCE

B. Increase sustainable choices across all culinary amenities

C. Reduce food insecurity on and off campus

ACADEMICS AND STUDENT LIFE

D. Infuse understanding of food systems on and off campus throughout the curriculum

E. Increase inquiry and training surrounding sustainable food systems

CULINARY

STRATEGIES	ACTIONS
A.1 Increase percentage of locally-grown foods purchased and plant-based meals served	**A.1.1** Build on collaborations with FEED and expand to other local food growers.
A.2 Estimate and track carbon footprint of foods purchased.	**A.2.1** Reinstate food tracking via the Inventory and Purchasing Management Program, and add carbon footprint (and other sustainability attributes)
B.1 Expand campus plastics bans, such as those for straws and water bottles. Reference CSU policy on Single Use Plastics	**B.1.1** Identify the most-easily compostable products for all single-use items
B.2 Increase the number of Fair-Trade products purchased each year	**B.2.1** Identify foods and items offered that are sustainable, compostable, etc. *See sidebar on food attributes.* **B.2.2** Create a Sustainable Purchasing Policy that includes foods and beverages. *(also see Procurement)*
C.1 Expand free food services to students and employees with food insecurity	**C.1.1** Increase support for Lobos' Pantry and explore other options such as food vouchers (also see Health and Safety) **C.1.2** Expand garden classroom production and direct harvesting opportunities
C.2 Make information about off-campus free food services readily available on campus	**C.2.1** Partner with community organizations to raise awareness
D.1 Incentivize integration of regional food challenges into the course curriculum	**D.1.1** Make disciplinary-specific information about regional food challenges easily available to faculty and provide curriculum revision stipend support **D.1.2** Provide presentations and invited speakers from local food initiatives to interested faculty **D.1.3** Develop the Garden Classroom, Copeland Creek, and Native Plant gardens as outdoor classrooms for learning about agricultural and natural systems **D.1.4** Develop an agricultural Education-into-Action team (similar to Rising Waters) to engage faculty and student research teams in regional agricultural challenges.
E.1 Support student and faculty research and creative inquiry on food-related challenges	**E.1.1** Leverage on-going speaker series (e.g., North Bay Forward) to build faculty-community service-learning collaborations on food-related issues **E.1.2** Launch annual research challenge that provides funding for faculty and students to study sustainable food practices **E.1.3** Prioritize entrepreneurship in environmental challenges. **E.1.4** Engage classes across disciplines in service-learning projects surrounding food challenges on and off campus
E.2 Engage students and faculty in monitoring and training to achieve sustainable food goals	**E.2.1** Create a student-run "No Food Left Behind" program - possibly through JUMP - to reduce food insecurity

GROUNDS AND PRESERVES

GOALS

CARBON

A. Reduce carbon used to maintain campus landscapes

B. Develop carbon sequestration initiatives for campus and SSU preserves

REGIONAL RESILIENCE

C. Transition to climate-smart goals for SSU lands

D. Increase abundance and diversity of native species

ACADEMICS AND STUDENT LIFE

E. Infuse understanding of natural landscapes (on and off campuses) throughout the curriculum

F. Increase inquiry and training on natural and sustainable agriculture systems

GROUNDSANDPRESERVES

STRATEGIES	ACTIONS
A.1 Transition to landscaping that does not require irrigation	**A.1.1** Draft and implement a landscaping plan that transitions campus from water-dependent to drought-tolerant. See Policy & Plan Recommendations table in Appendix C.
B.1 Adopt practices that increase carbon sequestration	**B.1.1** Incorporate carbon sequestration goals into a Forestry Management Plan for SSU preserves **B.1.2** Incorporate carbon sequestration goals into Campus Landscaping Plan. See Policy & Plan Recommendations table in Appendix C. **B.1.3** Adopt and demonstrate best practices in carbon sequestration as part of the Garden Classroom
C.1 Reduce impacts of increasing drought and flood and impacts to water quality	**C.1.1** Assess and implement landscaping and restoration approaches (e.g., Copeland Creek) that improve rates of water infiltration, water capture and storage on campus, and preserve lands. **C.1.2** Reduce the risk of campus lakes contamination of Copeland Creek during floods
C.2 Reduce impacts of increasing fire risk	**C.2.1** Apply best practices in buffer zones near structures on campus and preserves
C.3 Reduce impacts of increasing heat	**C.3.1** Adopt urban forestry goals on campus that minimize illness, extreme heat, and poor air quality
D.1 Protect native species vulnerable to declines on campus and at SSU preserves	**D.1.1** Map location of native species and their habitats on campus and preserves
D.2 Expand native vegetation on campus	**D.2.1** Adopt campus-wide landscaping policies that increase native species on campus. *See draft policy linked here. See Policy & Plan Recommendations table in Appendix C.* **D.2.2** Create an agricultural-ecological corridor on campus (includes Copeland Creek, native, butterfly, garden classroom, and campus lakes)
D.3 Control invasive species and other threats to biodiversity	**D.3.1** "Restore" Copeland Creek riparian corridor **D.3.2** Draft invasive species control plans for SSU Preserves
E.1 Incentivize faculty to integrate ecosystem services and challenges into course curriculum *(See Curricular and Co-curricular Section for more actions)*	**E.1.2** Provide regular field trips, tours, and information for faculty and their classes to campus (e.g., such as Copeland Creek, campus gardens, and landscaped areas) and preserves
F.1 Increase support for student and faculty research and creative inquiry on ecosystem services challenges. *(See Curricular and Co-curricular Section for more actions)*	**F.1.2** Leverage on-going speaker series (e.g., North Bay Forward) to build faculty-community collaborations that lead to service-learning opportunities **F.1.2** Continue to grow on-campus funding (e.g., Norwick, WATERS, Fire Up and Rising Waters) grants for faculty and students to research regional challenges

PROCUREMENT

GOALS

CARBON

A. Consider carbon footprint for purchasing decisions

REGIONAL RESILIENCE

B. Consider sustainability for purchasing decisions

C. Support diversification of local economy

D. Support regional partnerships through North Bay Forward to launch a Buy Local campaign

ACADEMICS AND STUDENT LIFE

E. Engage students and faculty to study procurement/supply chain solutions.

PROCUREMENT

STRATEGIES	ACTIONS
A.1/B.1 Adopt campus-wide policy to make sustainability a criteria for purchasing decisions at all levels	**A.1.1/B.1.1** Strategize and establish a campus-wide sustainable procurement policy. **A.1.2/B.1.2** As a state agency, the CSU gives preference to Small Business Enterprises (SBE) and Disabled Veterans Business Enterprise (DVBE). Establish language in the RFP to create a sustainable criteria section.
A.2/B.2 Identify and transition to sustainable purchases	**A.2.1/B.2.1** Identify alternatives for high-impact common purchases (e.g., two products per year) **A.2.2/B.2.2** Reduce or eliminate non-recyclable packaging materials used in shipments **A.2.3/B.2.3** Increase percentage of green cleaning supplies purchased to 100% by 2025
A.3/B.3 The CSU is implementing a Procure to Pay software throughout the system. Explore the possibilities of this system being able to track transitions to sustainable purchases	**A.3.1/B.3.1** When possible attend sustainable procurement training/conferences and then provide the information back to the procurement team.
C.1 Buy local across a range of economic sectors	**C.1.1** See Action A.1.2/B.1.2
D.1 Incentivize faculty to infuse an understanding of product life-cycles throughout the curriculum *(See Curricular and Co-curricular Section for more actions)*	**D.1.1** Provide information resources for Life Cycle Cost Analysis (LCCA) at the SSU Center for Teaching and Educational Technology **D.1.2** Document student research and projects involving LCCA as part of Campus as a Living lab, research results should be reported back to Procurement
E.1 Raise awareness on campus of the impacts of buying locally and sustainably	**E.1.1** Host events, or partner with existing events, to connect and educate the campus community on the impacts of buying local (e.g., host a local vendor market) and report back to Procurement
E.2/F.2 Increase research and creative inquiry *(See Curricular and Co-curricular Section for more actions)*	**E.2.1/F.2.1** Leverage on-going speaker series (e.g., North Bay Forward) to build faculty-community collaborations that lead to service-learning and report back to Procurement **E.2.2/F.2.2** Launch annual research challenge that provides funding for faculty and students to study and report to procurement on product life-cycles and supply chain management

TRANSPORTATION

GOALS

CARBON

A. Increase vehicle fuel efficiency and fuel switching

B. Reduce Vehicle Miles Traveled (VMT) by 30% from 2019 baseline by 2043

REGIONAL RESILIENCE

C. Align affordable well-connected public transportation options (paths, bike trails, buses, trains) with critical needs (food, work, health care) and healthy lifestyles (parks, recreation)

D. Design infrastructure in ways that encourage walking and biking

ACADEMICS AND STUDENT LIFE

E. Infuse understanding of transportation mitigation throughout the curriculum

F. Increase inquiry and training surrounding transportation challenges

TRANSPORTATION

STRATEGIES	ACTIONS
A.1 Transition to electric vehicles	**A.1.1** Replace all 36 fleet passenger vehicles with electric vehicles by 2035, averaging 3 per year **A.1.2** Implement "EV-first" vehicle purchasing policy to ensure that EVs are considered as the primary replacement option for every vehicle
A.2 Increase number of EV charging station ports on campus	**A.2.1** Assess the best locations to meet the needs of on-campus residents and those who need to park in more centralized parking lots on campus **A.2.2** Follow the installation schedule outlined in the CESA tool (cater to housing)
B.1 Incentivize carpooling and public transport such as SMART train and buses	**B.1.1** Include an annual bus/SMART train pass to all new employees who express interest **B.1.2** Distribute commuting survey to all staff, faculty and students annually. Include a question around the barriers to the "last mile" issue. **B.1.3** Promote SMART train, bus, EV and carpool resources **B.1.4** Promote carpool apps
B.2 Incentivize bike share and e-bike use	**B.2.1** Explore potential partnership opportunities surrounding subsidized and/or no cost fares for students and employees with public transportation agencies: Sonoma-Marin Area Rail Transit EcoPass Program, Sonoma County Transit – Subsidized Fare Program
B.3 Implement Concur, an online travel tool, that tracks annual VMT for auto, rail and, train travel	**B.3.3** Report annual VMT
B.4 Increase faculty and staff flexibility in terms of how many days they need to be on campus	**B.4.1** Write a Working Remote Policy
C.1 Make alternative transportation information readily available to students and employees	**C.1.1** Share clearly identified walking and biking routes to campus and from campus to outdoor destinations: Copeland Creek trail and trail to Crane Creek
D.1 Reduce logistic challenges to using bikes to commute to campus	**D.1.1** Promote e-bike incentives **D.1.2** Evaluate feasibility of installing bike lockers with e-bike chargers **D.1.3** Secure bicycle parking along with showers and lockers to make active commuting a viable option; Consider gym or rec facilities as options
E.1 Raise awareness about carpooling, bike and public transportation	**E.2.1** Create an annual commuter challenge led by student leadership
F.1 Write a Transportation Plan for entire campus	**F.1.1** Create a Transportation Demand Management Plan (TDM Plan) per CSU policy **F.1.2** Identify local challenge and provide $10K for faculty-student research or creative inquiry teams to support community partner working on a transportation challenge **F.1.3** Prioritize entrepreneurship in environmental challenges. **F.1.3** Engage classes across disciplines in service-learning projects surrounding transportation challenges on campus

WASTE GOALS

CARBON

A. Reduce landfill contributions

B. Pilot innovative technology to create a local composting program

REGIONAL RESILIENCE

C. Reduce use of plastics and non-sustainable materials

ACADEMICS AND STUDENT LIFE

D. Infuse understanding of waste systems (on and off campus) throughout the curriculum

E. Engage students and faculty in research and creative inquiry with community and campus partners into waste challenges

F. Engage students and faculty in monitoring and training to reduce waste on campus

WASTE

STRATEGIES	ACTIONS
A.1 Draft and implement a plan to achieve 90% waste diversion from campus	**A.1.1** Ensure that all construction and demolition (C&D) materials are source separated **A.1.2** Capture a list of non-recyclable items that need to be replaced with a more sustainable option. Reference waste audit results *(see E.2.1 below)* **A.1.3** Track monthly diversion with Recology **A.1.4** Share monthly diversion figures with students and staff. Consider LEED tracking using the Arc Platform.
A.2 Continue to expand the three-stream recycling across campus	**A.2.1** Partner with Recology to provide pre- waste audit services. (See also the audit process described in E.2.1 below.)
A.3 Initiate Go Paperless campaign	**A.3.1** Use Risk Management Solutions training/conferences to gather information and skills needed to move administrative processes online **A.3.2** Centralize printers throughout campus
A.4 Build programs around Move In– Move out Day	**A.4.1** Partner with local food bank and reuse store
A.5 Launch a "Supply Share" item lending library	**A.5.1** Communicate central storage area to be able to stage equipment for people to shop from **A.5.2** Set up a textbook exchange
B.1 Collaborate with local community to install an anaerobic digester to capture food waste and green waste from campus landscaping	**B.1.1** Track green waste tonnage **B.1.2** Apply compost on local Preserves as part of a carbon farming project **B.1.3** Research implementation and cost
C.1 Adopt and support applicable Zero Waste Sonoma goals	**C.1.1** Expand food recovery and food waste programs on and off campus by creating a service learning opportunity around SB1383
C.2 Ensure all single-use items provided at cafeteria and catering areas are certified compostable post-Covid	**C.2.1** Consider replacing chip bags in the cafeteria or ,partner with Terracycle to recycle chips bags **C.2.2** Document compliance with CSU Single Use Plastics policy requirements
C.3 Identify build out and implement a plan for hydration stations across campus	**C.3.1** Research cost and implementation schedule **C.3.2** Document phase out of plastic water bottles on campus by 1/1/23 per CSU policy requirements
C.4 Eliminate SWAG items that are not sustainable	**C.4.1** Find alternative recognition programs
C.5 Include eco-friendly packaging as a purchasing criteria	**C.5.1** Use waste audit *(ref. E.2.1)* to identify sources of plastics and other landfill-bound packaging material **C.5.2** Contact vendors and encourage them to change packaging material to reusable (start a take-back program), biodegradable, or recyclable
D.1 Make discipline-specific information on local waste systems and their connection to climate easily available to faculty for integration into curriculum	**D.1.1** Informational resources include Recology (waste hauler, website), Zero Waste Sonoma County (public agency, website), CalRecycle State Agency Buy Recycled Campaign (SABRC, website)

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WASTE

STRATEGIES	ACTIONS
E.1 Create an annual research challenge with campus or community partners in reducing waste and impacts of waste systems (e.g., circular economy)	**E.1.1** Use results of waste audit (see E.2.1 below) to identify opportunities to reduce waste and/or improve diversion **E.1.2** Post research challenge to recommend innovative solutions to reduce waste or improve diversion **E.1.3** Prioritize entrepreneurship in environmental challenges **E.1.4** Submit responses for grant funding
E.2 Engage classes across disciplines in service-learning projects surrounding waste and life cycle assessment	**E.2.1** Incorporate waste auditing in the curriculum for GEP 396.4 Waste Management, Recycling, and Policy course. *LEED-compliant waste audit guidelines are linked here.*
F.1 Organize and support a student-led waste reduction training and monitoring program that includes annual waste competitions	**F.1.1** Coordinate with Associated Students, including the SSU Sustainability Student Senator

BUILT ENVIRONMENT

GOALS

CARBON

A. Increase the number of small projects that incorporate green building strategies

B. Increase the number of certified green buildings

C. Improve the use of sustainable materials in construction

REGIONAL RESILIENCE

D. Incorporate sustainability into planning

E. Improve backup power systems

ACADEMICS AND STUDENT LIFE

F. Increase student involvement in sustainable construction on campus

G. Improve awareness of green buildings and sustainable construction principles and practices

H. Increase outdoor teaching facilities

BUILT ENVIRONMENT

STRATEGIES	ACTIONS
A.1 Create sustainable construction and operations guidelines for small projects and existing buildings that do not fall within the scope of the CSU Sustainability policy	**A.1.1** Create energy efficiency guidelines **A.1.2** Create sustainable materials purchasing guidelines **A.1.3** Create water efficiency guidelines
B.1 Use the CSU Sustainability Policy as a platform for increasing the number of certified green buildings on the SSU campus	**B.1.1** Attempt LEED certification on more newly constructed buildings **B.1.2** Attempt LEED certification on an existing building **B.1.3** Enter all campus buildings into ENERGY STAR Portfolio Manager **B.1.4** Pilot the Living Community Challenge on Academic 3. It is recommended that the University pursue new building designs taking into account the Living Community Challenge Standards as a pilot project. **B.1.5** Certify the campus for LEED to facilitate LEED certification/equivalent of future buildings
C.1 Identify sources of sustainable materials	**C.1.1** Review Environmental Product Declarations (EPDs) for frequently used construction materials **C.1.2** Utilize consultants and contractors that are local and source a high percentage of materials locally
D.1 Collect information about building performance (energy and water savings, indoor environmental quality, etc.) over the long term	**D.1.1** Extend budget cycle to look at long term economics of buildings that incorporate sustainable features
E.1 Ensure essential services are supported by backup power systems during outages	**E.1.1** Verify internet service at campus housing buildings and water pumps to ensure water pressure stays above 20 psi to avoid 3-day boil notice
F.1 Recruit a student intern from the Construction Management Certificate program or sustainability courses	**F.1.1** Create a paid internship for students to assist with LEED certification/ documentation, ENERGY STAR tracking, and learn about sustainable construction, 15-20 hours per week. See sample job description in Appendix C.
G.1 Educate students, staff, and faculty about sustainable buildings	**G.1.1** Add signage on existing buildings highlighting sustainable features **G.1.2** Educate students, staff, and faculty about sustainable buildings and campus ecology. Tree species could have signs with QR codes to allow students to learn, also for facilities managers to know if they are research trees. Identify native plants also. **G.1.3** Capture information about stormwater management and educate students about the volume that runs off parking lots and how it's managed **G.1.4** Incorporate sustainability in training for maintenance staff
H.1 Build additional outdoor seating areas on campus and at preserves that can be reserved for class use	**H.1.1** Construct permanent outdoor classroom on campus with roof and comfortable seating that can be reserved by faculty and complies with Copeland Creek Master Plan **H.1.2** Build facilities identified in Galbreath Wildlands Preserve Facilities Master Plan that increase immersive experiences for students in local ecosystems

ACADEMIC INSTRUCTION & RESEARCH

GOALS

CARBON

A. Provide telecommuting options for faculty and students

B. Enhance learning in ways that increase health, wellness and academic success of students

REGIONAL RESILIENCE

C. Improve wifi on campus and access to internet off-campus

D. Expand sustainability offerings in the curriculum

ACADEMICS

E. Develop innovative, interdisciplinary academic sustainability programs

F. Incentivize and support faculty to make curriculum changes

G. Promote sustainability classes to students

H. Increase Student Awareness of Sustainability

I. Infuse campus, preserve, and North Bay sustainability and resilience challenges into teaching, research, and events

J. Engage students and faculty in research and creative inquiry into local sustainability and resilience challenges with campus, preserves and community partners

K. Infuse key resilience workforce needs into certification courses and skill-development programs, including leadership programs and Construction Management certification program

L. Work with entrepreneurship program support projects addressing sustainability and resilience challenges

ACADEMIC INSTRUCTION & RESEARCH

STRATEGIES	ACTIONS
A.1 Identify which courses could be taught online	**A.1.1** Study the students' experience and thoughtfully increase online course offerings to promote student success while decreasing our carbon footprint. **A.1.2** Track Scope 3 carbon emissions savings associated with telecommuting
B.1 Encourage and support outdoor instruction by faculty in all disciplines	**B.1.1** Identify existing areas where outdoor teaching has been provided in the past and additional locations suitable for outdoor teaching. Ensure areas may be reserved through Academic Affairs **B.1.2** Inventory existing infrastructure and teaching aids for outdoor learning (mobile whiteboards, shade structures, seating, etc.) **B.1.3** Procure additional infrastructure and teaching aids as needed **B.1.4** Promote outdoor teaching as an option through email, CTET, and other outreach options
C.1 Provide hotspot devices for students to check out	**C.1.1** Determine the inventory of existing hotspots **C.1.2** Work with appropriate lender (IT, Library, etc.) to set up a loan system **C.1.3** Notify students
D.1 Create new courses related to climate change, resilience, environmental justice, carbon neutrality, etc.	**D.1.1** Identify specific pathways that a student could follow to participate in Sustainability Sea Lane. Include an immersive, sustainability-focused educational study program. Include metrics of diversity and social justice in establishing and reviewing programs. **D.1.2** Use a list of courses that include sustainability or are sustainability courses and identify those that would apply to Sea Lane or Minor.
D.2 Incorporate sustainability in Construction Management certificate program	**D.2.1** Add LEED AP accreditation to Construction Management Certificate program
E.1 Create a Sustainability Sea Lane or Minor	**E.1.1** Identify host department (GEP if appropriate) **E.1.2** Find funding
F.1 Apply for Grants, RTP credit, create a Sustainability Faculty Learning Community	**F.1.1** Identify grants pertaining to sustainability and inform faculty **F.1.2** Increase campus funding for faculty engaged in sustainability initiatives **F.1.3** Identify RTP credit opportunities in sustainability **F.1.4** Create a Faculty Learning Community
F.2 Increase philanthropic funding for student and faculty engagement in sustainability	**F.2.1** Highlight areas where giving is needed (Sustainability in the Classroom, Campus as a Living Lab, Preserves, Collaboratives, more). **F.2.2** Consider funding via CEI channels
G.1 Identify academic opportunities in sustainability across all disciplines	**G.1.1** Identify classes meeting sustainability criteria in the course catalog **G.1.2** Provide sustainability information to student advisors across all disciplines
H.1 Infuse high-impact educational practices in sustainability into existing course work in all disciplines: outdoor learning (e.g., SSU preserves, outdoor classrooms), service-learning, entrepreneur programs, problem-solving activities (e.g., Maker Space), cross-disciplinary courses	**H.1.1** Infuse campus, preserve and North Bay sustainability and resilience challenges into teaching, research and events **H.1.2** Engage students and faculty in research and creative inquiry into local sustainability and resilience challenges with campus, preserve and community partners

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ACADEMIC INSTRUCTION & RESEARCH

STRATEGIES	ACTIONS
I.1 Create new courses related to climate change, resilience, environmental justice, carbon neutrality, etc	**I.1.1** Find out which departments are designing new courses and whether sustainability and resilience may be appropriate content for integration in the course. **I.1.2** Incentivize and create a clear process for developing interdisciplinary courses that integrate economic, culture and environmental aspects of sustainability and resilience.
I.2 Identify and support invited speakers to speaker series and classrooms on North Bay sustainability and resilience challenges	**I.2.1** Focus speaker series, such as North Bay Forward, Dig into Nature, and Ecology Forum, on local earth and equity issues issues and make a library of recordings available **I.2.2** Make disciplinary-specific information about ecosystems services and regional challenges easily available to faculty and provide curriculum revision stipend support **I.2.3** Provide presentations and invited speakers to interested faculty
I.3 Develop interdisciplinary structures to promote learning about sustainability and resilience across all disciplines	**I.3.1** Create team-taught, cross-cutting courses and find a funding mechanism to incentivize this and remove administrative hurdles
J.1 Support inquiry partnerships surrounding environment and inquiry	**J.1.1** Expand Education-into-Action Research Teams (e.g., Rising Waters, Fire Up model) that partner faculty and students with regional leaders on emerging challenges **J.1.2** Bring expertise of faculty to support community challenges through contracts and services, such as Center for Sustainable Communities, and Anthropological Studies Center
J.2 Engage classes across disciplines in service-learning projects	**J.2.1** Build on CCE and CEI activities to create opportunities for class research and inquiry that supports long-term, inter-disciplinary meaningful contributions to sustainability challenges in the region
J.3 Build on WATERS Collaborative to develop grants or faculty and students to address local challenges	**J.3.1** Develop donor support fund or build existing endowed funds (e.g., Stephen Norwick Memorial Fund) to generate meaningful funding that encourages faculty and students to work on sustainability and resilience projects with community members.
J.4 Present sustainability and resilience project ideas to students choosing capstone projects (e.g., Engineering Science capstone process)	**J.4.1** Develop list of current capstone courses across campus **J.4.2** Fund staff time needed to compile lists of community leaders and challenges, scale projects to meet capstone course structure, and present targeted opportunities to students in capstone courses.
K.1 Share successful models for co-curricular models that teach skills and give students practice applying skills to regional projects (e.g., Naturalist Training, Land Management Training)	**K.1.1** Package existing co-curricular opportunities (e.g., volunteer opportunities, training, certifications, etc.) for students interested in developing skills in sustainability and the environment. **K.1.2** Explore opportunities to integrate sustainability and resilience into existing co-curricular programs
L.1 Incentivize and facilitate faculty to add to their courses examples of local challenges and how their discipline is needed to address those challenges.	**L.1.1** Collaborate with the Faculty Center to provide inter-disciplinary consultation for faculty who would like to incorporate sustainability into their programs. **L.1.2** Resurrect “Sustainability in the Classroom” grants to provide summer stipend for faculty integrating sustainability into course curriculum **L.1.3** Create a Sustainability Faculty Learning Community **L.1.4** nhance support for class field trips to campus eco-ag corridor and SSU preserves for students to learn about local human-environment interactions. Streamline field trip paperwork to make it easier for students, staff, and faculty.

STUDENT LIFE

GOALS

CARBON

A. Engage students and faculty in energy and waste reduction programs in classrooms, labs and student programs

REGIONAL RESILIENCE

B. Improve student wellbeing and resilience on campus, particularly in response to wildfires, but also related to food security, cost of living, etc. (ASL 1ai)

C. Increase students' ability to continue learning during climate emergencies

D. Reduce existing stressors on vulnerable student populations

STUDENT LIFE

E. Promote experiences, jobs, and career opportunities in sustainability and resilience-related fields

F. Make sustainability and resilience a key part of the lived student experience

STUDENT LIFE

STRATEGIES	ACTIONS
A.1 90% of all academic departments complete the Green Office Certification Program by 2030	**A.1.1** Conduct EcoAssessment™, an easy-to-use online tool that credits campus for completed initiatives.
A.2 Scope out a solution for providing electric vehicles for field trips	**A.1.2** Complete transition to electric fleet vehicles *(see Transportation Action A.1.1)*
B.1 Create experiences for all incoming Freshmen that connect students to each other, campus, environment, and local community members	**B.1.1** Expand introductory tours to SSU to Preserves **B.1.2** Use outdoor classroom spaces for orientation activities **B.1.3** Ask students to share any experiences they have had in natural disasters and how they affected them. Follow stories with descriptions of resilience measures currently in place and those that are planned. **B.1.4** Introduce students to outdoor areas on campus.
B.2 Infuse place into existing programs (e.g., Summer Bridge)	**B.2.1** Add an element of historical ancestry or field trips to the Preserves
C.1 Increase exposure to remote instruction technologies and accessibility	**C.1.1** Ensure instructors are aware of remote instruction technologies available at CTET **C.1.2** Communicate remote instruction process to students during orientation
C.2 Identify Cool down locations on campus	**C.2.1** Identify the buildings with high occupant capacity that have air conditioning and standby generators. **C.2.2** Discuss designating them as cooling centers during heat emergencies with facilities staff and building administrators. The Student Center is already designated as such, although the air conditioning does not have backup power. **C.2.3** Update campus maps with cooling centers identified. **C.2.4** Plan upgrades to other buildings to be designated as cooling centers in the future.
D.1 Conduct gap analysis for Basic Needs Initiative to determine where students may be vulnerable during emergencies and recovery	**D.1.1** Merge findings into the campus Emergency Plan
D.2 Align MESA program with a research challenge focused on climate resilience	**D.2.1** Prioritize entrepreneurship in environmental challenges.
D.3 Infuse outdoor experiences into physical and mental health programs	**D.3.1** Work with SSU health programs and therapists to find appropriate opportunities to provide students, faculty and staff with information about the physical and mental benefits of outdoor experiences
D.4 Determine how SSU can increase resilience of students at risk.	**D.4.1** Assess the cumulative effects of SSU pre-school, elementary school, middle school, high-school, college readiness and retention programs that increase educational opportunities for vulnerable populations (e.g. TRIO, CAASE, Summer Bridge) **D.4.2** Identify ways that SSU can coordinate regionally for the best possible outcomes for at-risk students
E.1 Expose students to sustainability-related career paths, employers and professionals	**E.1.1** Partner with faculty to provide relevant information to students on green career opportunities and employers **E.1.2** Create opportunities for students to speak with professionals working on climate-change initiatives **E.1.3** Highlight green job opportunities at career-related annual events **E.1.4** Include green job opportunities as part of career advising information
E.2 Boost training opportunities and experiences that make students competitive for green jobs	**E.2.1** Create new or modify existing programs (e.g., leadership) and certificate courses (e.g., Construction Management) in ways that make students competitive for green careers.

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STUDENT LIFE

STRATEGIES	ACTIONS
F.1 Make sustainable practices and branding a visible part of introductory and campus-wide events	**F.1.1** Update and highlight sustainability information in student orientation and campus tours **F.1.2** Adopt a minimum sustainability best practices and information protocol for campus-wide student events
F.2 Recruit student participation in helping to enhance sustainability awareness and adopt sustainability behaviors	**F.2.1** Maintain a list of all opportunities on campus and in the local community for ways students can get involved and share on Sustainable SSU website **F.2.2** Recruit students to participate during Earth Week and appropriate events
F.3 Make sustainable behaviors part of daily living practices in dormitories, classrooms and offices	**F.3.1** Expand existing residential life materials and programs in ways that establish sustainable behaviors as part of daily life. **F.3.2** Create clear messaging that identifies sustainable practices adopted by faculty and staff and departments **F.3.3** Whenever possible, provide educational materials to increase students' understanding of sustainable options.

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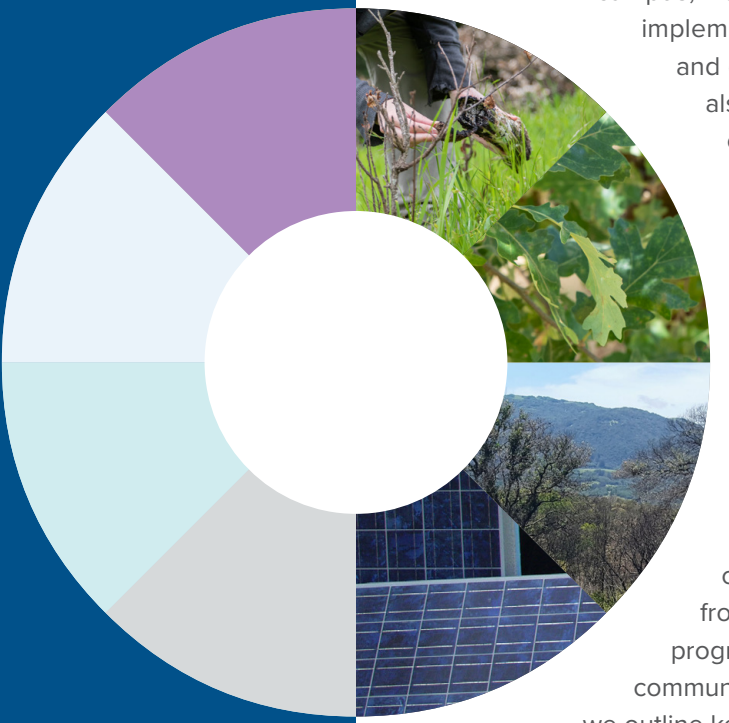
IMPLEMENTATION

OVERVIEW



This plan sets clear goals and pathways for infusing sustainability and resilience into all aspects of university operations and programs. As a campus, we have a strong desire to implement these changes rapidly and on schedule. However, we also recognize the reality of the challenges ahead. Implementation must be flexible if we are to face significant financial and logistic barriers, respond to unanticipated events, and take advantage of new opportunities as they arise.

Above all, implementation is dependent on broad and coordinated participation from divisions, departments, programs, individuals, and community partners. In this section, we outline key implementation tools, initial staffing, and funding recommendations and resources.

TOOLS

We have created implementation tools and plans for three key implementation areas.

Integrated Sustainability and Resilience Goals

Infusing sustainability (including carbon neutrality) and resilience across divisions, departments, and programs requires collaboration and synergistic approaches among all parts of campus. The Integrated Goals, Strategies, and Actions section of this plan identifies goals, strategies, and actions and includes climate neutrality goals. The **SSU Sustainability Tracker** is the supporting tool for the campus to prioritize and coordinate annual targets and to track overall performance metrics. The tracker integrates qualitative and quantitative elements of sustainability. Most accomplishments within sustainability sectors (e.g., waste, water, procurement, academics) are tracked qualitatively to describe the actions of individuals and programs (e.g, “SSU eliminated 35% of paper purchases"). Quantitative estimates of the GHG emission reduction (i.e., GHG emissions of projects related to energy efficiency, renewable energy, and electric vehicle transition) made using the Climate and Energy Scenario Analysis tool (CESA, see below) are additionally entered into the Tracker to create a single integrated source of information about accomplishments.

The Sustainability Tracker can be used to assign various action and reporting items to key departments responsible for reporting on qualitative performance metrics specific to their focus area. The Tracker is additionally designed to feed information into Second Nature’s annual reporting of GHG emissions and the Sustainability Tracking Assessment & Rating System (STARS). Additional information about the Sustainability Tracker is included below under PSAC Responsibilities.

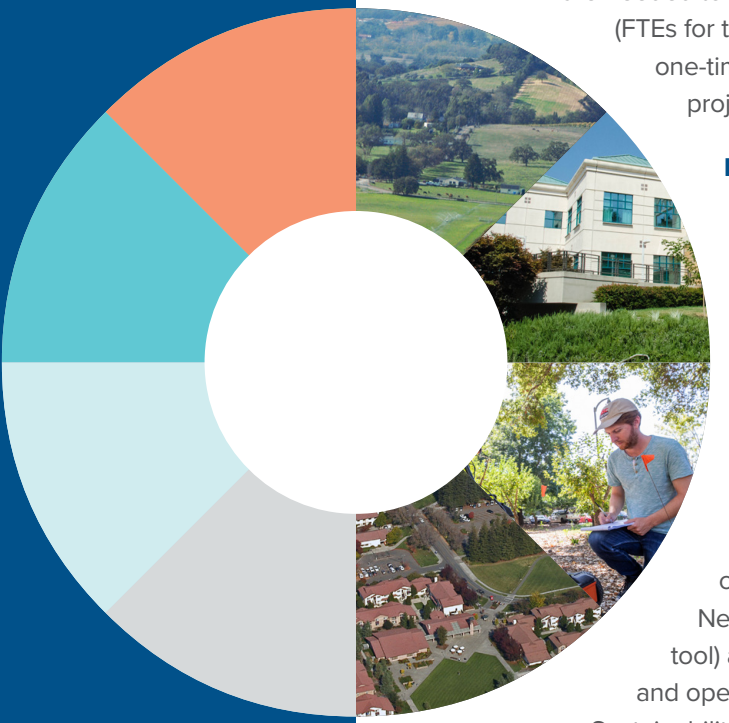
Climate Neutrality

The most urgent need for implementation is the reduction of GHGs. Achieving carbon neutrality by 2043 requires that the campus increase energy efficiency, building electrification, electrical vehicle use, and energy conservation behaviors. The Climate Neutrality Roadmap (Appendix A) and accompanying **Climate and Energy Scenario Analysis (CESA) tool** were created to help campus prioritize projects, track efforts and quantitatively assess progress towards carbon neutrality. The Roadmap includes a thorough breakdown of costs associated with individual projects and three scenarios over a 21-year time horizon and an assessment of how the necessary funding can be achieved through a Green Revolving Fund (see page 51). The CESA tool allows rigorous quantification of GHG emissions for energy efficiency, renewable energy, and electric vehicle transition.

Communication and Engagement

Infusing new approaches into standard procedures and forging new relationships requires new ways of communicating and engaging administrators, staff, faculty, students, and community partners. A **Communication and Engagement Plan** (Appendix D) identifies mechanisms for distributing information on key concepts, promoting behavioral change on campus, and integrating with the Sustainability Tracker to report progress over time.

LEADERSHIP ROLES



The PSAC is charged by the President with coordinating the implementation of the CAP. Four key leadership positions that also serve on the PSAC are needed to implement the CAP (Table A). (FTEs for these and other recurring or one-time staff needs are listed under project costs and staffing needs).

Director of Resilience and Sustainability Operations

The operations director serves as PSAC Co-Chair and also chairs the Zero-Impact Working Group (Table A). The director is generally responsible for leadership, project implementation, and fundraising in the areas of carbon neutrality (Climate Neutrality Roadmap and CESA tool) and resilience of infrastructure and operations (Integrated Sustainability and Resilience Goals and Sustainability Tracker). The operations director works with campus leadership to track carbon and resilience goals, identify and implement critical path projects, track Green Revolving Fund savings (see below), secure off-campus funding through grants, chancellor's office proposals, contracts, and private-public partnerships. The director additionally develops partnerships with regional leaders and participates in regional initiatives in ways that leverage federal and state funding. The director is responsible for annual reporting obligations required by the Presidents' Climate Leadership Commitment and needed to communicate and encourage the participation of the campus community in projects. This position is currently filled by the Director of Transportation and Parking Services but a full-time position is needed.

Sustainability Programs Director

The programs director serves as PSAC Co-Chair and also chairs the Regional Resilience Working Group (Table A). The programs director is generally responsible for leadership, project implementation, and fundraising in the areas of learning and resilience of people, lands, and ecosystems and engaging working groups in Integrated Sustainability and Resilience Goals. The director works collaboratively with other sustainability staff, campus and community leaders to develop and sustain programs that: (a)

create high-impact educational and professional experiences for students, improve personal resilience for students; (b) support faculty to integrate sustainability into the curriculum; (c) establish campus as a demonstration site for best practices, and; (d) adopt climate-smart goals, including carbon sequestration on grounds and preserves, The director develops partnerships with regional leaders and participates in regional initiatives in ways that leverage federal and state funding for CAP goals. The director is responsible for providing key sections of the annual reporting obligations required by the Presidents' Climate Leadership Commitment and is a leader in managing the Sustainability Tracker. This position is currently filled by the Center for Environmental Inquiry Director but a full-time position is needed.

Faculty Sustainability Chair

The faculty sustainability chair leads the Academic and Student Life Working Group (Table A). The faculty chair is generally responsible for supporting the integration of sustainability in the curriculum, service-learning projects in sustainability and resilience, and the development of student-led monitoring programs. The chair also works with the strategy, advancement, and communications working group to create and host non-curricular student learning experiences. This part-time position (3 WTUs) is appointed by the Provost and additional teaching unit allocation may be needed.

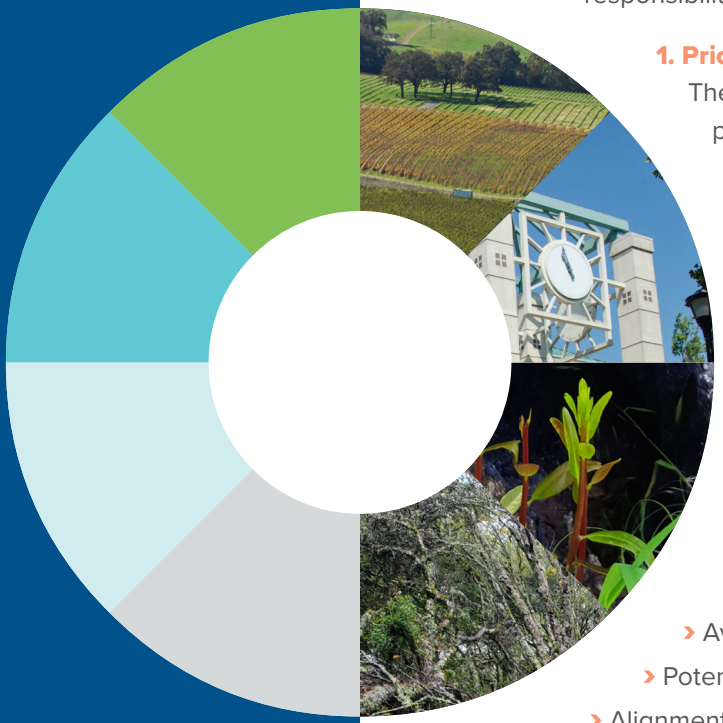
Sustainability Communications Coordinator

The Sustainability Communications Coordinator serves as the Chair of the Strategy, Advancement and Communications (SAC) Working Group (Table A) which oversees the implementation of the Communication and Engagement Plan (Appendix D) and more generally enhances SSU branding with regards to sustainability. The communications coordinator is responsible for consistent communication that raises the profile of sustainability research, education, and carbon projects, and increases awareness of learning opportunities. This position is currently unfilled and unfunded.

Table A: Key PSAC Leadership Responsibilities. Positions in red do not have full or permanent funding.

	DIVISION	ADMINISTRATION & FINANCE	ACADEMIC AFFAIRS		
	PSAC CO-CHAIRS	**Director of Resilience and Sustainability Operations**	**Sustainability Programs Director**		
	PSAC WORKING GROUP (CHAIR)	**Zero-Impact** (Director of Resilience and Sustainability Operations)	**Regional Resilience** (Sustainability Programs Director)	**Academics & Student Life** (Faculty Sustainability Chair)	**Strategy, Advancement & Communication** **Sustainability Communications Coordinator**
	PLANNING	Integration & Planning	Integration & Planning	Integration & Planning	Integration & Planning
AREAS OF RESPONSBILITY	CARBON	Campus Carbon Neutrality **(State Mandated by 2045)**			
		Broader Carbon Footprint			
	RESILIENCE	Campus Infrastructure and Operational Resilience to Extreme Events	Resilience of People to Extreme Events		
			Resilience of Ecosystems and Lands		
	ACADEMICS & STUDENT LIFE			Service-learning projects and research challenges	
				Student-led monitoring and training programs	
				Integration in curriculum	
	COMMUNICATION & ENGAGEMENT				Internal Communications
					External Communication
					Behavioral Change Initiatives

PSAC RESPONSIBILITIES



Working Groups will use the Sustainability Tracker to assist in the development of CAP strategies and actions. planning and evaluation. Key areas of responsibility are to:

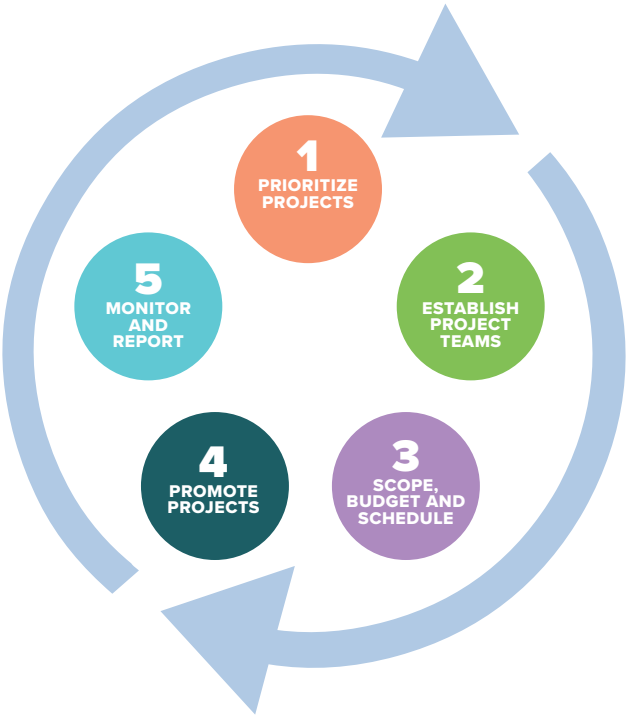
1. Prioritize Projects

The Sustainability Tracker provides initial priority rankings and timelines for each Climate Action Plan strategy. Priority rankings were developed based on the following factors:

- GHG reduction potential
- Impact on campus and community resilience
- Promotion of academic excellence
- Alignment with core university values
- Availability of funding
- Potential for behavioral change
- Alignment with other university plans and policies

These scores were then used to develop an implementation timeline broken down into three categories: those set to begin in 2023, 2026 or 2030.

Working groups will review and refine the results of the initial prioritization analysis. Scheduling will be an ongoing process. Sustainability is inherently wide-ranging and not every action can be implemented at



once. Some strategies can be started immediately. Other strategies, such as policies and regulations involve staff time "up front," but in the long run rely on the activity of faculty, staff, and community partners following established protocols. Still other strategies, including capital investments, involve a common series of steps from project scoping, fundraising and procurement, to planning, design, and construction.

2. Establish Project Teams

Working groups will recruit and form teams composed of staff, student, faculty and community leaders to undertake prioritized strategies and actions. Participation of groups - including those disproportionately affected by CAP strategies, actions or climate change events - must be a hallmark of implementation. A non-exhaustive list of stakeholder groups needed for undertaking projects in the CAP include:

- Associated Students, Student Clubs and Organizations
- Academic Schools & Departments
- Facilities Management
- Emergency Operations
- Financial Services
- Transportation
- Risk Management and Safety Services
- SSU Preserves

In addition, Working Groups will support faculty, students and staff volunteering to undertake elements of the CAP.

3. Scope, Budget and Schedule

Working Groups will work with project teams to determine specific project goals, deliverables and tasks, and update budgets and schedules. The Sustainability Tracker provides initial estimates of infrastructure costs (e.g., Table A), staff and faculty full-time equivalents (FTEs) needed to undertake projects, and a short list of possible funding sources for a variety of activities (Table B).

4. Promote Projects

Working Groups will work with project teams to identify how they can assist each team with project goals. Project promotion includes securing funding, assisting with administration and logistics, and publicizing on-going projects.

5. Monitor and Report

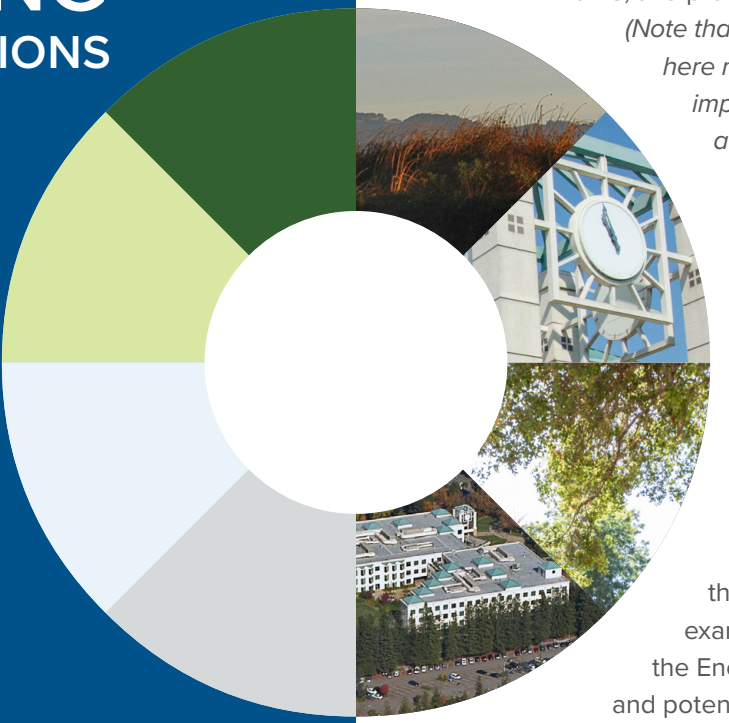
The Presidents' Climate Leadership Commitment obligates SSU to report every year on greenhouse gas emissions and progress towards CAP goals. Monitoring and reporting are not only important for communicating progress against clear benchmarks but also for driving creative solutions and transparently communicating SSU's commitment to prospective students, foundations, partners and internal and regional stakeholders. SSU's primary monitoring and reporting tool is the Sustainability Tracker.

Working Groups will use the Sustainability Tracker to contribute information on project accomplishments. The Sustainability Tracker serves both as a coordination platform and as the ultimate source of information for all reports (e.g., PCLC, STARS) and communications (e.g., annual campus Sustainability Snapshot). The Sustainability Tracker integrates two required approaches for monitoring and reporting:

- **Qualitative Approach**
  A qualitative approach tracks the sustainability **actions** of individuals and programs. This approach can help answer questions related to whether an action had its intended impact, whether it did so in a cost effective manner, and other lessons learned from its implementation.
- **Quantitative Approach**
  A quantitative approach tracks SSU's progress specific to **GHG emissions**. This is important for understanding if we are on track to meet our carbon neutrality goals, or if we need to consider adjusting the timeline of project implementation. Annual GHG emission inventories are a necessary part of monitoring reductions of GHG emissions year to year.

Above all, the approach to implementation must be flexible. As technologies, business models, and politics evolve, SSU will need to adjust approaches to implementation. Similarly, as progress towards key targets is tracked, SSU may need to scale up or down its efforts. As costs and feasibility change, the campus will need to periodically evaluate and adjust course. Updating and revising the CAP will be needed on a regular basis and the campus should plan on updates every five years (in 2027 and 2032).

PROJECT COSTS & STAFFING
RECOMMENDATIONS



The CAP will require substantial investment. One-time and ongoing funding will be needed in the form of capital investments, equipment, faculty and staff time, and professional services contracts. *(Note that some costs not included here may fall under other plan implementation budgets, such as a Transportation Demand Plan, Landscaping Plan, or Forestry Management Plan, and costs and FTE will need to be determined within those plans).*

Project Costs

Initial infrastructure and consulting cost estimates for each of the CAP strategies are included in the Sustainability Tracker. An example of cost estimates from the Energy sector is given in Table B and potential funding sources by sector in Table C. These should be considered estimates only. Investment-grade analyses are needed before beginning implementation. Based on these initial estimates, the total cost of implementing projects identified in the CAP are:

- $54 M in electrification and renewable energy
- $10 M in additional climate action projects
- $64 M total

Staffing Needs

In addition to the project costs, a rough estimate of full-time equivalents (FTEs) needed to undertake the projects was made for each strategy. Based on these initial estimates, the total FTEs needed to implement the CAP are:

- 2.5 recurring FTEs for leadership, fundraising, project management
  (1.0 FTE Director of Sustainability and Resilience Operations,
  1.0 FTE Sustainability Programs Director, 0.5 FTE Sustainability Communications Coordinator)
- 3.5 recurring FTEs technical support staff
- 11 one-time FTEs divisions and departments

The position most urgently needed to meet the State's carbon neutrality obligations by 2045 is a 1.0 FTE Director of Sustainability and Resilience Operations.

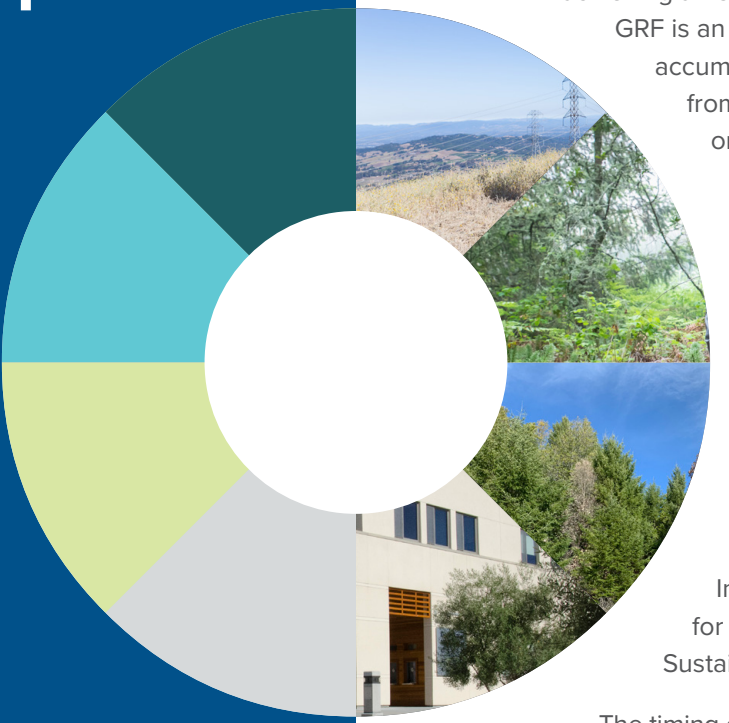
Table B: Sample of Budget Project Costs per Sector

Sector	Strategy Number	Strategy	Estimated Implementation Cost	Estimated Ongoing Costs
ENERGY	A.1	Develop electrical systems in ways that allow easy sharing of building-specific energy	$2,120,00	$5,000
	B.1	Implement energy conservation measures in existing buildings and infrastructure	$50,000	$5,000
	B.2	Improve energy efficiency of newly constructed buildings	$10,000	-
	B.3	Pursue campus-wide energy efficiency projects	$45,000	$10,000
	C.1	Establish a campus energy efficiency (EE) program to reduce energy demand	$100,000	$100,000
	C.2	Transition to an all-electric, fossil fuel free campus	$17,883,368	$20,000
	C.3	Electrify Central Plant	$13,883,911	$20,000
	D.1	Complete Development of Currently Contracted Solar + Storage Project with SunPower	$11,343,250	-
	D.2	Complete feasibility analysis, procure and install additional on-site carport and/or ground mount solar projects at 1–5 locations on the SSU campus	$11,280,750	$10,000
	D.3	Identify backup power for Lobo's Pantry	$85,000	$10,000
	D.4	Explore geothermal heat exchange system for Athletic Village	$30,000	$10,000
	E.1	Create a funded annual research challenge that focuses on carbon neutrality goals	$10,000	$5,000
	E.2	Engage classes across disciplines in service-learning projects related to energy	$10,000	$5,000
	E.3	Organize and support a student-led energy-use training and monitoring program	$10,000	$5,000

Table C: Funding and Financing Opportunities by Sector

Sector	Funding/Financing Source(s)	
Energy	CSU Capital Funding CEC loans PG&E on-bill financing ESCO CSU Systemwide Revenue Bonds PPA	DOE Office of Science Funding opportunities SSU Center for Environmental Inquiry grants EPA P3 program EPA Environmental Education grants SSU Maintenance Funding budget
Water	SSU Center for Environmental Inquiry grants SSU Sustainability in the Classroom grants Gordon and Betty Moore Foundation Environmental Conservation grants SSU Maintenance Funding budget	
Culinary	CSU Basic Needs Initiative SSU Center for Environmental Inquiry grants	
Grounds & Preserves	SSU Sustainability in the Classroom grants EPA Environmental Education Grants SSU Maintenance Funding budget	
Procurement	SSU Center for Environmental Inquiry grants DOE Office of Science Funding opportunities EPA Environmental Education Grants	
Transportation	CSU Minor Capital Outlay (MCO) funding Cost Recovery revenue	
Waste	DOE Office of Science Funding opportunities EPA Environmental Education Grants	
Built Environment	SSU Center for Environmental Inquiry grants CSU Systemwide Revenue Bonds CSU Minor Capital Outlay (MCO) funding Public-Private Partnerships CSU General Fund	
Academic Instruction	SSU Sustainability in the Classroom grants EPA Climate Justice grants EPA Environmental Education Grants CSU-funded reserves CSU Systemwide Revenue Bonds for Academic Programs	
Student Life	SSU Center for Environmental Inquiry grants SSU Sustainability in the Classroom grants EPA Environmental Education Grants CSU Basic Needs Initiative EPA P3 program American Rescue Plan Act EPA Climate Justice grants Gaia Fund Sustainable Agriculture grants	

BUDGET STRATEGY



The central strategy for funding CAP projects is the SSU Green Revolving Fund (GRF). GRFs are a financially meaningful and feasible path to achieving **all of SSU's CAP goals**. A GRF is an internal capital pool that accumulates budgetary savings from energy efficiency projects on campus to invest in further CAP projects (Figure B). The GRF model is a widely successful strategy among universities throughout the United States with at least 79 funds ($111 million) established since 2012. (Green Revolving Funds: A Guide to Implementation & Management 2013. Sustainable Endowments Institute & the Association for the Advancement of Sustainability in Higher Education).

The timing of GRF establishment and staff onboarding is critical for achieving CAP goals:

- The more investment that is made upfront, the fewer GHG emission reductions will need to be invested over time (ex.: Investments in high-performance buildings will reduce future building decarbonization investment needs)
- Return on investment can be substantial leading to significant financial savings over time (ex.: Investments in energy-efficient appliances can save on future energy bills.
- The cost of inaction is much higher. Investments in sustainability and clean infrastructure reduce costs for the university, promote growth in local jobs and the economy, and reduce recovery costs from climate-related disasters. An analysis by the National Institute of Building Sciences found that for every $1 spent on mitigating natural hazards, $6 is saved.

Three immediate actions are needed to kick-start the GRF *(for details see Appendix A)*:

1. Capitalize the GRF in 2022. A SSU GRF is currently established and allows the university to fund limited upgrades. The following modifications to the fund are needed to provide the funding needed for CAP projects:

- **a.** An energy consumption baseline needs to be established to accurately track savings.
- **b.** The actual expenses associated with that baseline needs to be recorded and tracked over time. This means that when energy costs rise over time, the expenses that SSU would have incurred considering baseline consumption, are measured and recorded.
- **c.** A system to measure deviations from baseline consumption is required (i.e. metering and submetering).
- **d.** The difference between what would have been spent, and the actual expenditures is transferred into a dedicated internal GRF.
- **e.** An oversight committee is established which vets candidate projects.

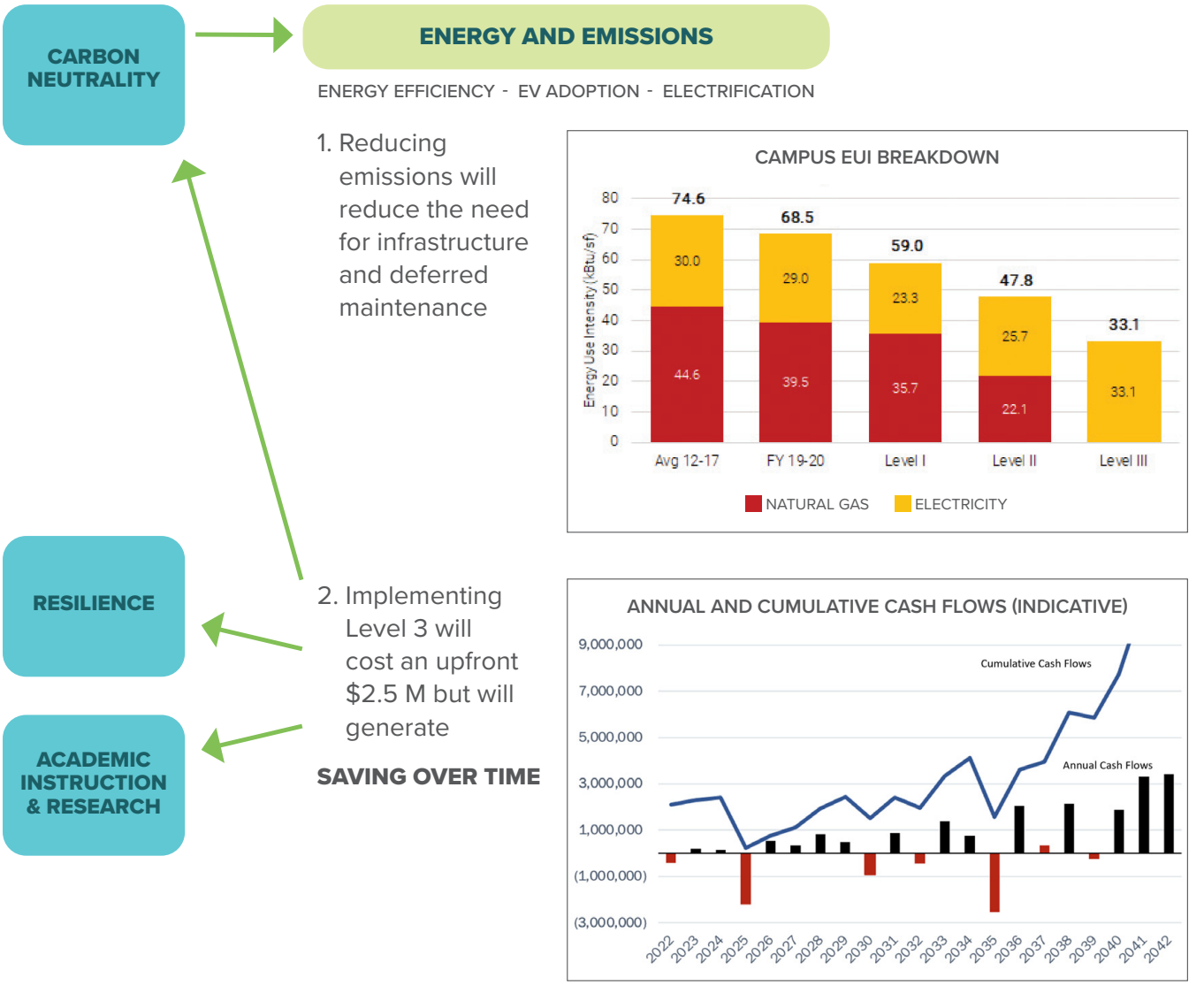


Figure B. Savings realized by the reduction in energy costs can be used to fund carbon, resilience, and curriculum goals.

BUDGET STRATEGY CONTINUED

2. Seed GRF with $2.5 M in 2022. An initial investment of $2,5 million is needed to jump-start a project that will result in energy savings and the accumulation of GRF funds. **If needed, this initial investment will be repaid from the GRF once energy savings are realized.** If SSU (or Chancellor's Office) does not seed the GRF, an additional $17.3 million-plus staff salary will need to be expended over the next 20 years to ensure the 2045 legal requirements are met.

3. Hire Full-Time Operations Director: Four leadership positions (2.5 additional FTEs identified above) are needed to steward SSU's pathway to sustainability. The most urgent of these is **the Director of Sustainability and Resilience Operations.** This position is needed immediately to ensure capitalization of the GRF, launch implementation of a kick-off energy saving project that will accumulate funding in the GRF, and meet annual reporting requirements.

Costs to the university and its partners of implementing the CAP can be substantially reduced by leveraging existing and future funding streams. The Director of Resilience and Sustainability Operations and the Sustainability Programs Director must be able to work with GRF investment teams, prepare proposals, collaborate regionally, and pursue grants. Potential funding sources - in addition to the GRF - fall into four categories:

› **Chancellor's Office -** Some types of funding are made available through the Chancellor's Office, Systemwide collaborations may also be an important strategy for securing funding that benefits all campuses.

› **Grants -** Grants have the advantage of being "free cash," but the disadvantages are that they are typically competitive, have funding criteria that may not align exactly with the desired strategy, and reporting requirements. Grants are typically one-time or multi-year and not available for long-term strategies. Table B describes several potential sources of regional, state and federal funding that the university can consider. Searchable databases, including the university's grantsmanship portal, can be monitored regularly to take advantage of all available funding opportunities.

› **Public-Private Partnerships -** Public-private partnerships can also be evaluated as a funding option for many CAP projects. Traditional university public-private partnerships include bookstore management, food services, and security. Going forward, the university can pursue these types of partnerships for energy efficiency, renewable energy, capital projects, and many other types of projects.

› **Self-Funded -** The university must also consider funding projects itself if outside funding cannot be secured. It's important to note that, although not quantified in this plan, the costs of inaction on climate change can be substantial and often far outweigh the costs of mitigation and adaptation.

CONCLUSION

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CONCLUSION

The goals of this plan are to set SSU on a path toward carbon neutrality, climate resilience, and academic success. While the proposed CAP actions can be daunting, the cost of inaction is much higher. Investments now substantially reduce long-term operation costs, reduce recovery costs from climate-related disasters, and promote growth in local jobs and the economy.

The goals are ambitious, but ones that we believe we can achieve. There will undoubtedly be twists and turns on this path, and we will need to stay flexible and adapt along the way. But if we can achieve these goals, we believe that we can build a community that is healthy, connected, and vibrant. We encourage everyone to embrace and fully participate in implementing this CAP.

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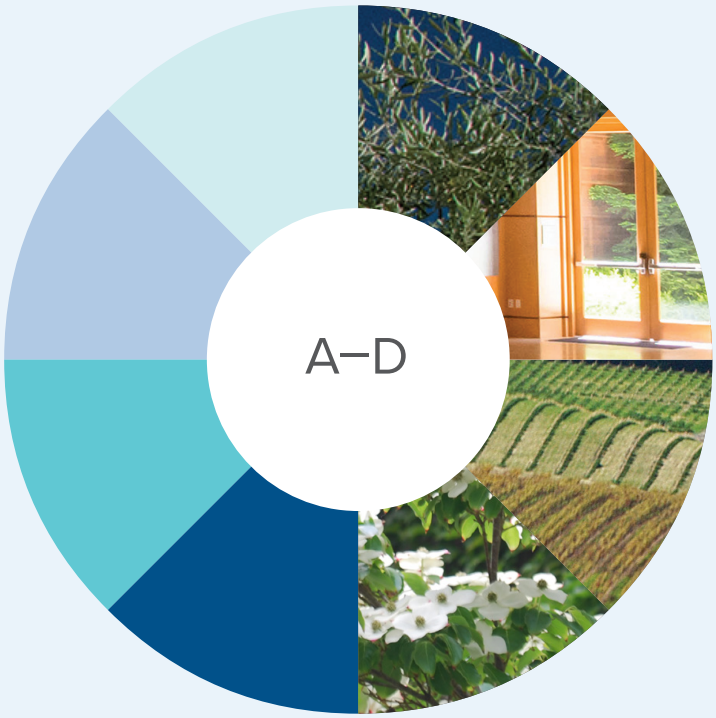
APPENDICES



CARBON NEUTRALITY ROADMAP

SONOMA STATE UNIVERSITY

LETTER FROM SUSTAINABILITY CO-CHAIRS

Under the visionary leadership of Sonoma State University (SSU), President Judy Sakaki, SSU joined the University Presidents' Climate Commitment on April 5, 2019. Her signature set in motion a series of efforts to address climate change impacts affecting our education and research mission and placing our students, employees and communities at risk.

The SSU Climate Action Plan, scheduled for completion in May 2022, will lay out a path with concrete, measurable actions needed to: (1) reduce our carbon emissions, (2) increase resilience to climate disruption, and (3) prepare our students for careers in a changing world. We hope to inspire every SSU student to apply what they learn while at SSU to contribute to a just and sustainable future.

This document, the Carbon Neutrality Roadmap (CNR), is an integral part of the Climate Action Plan. It establishes a path to carbon neutrality by 2043 and will be appended in its entirety to the Climate Action Plan.

In the coming months, we will be working with stakeholders to synthesize ideas, strategies, and approaches that integrate the carbon neutrality goals with resilience and academic planning to create a concise and effective Climate Action Plan.

We have the tools, creativity, and willpower to change our trajectory. Let's get to work!!

Megan Varnadore
Director of Resiliency and Sustainability Operations

Claudia Luke, PhD
Sustainability Programs Director

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Optony
EcoShift Consulting, a division of Blue Strike Environmental

EXECUTIVE SUMMARY

As a member of the 23-campus California State University system, SSU is proud to serve a diverse student population on its main campus, its three environmental preserves, and satellite campuses. In 2019, President Judy K. Sakaki signed two seminal documents to guide the future of SSU. "Building Our Future: Strategic Plan 2025" highlights the university's commitment to the core values of diversity and social justice; sustainability and environmental inquiry; connectivity and community engagement; and adaptability and responsiveness. The "Presidents' Climate Leadership Commitment," a program of Second Nature, committed SSU to draft a Climate Action Plan that lays out a pathway for achieving carbon neutrality, increasing regional resilience, and integrating sustainability across curriculum and research.

This document, the Carbon Neutrality Roadmap (CNR), outlines a plan to achieve carbon neutrality by 2043. Carbon neutrality is defined as reducing net campus greenhouse gas (GHG) emissions to zero. This bold commitment necessitates ambitious policies and programs that are outlined in this report.

APPROACH AND BACKGROUND

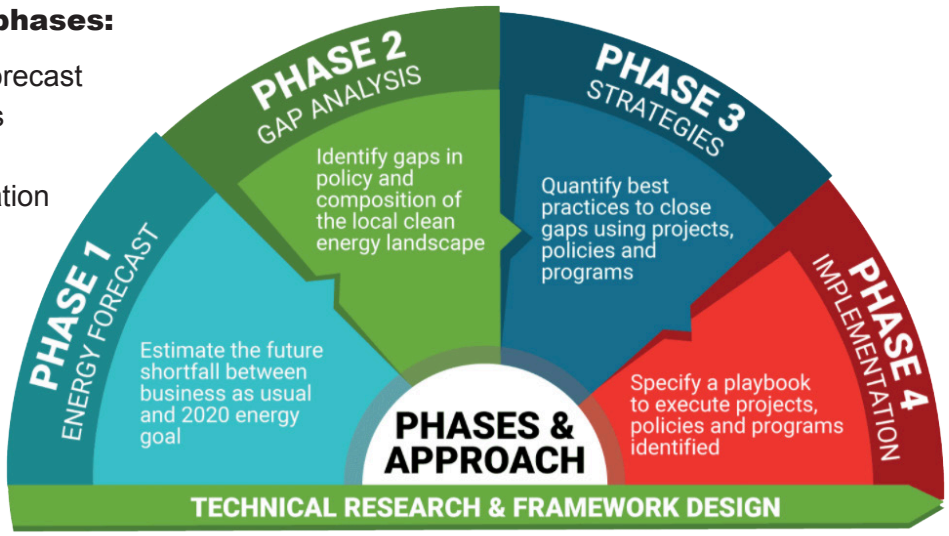
The CNR is an actionable, relevant document that identifies strategies and actions needed to meet SSU's net zero emissions goal. An accompanying Climate and Energy Scenario Analysis (CESA) tool allows the campus to track efforts and quantitatively assess progress towards this goal.

REPORTING TO SECOND NATURE

As CNR strategies are implemented over time, progress is captured using a Sustainability Tracker. This progress is then reported annually to Second Nature through the STARS (Sustainability Assessment Tracking & Rating System) framework.

The report is divided into four phases:

Phase 1: Baseline and Emission Forecast
Phase 2: Framing the Gap Analysis
Phase 3: Scenarios and Individual Strategies for Implementation
Phase 4: Implementation Timeline and Budget



For the purposes of carbon accounting, carbon emissions can be divided into three areas known as Scope **1**, Scope **2** and Scope **3**.[1]

Scope 1

Carbon emissions relating directly from fuel burned on campus (primarily natural gas for heating) or university-owned vehicles.

Scope 2

Carbon emissions associated with energy purchased by SSU and generated elsewhere, (primarily grid electricity used on campus).

Scope 3

Carbon emissions resulting indirectly from SSU operations such as those associated with student, faculty and staff commuting, faculty and staff travel, waste, food purchasing or other procurement activities.

The Presidents' Climate Leadership Commitment allows flexibility in defining which scope emissions to include in the planning process. SSU has included all **Scope 1 and 2 emissions** in this CNR. Although Scope 3 emissions are more difficult to quantify, SSU remains committed to prioritizing behavioral change programs and policies which address these emissions. Specific Scope 3 strategies are outlined on page 17.

This CNR identifies solutions that result in **carbon reduction rather than carbon offsets**. This decision was made for three reasons. First, the spirit in which the commitment was made sought to challenge the campus community to develop its own solutions, rather than simply pay for offsets produced by others. Second, there is significant difficulty in determining the additionality of carbon offsets. (Additionality is the concept of whether purchased carbon offsets actually resulted in carbon emissions reductions that would not have happened without the investment used to purchase the offsets.) Third, there are important local benefits in the form of air quality improvements, energy cost savings and campus resilience that can best be achieved through carbon reduction strategies that require investments on campus. Therefore, carbon offsets are not included in any of the scenarios.

[1] *Green House Gases at EPA https://www.epa.gov/greeningepa/greenhouse-gases-epa#:~:text=Scope%201%20GHG%20emissions%20are, combustion%20and%20fleet%20fuel%20consumption.*

The implementation of the CNR has significant potential to support other initiatives on campus, in the region, and across the state, including efforts in climate action planning, economic development and resilience to extreme events (**Figure A**).

BENEFITS AND OUTCOMES

ALIGN WITH LOCAL CLIMATE ACTION PLAN

Align with the priorities to be outlined in the 2022 Climate Action Plan.

CONTRIBUTE TO GLOBAL CLIMATE ACTION

Decrease greenhouse gas emissions by 100% by 2043.

PROMOTE LOCAL ECONOMIC DEVELOPMENT

Produce green jobs in the solar and the energy efficiency industries.

ENHANCE DISASTER RESILIENCY

Continue operation of critical facilities and services during disasters.

REACH CSU GOALS

Share best practices with other CSU campuses.

Figure A. *Benefits and outcomes of strategies*

RECOMMENDED STRATEGIES

Phases 1-3 identify four strategies needed for SSU to achieve carbon neutrality:

1: Reduce building electricity consumption with energy efficiency. This will require a budgetary commitment towards new energy efficient technologies (lighting, HVAC recommissioning, and other various building systems).

2: Achieve 100% building electrification (e.g., replace fossil fuel energy sources with heat pump water heaters). This will require a budgetary commitment towards new mechanical systems.

3: Replace fossil fueled vehicles with electric options. This will require a budgetary commitment towards the purchase of new electric vehicles and infrastructure for charging.

4: Implement behavior change actions with conscious focus on social and environmental impacts.

Recommended scenarios were determined using specific, measurable, achievable, relevant, and timely (SMART) considerations. These specific measurements allow SSU to follow a concrete time frame for strategy completion driven by the feasibility and costs of each action. For each strategy, we provide a list of specific actions and projects.

SCENARIOS

We used the Climate and Energy Scenario Analysis (CESA) tool to test and create three scenarios to carbon reduction. The scenarios (Figure B) align growth, phasing, and infrastructure investment over various time horizons and can be adjusted as market trends change or to account for budgetary uncertainty.

SCENARIO I	SCENARIO II	SCENARIO III
Key Characteristics 6 Solar projects with installations in 2022, '24, '26 and '30 Fleet Replacement with EVs according to existing schedule Lighting and HVAC retrofits completed over the next ten years, plus base central heating upgrades.[2]	**Key Characteristics** All of Scenario I, plus retro-commissioning and building electrification and partial CUP electrification.	**Key Characteristics** All of Scenario II plus full CUP electrification before 2040.
Considerations	**Considerations**	**Considerations**
Follows SSU's standard HVAC and fleet replacement schedules Additional cost considerations (price premiums) Slowest accrual of benefits Will not achieve carbon neutrality without offsets	Higher investment required relative to the Level I approach Additional cost considerations (price premiums) Benefits accrue more rapidly than Level I Will not achieve carbon neutrality without offsets	Higher investment required each year relative to the Level I Phased approach Additional cost considerations (price premiums) Fastest accrual of benefits accrue more rapidly than Levels I or II Achieves full carbon neutrality without the use of offsets by 2043
Impact	**Impact**	**Impact**
Achieves 18% GHG reductions by 2043 Total GHG Reductions = 52,950 MT CO2e	Achieves 49% GHG reductions by 2050 Total GHG Reductions = 97,863 MT CO2e	Achieves 100% GHG reductions by 2043 Total GHG Reductions = 146,689 MT CO2e

Figure B. *Key Characteristics with each Scenario*

The three scenarios are differentiated by the level of investment required and impact on greenhouse gas (GHG) levels. Scenario 1 includes the installation of six solar PV projects on campus property, full replacement of fleet with electric vehicles (according to the existing schedule), and over 60 energy efficiency measures from lighting to HVAC retrofits. It also includes vital repairs to heating and hot water (HHW) leaks and optimizing HHW controls. Scenario II includes all the measures from Scenario I, and adds additional energy efficiency measures including a series of retro-commissioning and building electrification projects, including a heat recovery chiller at the central utility plant (CUP). Scenario III includes projects in Scenarios I and II, and adds additional building electrification, and an air-source heat pump for full electrification of the central plant. Scenario III is the only one to achieve full carbon neutrality without the use of carbon offsets.

RESOURCES REQUIRED

The CNR includes a thorough breakdown of costs associated with individual projects and each scenario, over a 21 year time horizon.

Scenario 1	Scenario 2	Scenario 3
$29.9 Million, **18%** GHG reduction	**$36.1 Million**, **49%** GHG reduction	**$56.3 Million**, **100%** GHG reduction

Depending on the scenario, capital costs range from an average of $1.4 million per year to $2.5 million per year.

In addition to capital costs, dedicated staff (at least 1.0 FTE) are needed to secure funding for projects, coordinate implementation, and monitor and report on results. New systems installed may require training or new maintenance staff. Please refer to Phase 4, Step 3 on page 26 for a detailed approach to funding.

The good news is that **cost savings far outweigh the costs of implementation** for all scenarios and the majority of individual projects, Cost savings accrue primarily from a reduction in energy used and maintenance savings.

Achieving carbon neutrality and the associated financial benefits requires early upfront investments. . The greater the initial level of investment, the greater the financial and environmental reward. With early investment, the campus can benefit from significant cost savings that can also be used for other timely investments. On the flip side, the investments tend to become more costly the longer they are delayed.

SSU has an opportunity to lead by example and take the necessary steps to reach carbon neutrality by 2043. Therefore, we recommend following Scenario III.

[2] *The base heating hot water plant upgrade is a deferred maintenance project that includes repairing leaks, heat exchanger replacements and system optimization to reduce heating hot water temperatures. Since little is known about the extent of the leakage in the system, costs have not been estimated for this project. Furthermore, this project appears as the first central plant project in all Investment Level Scenarios since it will be required before other central plant and electrification projects are completed.*

PLANNING PROCESS

PHASE 1

PHASE 1: BASELINE & EMISSIONS FORECAST

An emissions baseline represents the amount of emissions in a baseline year (in this case 2020), and an emissions forecast provides a projection of the amount and sources of emissions SSU would most likely generate through 2043. The baseline and forecast serve as reference points for reduction targets and inform the strategy and action selection process. This is referred to as a business-as-usual (BAU) scenario. Under a business-as-usual scenario, as shown by the black line in **Figure B**, in which SSU does not change its operations in any way, emissions are projected to decrease by 6,000 metric tons (MT), from a high in 2023 of 10,757 MT, to 4,702 MT by 2043. The reduction is due to the assumption that California's renewable portfolio standards (RPS) will be realized by electricity providers. (The dip in 2021 represents the effect of COVID-19 on campus activities. An increase in emissions is expected, as full campus functions return to 2019 levels.)

Though the decrease in emissions from RPS is significant, it is clear that SSU will not achieve its carbon neutrality goal without significant operational changes. For example, SSU's current energy efficiency levels represent a significant challenge to achieving its carbon neutrality goal. The current level of building efficiency creates both challenges and opportunities in relation to achieving carbon neutrality. Challenges arise if important investments are not made; however, opportunities exist to harmonize investments in maintenance with emission reduction goals. Further, though student enrollments are currently below normal levels, this trend is not expected to continue. Eventual campus growth could easily result in increased carbon emissions, if nothing is done to mitigate those emissions. However, the revenue that also results from growth, can be leveraged to realize the significant rewards discussed in this report, including the move toward a carbon neutral future.

COVID CONSIDERATIONS

The COVID virus has had significant impacts on campus life and operations at SSU, the most significant of which will be realized in financial year (FY) 2021. Electricity use in FY2020 fell by 43% from 2019, and natural gas usage fell by 21%.Consumption totals in both categories are expected to fall further in FY2021 before rising in 2022 and 2023 as normal campus activities begin again.

Additionally, SSU can build on its track record of successful energy management achieved during past campus growth. To date, SSU has effectively managed carbon emissions related to campus growth through strategic energy efficiency improvements and renewable energy development. Energy use intensity (EUI) of campus buildings has decreased while building square footage has increased, which indicates that campus energy usage has remained stable despite growth. Additionally, in 2022, SSU will build a 5 MW solar array to meet a portion of its electricity demand with 100% renewable energy.

[3] https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx. [4] Figures based on SIMAP inputs from FY2019, and utility bills from FY2020.

EMISSIONS FORECAST

- Onsite renewable generation
- Natural gas usage
- Fertilizer usage
- Annual solid waste volume
- Employee travel information
- Liquid fuel usage in campus vehicles
- Staff/student commute data
- Capital Improvement Plan
- An annual 1% increase in student and faculty population

Figure B: *SSU Emissions Sources & Scopes*

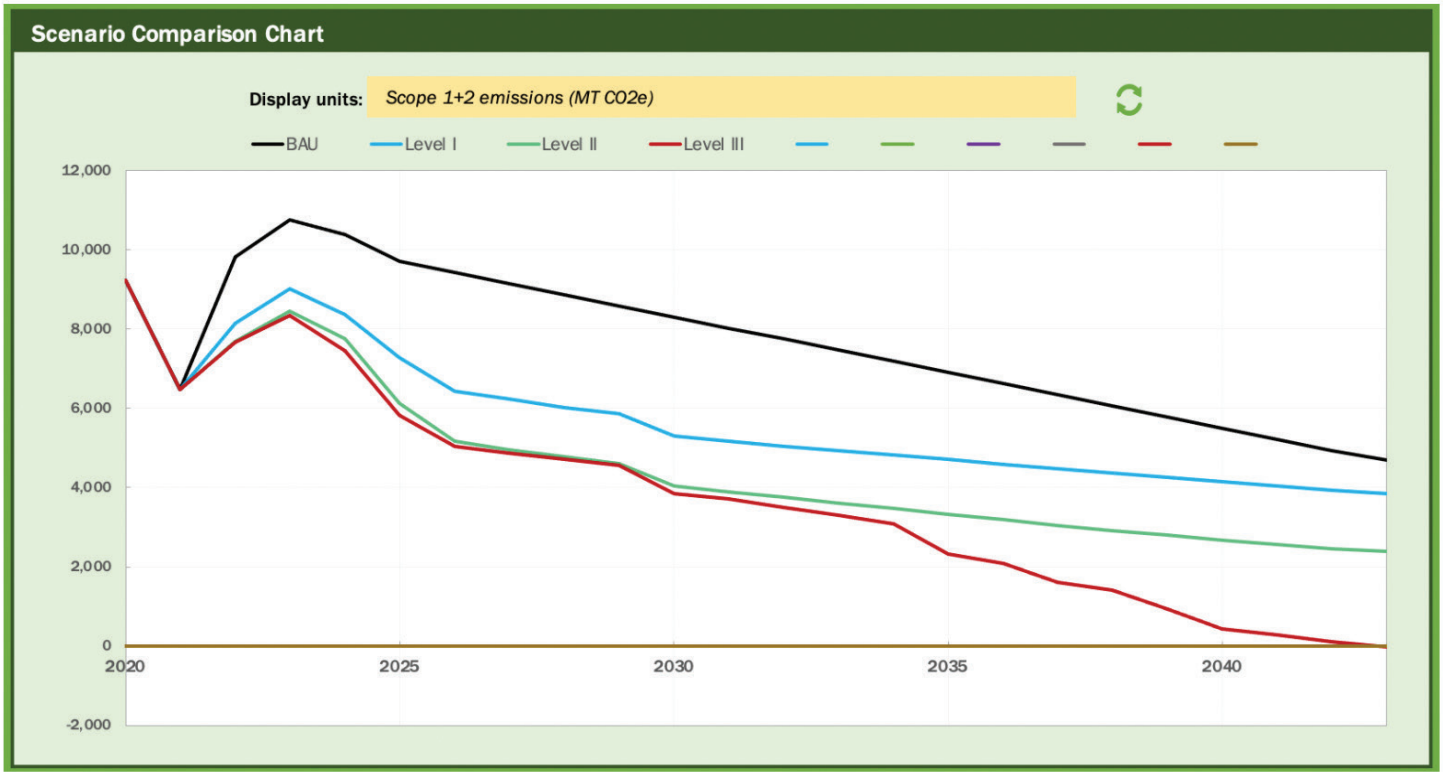


Figure C*: BAU Energy Use and Emissions (2020-2050) compared to the Scenarios I, II, and III*

Figure C represents emission reductions from the BAU and the three investment levels. The initial dip and rise are the effects of COVID and the recovery period. The black BAU line shows a steady decrease in emissions as grid suppliers gradually source electricity from renewable generation. The blue line shows investment Scenario I. Reductions in GHG from renewable energy installations, fleet replacement and some energy efficiency retrofits accelerate the BAU pathway. The green line shows the effects of investment Scenario II. GHG reductions from this scenario are realized from additional energy efficiency measures (especially HVAC retrofits, building electrification, and central plant projects). The red line shows the effects of investment Scenario III. As can be seen, the investments are similar to Scenario II through 2030, but then increase to accelerate the achievement of carbon neutrality, which is realized by 2043. These additional investments include a full suite of building electrification and additional investments in the central plant.

BRITISH THERMAL UNITS

(Btu) are units of energy equivalent to the amount of heat required to increase the temperature of one pound of water by one degree. By measuring energy use in Btu, it is possible to combine energy from energy, natural gas, and vehicle use into one common metric. kBtu is equivalent to 1,000 Btu.

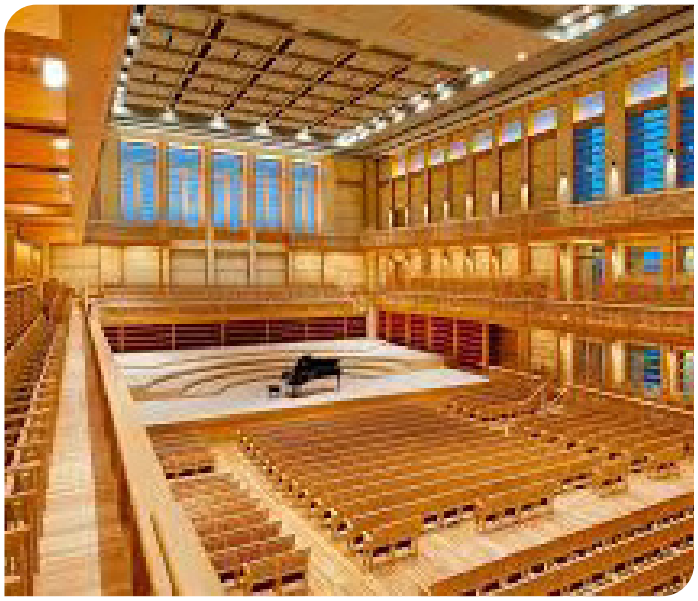
PHASE 2

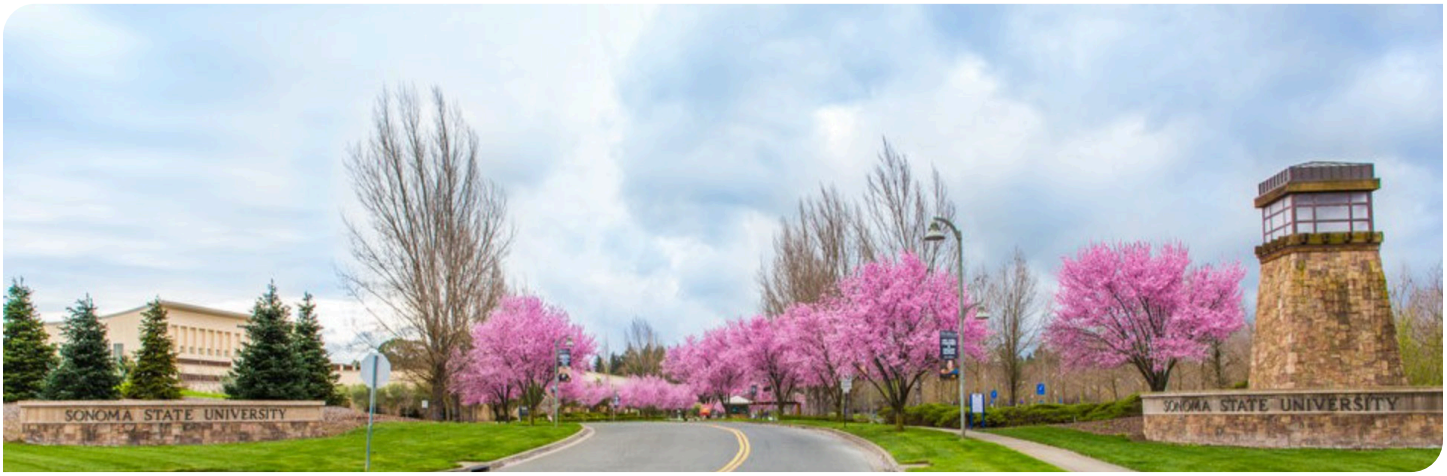
PHASE 2: FRAMING THE GAP ANALYSIS

As part of this process, SSU reviewed current policies and programs and produced a comprehensive, annotated list of high-impact strategies that could be analyzed and prioritized based on feasibility, financial considerations, health benefits, and equity. Figure D outlines strategies and considerations focused primarily on energy use and fleet management which contribute the largest percentage of GHG emissions. Broad sustainability strategies such as procurement, food and waste were also considered. Although these sectors contribute very little to reducing GHG emissions, they are mentioned in this CNR and will serve as foundational elements for the upcoming 2022 Climate Action Plan.

KEY FINDINGS:

- Buildings represent the largest component of SSU energy use and emissions
- Powering buildings on clean electricity is one of the most cost-effective ways to reduce emissions
- Adopting clean vehicle technology will have a major impact on reducing transportation emissions
- Without further action, SSU will not meet internal greenhouse gas reduction goals and is currently not aligned with statewide goals or scientific consensus on avoiding the worst impacts of climate change.





STRATEGIES & CONDITIONING

POLICY	STRATEGIES	CONSIDERATIONS
Green building policy	Adopt requirements for EV charging installations	Are there ways to promote SSU as a leader in the state?
Fleet purchasing policy **Disaster planning policy**	Target net zero emissions in all facilities Eliminate natural gas use in all facilities Right size the fleet so vehicles are used more efficiently and therefore replaced more frequently, allowing for faster adoption of electric vehicles Transition to electric or hybrid vehicles Focus on energy resiliency	
Resolution to commit to 100% renewable energy	Install rooftop solar Improve Building Energy Management Systems Increase energy efficiency in buildings and waste water treatment	How many projects can SSU implement each year given the allocation of staff and funding? What are the trade-offs to investing more money upfront versus phasing projects over a longer period of time? What role do renewable energy credits play in helping SSU reach its goal and what type of credits should be considered?
Adopt new approaches to financing	Streamline the internal Green Revolving Fund process Consider Pilot Projects Align Capital Improvement Plan budget Access third party financing Consider Public Private Partnerships	How can the SSU align the annual budget with the strategies in the CNR?

Figure D: *Strategies and Considerations for carbon neutrality*

PHASE 3

PHASE 3 PART 1: SUMMARY OF SCENARIOS

The primary difference between scenarios is the level of investment that occurs, the rate at which benefits accrue, the level of GHG that is reduced, and the expense per MT of that reduction. Implementing projects earlier in the process will reduce GHG emissions earlier (thus increasing the overall reduction) while increasing return on investment.

SCENARIO I

The Scenario I Investment accelerates the reduction of GHG, from a BAU case; however, by 2043 the reductions from the BAU case largely catch up with those from Scenario I. Reductions primarily come from solar installations on campus, and the replacement of the campus fleet with electric vehicles. It also includes lighting and HVAC retrofits in many campus buildings. The investment cost for Scenario I is $29.9 million, which occurs mostly between the years of 2022 (when the SunPower project will be initiated) and 2030. The fleet replacements (including golf carts) are scheduled to happen during the regular replacement cycle of current vehicles, and therefore are not considered in the budget. What is considered, however, is the electrical charging infrastructure that will be required to keep the new vehicles charged.

Importantly, this scenario (and the others as well) also includes an unbudgeted assessment and repair of HHW leaks and HHW control optimization. Currently little is known about the extent of the leaks, and to adequately assess the costs for repair, a full study is required. The cost of the study and repairs have therefore not been included in the initial investment for Scenario I. However, this measure must be accomplished in order for later interventions to be effective. Under this Scenario, it is recommended for completion in 2025.

As outlined in Figure F, Scenario I would accelerate the reduction of GHG for SSU compared to the baseline. The acceleration reduces GHG by 52,950 MT. The cost of this reduction is $171/MT of CO2 reduced. Moreover, the NPV for the scenario is $9.1 million, which means the discounted cash flows are net positive by this amount, signifying a highly cash-positive investment.[3]

[3] *NPVs for all of the Scenarios are calculated using the same financing pathway. The pathway consists of PPAs for all solar PV projects, cash for all electricity efficiency projects and capital improvements (vehicle charging infrastructure), and a business-as-usual expense for fleet replacement to electric vehicles according to existing replacement schedule. This pathway does not necessarily represent an optimized financing structure. For example, the use of low and zero interest borrowing for early energy efficiency projects will raise scenario NPVs.*

SCENARIO II

The Scenario II Investment accelerates the reduction of GHG further, and has the added benefit of maintaining a lower total of GHG emissions than the BAU well beyond the year 2043. Scenario II reductions come from all projects in Scenario I, but also include a series of retro-commissioning projects, two significant HVAC retrofits, over a dozen building electrification projects, and one additional central plant project. This is one of the more expensive projects from the menu, costing $2.4 million. Under this scenario, the first phase of the central plant electrification project would occur in 2025, while the HHW leak repair and optimization project mentioned under Scenario I would be required in 2022. The most significant investments under this scenario happen between the years of 2022 and 2030, with two additional large projects (the HVAC retrofits mentioned above, each costing about $1.3 million) being added in 2035 and 2040. The total cost of the series of Scenario II projects is $36.1[4] million.

The series of Scenario II investments brings overall reductions of 97,863 MT at a cost of $105 per MT of reduced CO2. The NPV for Scenario II is slightly higher than that of Scenario I, at $10.3 million, indicating additional projects that aggregate to positive returns. The reason is the added value of maintenance and energy cost savings that accrue to the additional energy efficiency projects included in this scenario.

SCENARIO III

The Scenario III Investment adds additional investments to those found in Scenario I and II, and reduces GHG emissions to zero in 2043 and beyond. Scenario III reductions come from nearly all projects in Scenario I and II, but also include two dozen additional building electrification projects, and a final central plant project that adds an air-source heat pump for full electrification. This heat pump and one of the building electrification projects (at Sauvignon Village), are the two most expensive projects from the menu, costing $2.8 and $3.2 million respectively. However, they bring large benefits from a GHG reduction perspective as they transfer energy usage from large quantities of natural gas, to electricity, which can then be supplied from renewable sources. These investments are scheduled to take place in 2035 (heat pump) and 2039 (building electrification). The full cost of all projects in the Scenario III recommendations is $53.3[5] million, over 20 years.

[4] *This does not include the cost of base heating hot water upgrades (required for central plant electrification). This is being treated as deferred maintenance cost- upgrades are required regardless of carbon neutrality targets.*

[5] *This does not include the cost of base heating hot water upgrades (required for central plant electrification). This is being treated as deferred maintenance cost- upgrades are required regardless of carbon neutrality targets.*

INVESTMENT LEVEL	INCLUDES	NPV ($ MILLION)	INITIAL COSTS ($ MILLION)	$/MT CO2E REDUCED	TOTAL CO2E REDUCTIONS
Scenario I	All RE, Fleet and some EE	9.06	29.9	171	52,950
Scenario II	All RE, Fleet, additional EE	10.31	36.1	105	97,863
Scenario III	All RE, Fleet and all EE	9.14	53.3	62	146,689

Figure F: *GHG emissions under a Scenario I approach. RE = Renewable Energy; Fleet =The Campus Maintenance Fleet ; EE = Energy Efficiency Measures*

CSU WIDE COMMUNITY CHOICE AGGREGATION

Currently, a CCA program has been considered in the past at the Chancellor's office which might influence the timing and implementation of this CNR. CCA is a mechanism used throughout California to provide local control over a community's electricity mix. A CSU-wide CCA would be a Joint Powers Authority with the ability to sign long-term power procurement contracts on behalf of every CSU campus. By shifting the authority to determine the mix of electricity supplied to campuses, a CCA would enable the transition of SSU's electricity supply to 100% carbon free energy faster than California's statewide Renewable Energy Portfolio standard (currently targeted for 2045).

Without a CCA, SSU would have to invest significantly in local renewable energy and energy efficiency to achieve its carbon neutrality goal without carbon offsets, making its goal less financially feasible. A CSU-wide CCA provides a mechanism to address not only current emissions associated with electricity but also future emissions resulting from increased electricity use caused by the vehicle and heating electrification included in the CNR carbon reduction measures. Additionally, a CCA provides another mechanism for the Chancellor's Office to fund carbon reduction efforts on campus (e.g. building electrification), as all campuses that join would be paying the CCA for electricity, enabling excess revenue to be easily redirected back to campus specifically targeted for climate projects.

PHASE 3

PHASE 3 PART 2: SUMMARY OF INDIVIDUAL STRATEGIES FOR IMPLEMENTATION

From this point, SSU can drill down to specific actions and metric criteria for each of the developed scenarios. Specific details for each strategy will allow SSU to follow a concrete time frame for strategy completion driven by the feasibility and costs of each action within SSU. Strategies are designed to align with other SSU plans such as the 2022 Climate Action Plan, Resiliency Plan and the Capital Improvement Plan.

Within each scenario, strategies were first ranked based on Net Present Value and the highest potential for greenhouse gas emission reductions. A second review assigned social and environmental co-benefits to each strategy; the most prominent co-benefits are outlined in **Figure G**.

SSU has identified four objectives that will help the campus reach its carbon neutrality goal: (1) improve building performance, (2) increase renewable energy generation, (3) increase vehicle fleet efficiency and (4) increase the impact of behavioral change programs. A careful analysis was conducted and challenges and strategies were considered in order to frame each objective. An objective is defined as an end result or target that provides a broad framework for SSU to work within. From these objectives, specific actions are then defined that will lead to greenhouse gas emissions reductions.

SYMBOL				
CO-BENEFIT	High potential to **save money**	High potential to **ensure equity**	High potential to **create jobs**	High potential to **improve public health**

Figure G: *Co-Benefits*

OBJECTIVE 1 – IMPROVE BUILDING PERFORMANCE

SSU has over two million square feet of buildings including academic classrooms, administrative offices and residential apartments. Reducing energy consumption in existing facilities and optimizing existing operations is an essential part of reducing overall carbon emissions and meeting the SSU climate action plan goals. Approximately 60% of campus buildings were built pre-2000s when energy codes were not as stringent as modern standards. There are significant opportunities to reduce energy demand and carbon emissions by optimizing existing HVAC and lighting systems. Given California's path toward 100% carbon free electricity by 2045, reducing natural gas consumption will be critical for SSU to meet their carbon neutrality goals. Energy projects can be implemented as energy retrofit projects or part of larger building renewal efforts. The Stevenson Building renovation project is a great example of how a whole building renovation can support SSU's long term carbon neutrality goals.

Outlined below are specific strategies and actions that are recommended. A key strategy for SSU is to develop a campus energy efficiency program, which will require a full-time, dedicated energy/sustainability manager. This person will be responsible for establishing energy efficiency criteria, managing energy funding and financing, supporting project execution and overseeing retrofit and commissioning programs. This energy manager can be supported by student interns which will also provide hands-on work experience prior to graduation.

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
1A	Establish a campus energy efficiency (EE) program to reduce energy demand	Hire a full-time energy manager and establish an annual energy investment plan Complete a campus LED lighting retrofit program Establish a campus RCx / continuous commissioning program Identify optimal HVAC upgrade projects and establish funding & financing sources	 	Annual energy efficiency investment ($) Annual EUI reduction (kBtu/sf-yr)	Short Term Short Term Short Term Mid to Long Term	Facilities Management
1B	Transition to an all-electric, fossil fuel free campus	Implement a no-new gas policy and update campus design standards to support electrification Replace natural gas system during buildings retrofit projects and at equipment failure Electrify existing heating and DHW systems, as outlined in the CESA tool	 	Campus natural gas consumption (therms/sf-yr)	Short Term Mid to Long Term Mid to Long Term	Facilities Management

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
1C	Electrify Central Plant	Complete a CUP electrification study and establish a long-term implementation plan Implement base heating system upgrades to reduce HW temperatures Implement Phase 1 (partial electrification) Implement Phase 2 (full electrification)	 	HW supply temperature (F) CUP natural gas consumption (therms)	Short Term Short Term Mid Term	Facilities Management

STRATEGIC IMPACT METRICS	
Cost Effectiveness of Policy in Dollars Spent per emission reduced	$46/MT CO_2e reduced
Emissions Reduction Potential through 2043 ($MtCO_2e$)	113,896 MT
Recommendations • Campus energy use intensity (EUI) excluding on-site generation (solar PV) • Campus & central utility plant natural gas consumption • Annual investment in energy efficiency & electrification projects	

OBJECTIVE 2 – INCREASE RENEWABLE ENERGY GENERATION

Within the CNR planning process, SSU explored the development of solar PV systems as the main avenue to increase renewable electricity generation on campus. Prior to the planning process, SSU had approved a 5 MW solar and battery storage project for development and eventual conversion into a microgrid. Based on advice from the Chancellor's Office related to regulatory and economic risk of signing long-term power contracts in a rapidly changing electricity market, this project was intended to be "Phase 1" of a larger development. As such,this project did not take advantage of all viable space for solar development. Accordingly, the CNR process focused on identifying additional solar potential to be considered for future phases of solar development. Overall, an additional 3.3 MW of carport solar and 1.4 MW of ground mount solar was identified.

Given California's path toward 100% carbon free electricity by 2045, on-campus renewable electricity is not absolutely necessary to meet the University's carbon neutrality goal. Assuming California archives its statewide goal, as the carbon intensity of the statewide electricity mix falls, so too will SSU's carbon emissions related to electricity use, including any increased use from vehicle and building electrification, until they eventually reach zero. This is demonstrated in the relationship between the BAU and Scenario I discussed in previous sections. However, there are several significant benefits remaining that SSU can capture by developing renewable electricity generation on campus. These include faster reduction in emissions and lower cumulative emissions, potential utility cost savings and increased resilience potential made available by additional electricity generated on site (when renewable generation is paired with battery storage, such as on SSU's currently proposed project).

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
2A	Complete Development of Currently Contracted Solar + Storage Project with SunPower	Complete contract signing Implement agreed upon site improvements prior to construction Monitor system construction performed by SunPower		Percentage of renewable electricity generated on-site compared with overall SSU usage	Near Term	Facilities Management
2B	Complete feasibility analysis, procure and install additional on-site carport and/or ground mount solar projects at 1-5 locations on the SSU campus	Complete a financial and technical feasibility study, assessing multiple financing options, for each potential project included in the CESA tool Engage with PG&E to gain a complete understanding of electricity export limits and solar upgrade costs Release RFP Approve contract(s)		Percentage of renewable electricity generated on-site compared with overall SSU usage	Mid-Term	Facilities Management

STRATEGIC IMPACT METRICS	
Cost Effectiveness of Policy in Dollars Spent per emission reduced	$46/MT CO_2e reduced
Emissions Reduction Potential through 2043 ($MtCO_2e$)	113,896 MT

OBJECTIVE 3 –INCREASE VEHICLE FLEET EFFICIENCY & FUEL SWITCHING

While University-owned vehicles only account for **2%** of overall emissions, these emissions must be addressed in order for the University to meet its goal. The analysis of transitioning the university's fleet away from fossil fuels covered three main strategies; (1) streamlining fleet management and operations, (2) vehicle electrification and (3) infrastructure development. From the data collected, it is clear that vehicle mileage (range) is unlikely to be a barrier to conversion of the campus vehicles to electric. Rather, vehicle and infrastructure cost and, to a lesser extent, operational requirements are the major barriers to electrification.

There are 36 on-road vehicles in SSU's fleet and every vehicle has an applicable EV alternative currently on the market. The fleet replacement analysis identified 16 existing vehicles that are due for replacement in 2022, 5 in 2023 and between 1-3 each year from 2025 - 2035. The analysis also assessed vehicle electrification on a total cost of ownership (TCO) basis, to understand the costs of owning and operating a new EV compared to a new internal combustion engine (ICE) vehicle. Unfortunately, due primarily to the low mileage nature of the university vehicles, only the Campus Police/Safety and Parking Vehicles are likely to experience TCO savings (~$125,000 over the lifespan of the vehicles) if electrified.

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
3A	Transition the fleet to electric vehicles	Replace all 36 fleet passenger vehicles with electric vehicles by 2035, averaging ~3 per year Implement "EV-first" vehicle purchasing policy to ensure that EVs are considered as the primary replacement option for every vehicle		MTCO2e/year reduced Number of electric vehicles purchased per year Percent of fleet that is EV Increased MPGe Increased fuel savings Savings in fleet maintenance	Mid Term	Facilities Management
3B	Increase the number of EV charging station ports on campus	Develop vehicle charging infrastructure in select on-campus lots Follow the replacement scheduled outlined in the CESA tool		Total # of SSU-owned EV charging stations	Mid-Term	Facilities Management

STRATEGIC IMPACT METRICS	
Cost Effectiveness of Policy in Dollars Spent per emission reduced	$101/MT CO_2e reduced
Emissions Reduction Potential through 2043 ($MtCO_2e$)	2,468 MT

[8] *Note: The CESA tool includes a vehicle replacement schedule recommended based on the age and usage of SSU's current vehicles. However, this timeline can be adjusted based on budget availability*

OBJECTIVE 4 –INCREASE IMPACT OF BEHAVIORAL CHANGE PROGRAMS

Behavior change programs can achieve additional cost saving and carbon reduction benefits beyond the traditional infrastructure projects. As more students and faculty reduce energy use on campus, there are less GHG emissions to tackle. The benefits of a campus-wide behavior change program focused on energy conservation are diverse and varied. There are immediate benefits in the form of emissions and cost savings from reduced energy use and long-term impacts from increased awareness of energy use and increased self-efficacy related to sustainable behaviors. Given the formative age of college students, experiences during a short-lived energy conservation program may result in long-term impacts in the form of normative behaviors and lifestyle changes, career choices and cultural shifts. Additionally, many people underestimate the impacts that their behavior can have on energy conservation.

Demonstrating to students the potential impact that their behaviors can have on carbon emissions in order to increase their capabilities and self-efficacy related to energy conservation activities is another benefit that SSU can achieve through behavior change programs. Capturing these long-term benefits aligns with SSU's educational mission as a university and offers a good opportunity to engage with students living on campus. The 2022 Climate Action Plan will include a suite of recommended behavior change strategies that SSU can draw on to launch campus-wide behavior change programs in support of its carbon neutrality efforts.

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
3A	Reduce electricity use	Implement a campaign to turn off the lights if offices do not have occupancy sensors. Assign each department an "energy owl" to support energy reductions within departments and offices. Encourage the use of power strips		No of staff, faculty and students who are aware of behavioral change programs	Ongoing	Green Team

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
4B	Reduce water use	Promote table cards near faucets to turn off the water while lathering		No of staff, faculty and students who are aware of behavioral change programs	Ongoing	Green Team
4C		Remind staff to close all laboratory hoods. “Shut the Sash”		No of staff, faculty and students who are aware of behavioral change programs	Ongoing	Green Team

SCOPE 3 EMISSIONS

Given the focus of SSU’s carbon neutrality commitment on Scope 1 and Scope 2 emissions, the carbon neutrality modeling and strategy recommendation efforts focused primarily on these scopes. However, Scope 3 emissions should not be ignored due to their comparatively large contribution to emissions across all three scopes.

Based on the Scope 3 emission data collected by SSU and currently available, in Fiscal Year 2020, Scope 3 emissions represented 33.5% of SSU’s total carbon emissions across all scopes. The strategies and actions below will be further developed as part of the 2022 Climate Action Plan.

Tracking and addressing this large portion of total Scope 3 carbon emissions has unique challenges. First, the diverse nature of activities that contribute to Scope 3 emissions means that the data needed to fully measure Scope 3 emissions may not be collected and may not be easily available to SSU staff. Second, SSU does not have direct control over all activities that contribute to Scope 3 emissions. The most significant example of this is faculty, staff and student commuting, which is the single largest source of Scope 3 emissions for SSU.

To assist in addressing the first challenge associated with Scope 3 emissions, data tracking, the SSU reviewed all available data on Scope 3 emissions currently collected and identified key data gaps. **Figure G** includes a list of all Scope 3 emissions sources, the primary data source associated with each source and an indication of whether or not SSU is currently collecting that data. Increasing collection of Scope 3 emissions data for analysis is an area where SSU can use student participation to drive success.

STRATEGY NO.	STRATEGY	ACTION	BENEFITS	METRIC	TIMELINE	LEAD ACTOR
CAP_1	Increase % plant-based meals served	Create educational programs that reward low impact diets		No. of plant-based meals served	Short Term	Culinary
CAP_2	Increase % of locally purchased food	Consider partnering with a local farm Provide produce or products that may be gathered through field "gleening" programs or programs similar to "imperfect produce".		Increase in % local food purchased	Short Term	Culinary
CAP_3	Develop a Carbon Farming program	Assess ways for campus and preserves to increase carbon sequestration Develop garden classroom as demonstration site for carbon farming		$MTCO_2e$/ hectare	Mid Term	Geography, Environment and Planning
CAP_4	Incentivize carpooling and public transport. such as SMART train and buses	Offer preferred parking for staff who participate in carpooling Include an annual bus/ SMART train pass to all new employees who express interest Distribute commuting survey to all staff, faculty and students in Fall 2022		$MTCO_2e$/ hectare	Mid Term	Geography, Environment and Planning
CAP_5	Promote Bike Share program	Partner with Sonoma County Transportation Authority		No. of annual bike trips; number bikes used for movement across campus		Sustainability Director

The 2022 Climate Action Plan

will identify how SSU can improve data collection across all sectors.

EMISSIONS SOURCE & DESCRIPTION	PRIMARY DATA SOURCE	DATA COLLECTED?
Commuting: Emissions associated with faculty, staff and student commutes.	Commute survey will be distributed in Fall 2021	Yes
Business Travel & Study Abroad: Emissions associated with faculty and staff travel on SSU business and student travel for study abroad.	Expense receipts, study abroad program statistics	Yes
Food: Emissions associated with food procured and prepared on campus	Inventory of all food & beverages purchased, inventory or sustainable food & beverages purchased	No
Purchasing: Emissions associated with SSU procurement activities relating to goods used on campus and services provided by third-party vendors	Collated records of all purchases of goods & services enabling an assessment of purchase supply chain	No
Waste: Emissions associated with waste generated on campus	Total waste generated & landfill diversion rate	Yes
Wastewater: Emissions associated with the treatment of wastewater generated on campus	Total annual volume of wastewater generated	No
Paper: Emissions associated with the production of paper purchased for use on campus	Records of annual paper purchased by type (e.g. virgin or 100% recycled content)	No
Transmission & Distribution Losses from Electricity: Emissions associated with energy that is lost to heat during the transmission and distribution process of the electricity purchased by SSU.	Estimated from annual electricity purchased	No

Figure G: *Scope 3 Emissions Sources & Data Collection Assessment*

PHASE 4

PHASE 4: IMPLEMENTATION TIMELINE AND BUDGET[9]

The Implementation and Spending Schedule shown in Figure H shows the annual and cumulative initial project costs for the Scenario III Investment. It does not include any financing arrangements, but simply illustrates the initial capital requirements for the combined projects. (This means that financing charges that have been integrated into the total costs of the program above, are not included.) Also note that the figure does not include the SunPower solar PV and storage facility since **the project is financed from SSU's operational budget and the figure addresses capital budget costs only**.

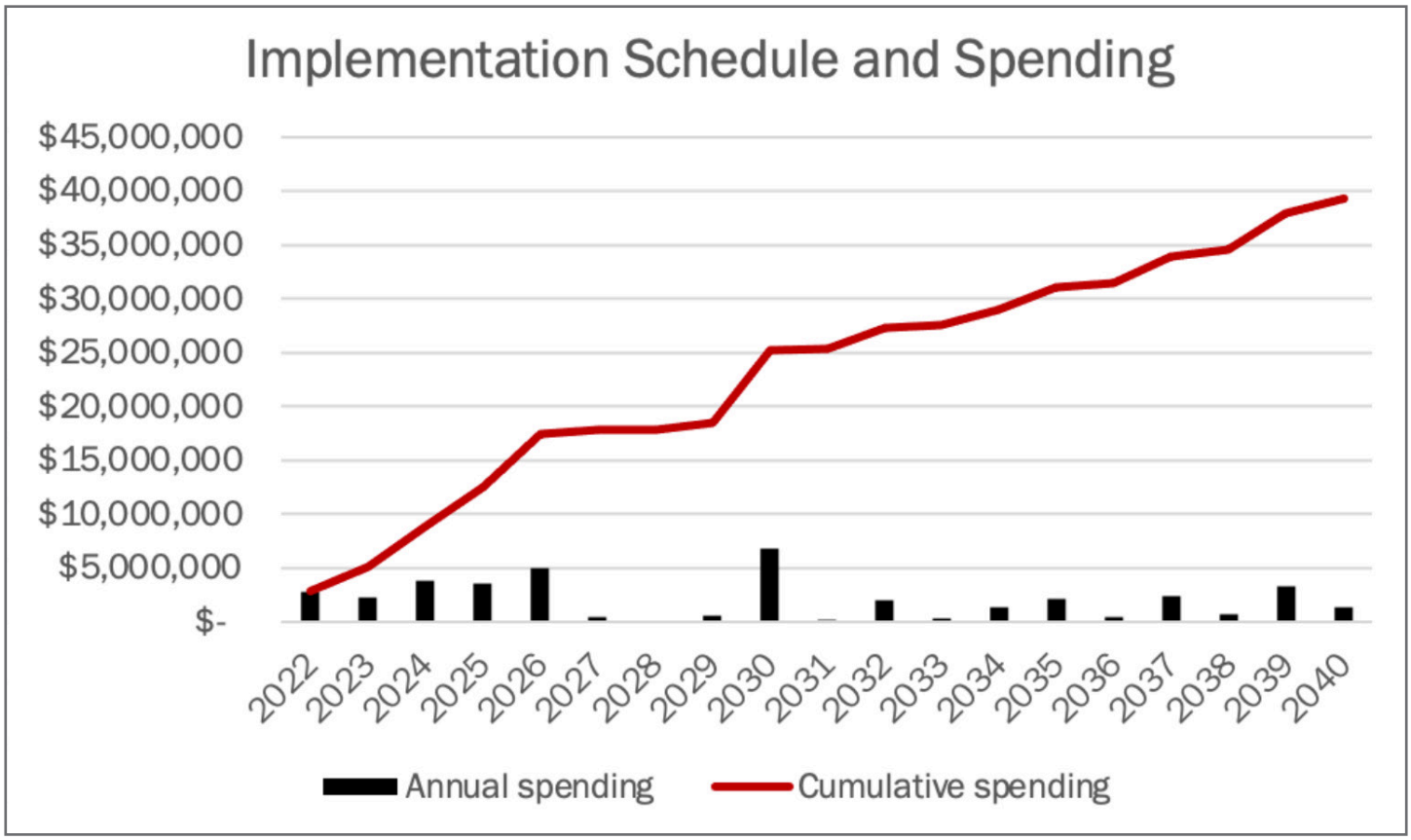


***Figure H**: Implementation Schedule and Spending*

[9] *The implementation and spending schedule presented includes the following financing arrangements: PPAs for all solar PV projects, cash for all electricity efficiency projects and capital improvements (vehicle charging infrastructure), and a business-as-usual expense for fleet replacement to electric vehicles according to existing replacement schedule. This pathway does not necessarily represent an optimized financing structure. For example, the use of low and zero interest borrowing for early energy efficiency projects would distribute early capital requirements (spending) over several years.*

FUNDING

To fund the full suite of recommended projects, and achieve full carbon neutrality by 2043, the following three steps are recommended. Step 1: Pursue PPAs for all solar PV projects through contracts similar to that with SunPower. Step 2: Take full advantage of low cost financing for emissions mitigating and energy saving projects. Step 3: Improve the Green Revolving Fund (an established, innovative way to fund sustainability efforts) by seeding it with an initial investment; then fully leverage the Fund by paying for all projects out of proceeds from efficiency gains.

STEP 1:

Pursue PPAs for all solar PV projects. Power purchase agreements allow the campus to avoid large, up front capital outlays, instead transferring payments for energy project installation to an expense. In the case of the SunPower PPA the amortized cost of the initial installation plus the energy charge are less than the energy savings benefit that results from purchasing electricity from the new supplier, when storage is considered. We expect other PPA terms to be similar in nature.

STEP 2:

Take full advantage of low cost financing for emissions mitigating and energy saving projects. There are many ways to finance projects such as those suggested in this proposal. Several state programs offer low and zero cost financing for up to 20 years. We recommend making use of at least two borrowing programs if available to SSU. First, the CEC loan program allows entities to borrow up to $3 million over 20 years at 1% interest. Second, PG&E's on-bill financing allows borrowing of up to $4 million at 0% for 10 years for public entities. Other options including ESCOs and lease/financing options should also be fully explored.

STEP 3:

Establish a Green Revolving Fund with an initial investment. The size and timing of the capital investment will depend on the optimized financing arrangements and the cash availability of the campus during the initial years of implementation. Early capital infusions will ensure that the fund has sufficient operating cash to pay for projects that come early in the implementation schedule. From that point forward, we estimate that the Fund will be able to fully pay for all projects out of proceeds from efficiency gains. Efficiency gains are measured against a baseline and tracked in real time. All savings from the measures implemented are placed in the fund, which is a special account within the university accounting system. An increasing balance will accrue to the Fund as efficiency gains add up; the balance can be used to pay cash for subsequent projects. Then, once the critical investment period is over (about 12 years), that balance can be used for a host of other purposes from funding the general budget, investing in student-initiated sustainability ideas, or reducing the deferred maintenance backlog. The initial capital for the Fund may come from a variety of places including the endowment, cash balances, or short-term investments that are currently on the balance sheet. In fact the Fund itself can be viewed as an investment, with a payback period and IRR that can be calculated once other financing arrangements are in place.

NET PRESENT VALUE

(NPV) is the value in present-day dollars of a series of cash flows over a period of time, and is a common metric to evaluate different investments. By using NPV to evaluate different options, SSU can determine the most cost-effective pathway to achieving its renewable energy targets.

SUMMARY

This CNR outlines a specific approach which allows SSU to reach carbon neutrality by 2043. This approach has been vetted using qualitative data and a deep understanding of the financial impacts. However, the approach remains flexible and can be adjusted to meet the needs of the campus. It is possible to adjust the years that different projects are implemented based on SSU's budget, though delaying action too long increases uncertainty and leaves more up to chance, risking not reaching the target on time.

The CSU Office of the Chancellor has encouraged campuses CSU wide to consider carbon neutrality. SSU has stepped forward as a leader. But SSU can't do this alone. Even with SSU's best efforts, the goals of this plan will require financial support from the CSU Office. This effort can not be a part time effort that is only addressed when time or budget allows. It will need dedicated FTE staff position(s) and be a financial commitment starting today, and for the next 20+ years. As previously stated, SSU's budget commitment should range between $1.4 to $2.5 million each year. Without this dedication, SSU will struggle in meeting its GHG goals. Using the Green Revolving Fund is a good place to start.

SSU's campus budget ranges between $136 million to $147 million each year. In hope of reaching our 2043 GHG goals, all SSU has to do is commit 1% to 2% of it's base funding towards solving this climate crisis. These green energy projects would address much of SSU's deferred maintenance as well. With the right budget focus, SSU can commit to a better future for it's students, the community, and the world!

APPENDIX A:
STRATEGY DESCRIPTIONS

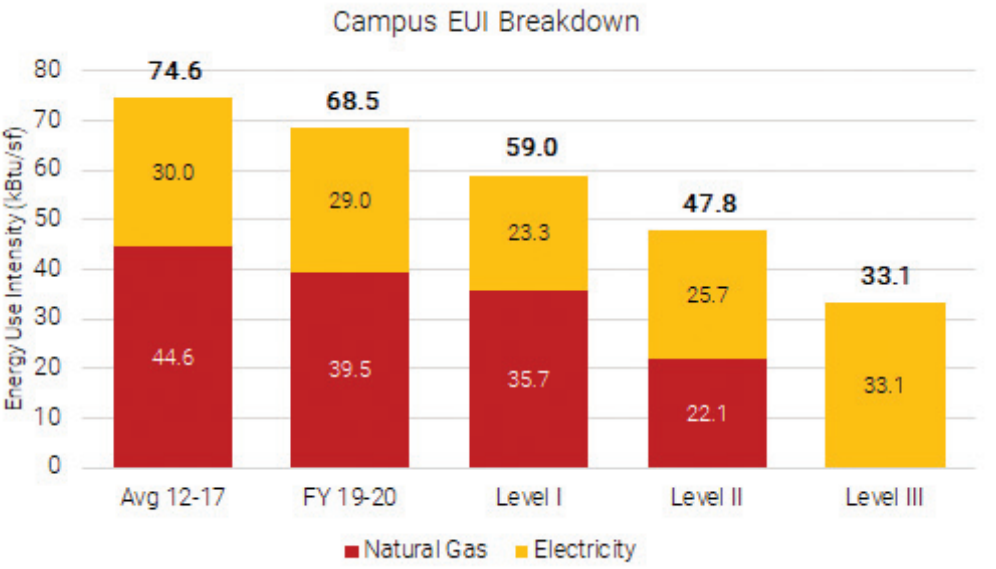
OBJECTIVE 1 – IMPROVE BUILDING PERFORMANCE

CAMPUS ENERGY USE

Between 2012 and 2020 (pre-pandemic) SSU operated with an EUI of between 68.5 and 79.7 kBtu/sf. Roughly 60% of all energy use is direct combustion of natural gas on campus. Reducing natural gas demands will be critical for SSU to cost effectively achieve their carbon neutrality goals. Campus operations during Fiscal Year 20-21 was significantly impacted due to the COVID-19 pandemic. The campus saw a significant reduction in energy consumption due to limiting campus operations.

		Electricity			Natural Gas			Total Energy	
Year	SF	kWh	MBtu	kBtu/sf	therms	MBtu	kBtu/sf	MBtu	kBtu/sf
FY 12-13	2,003,643	18,115,745	61,811	30.8	884,140	88,414	44.1	150,225	75.0
FY 13-14	2,128,084	18,423,841	62,862	29.5	987,876	98,788	46.4	161,650	76.0
FY 14-15	2,157,609	18,342,019	62,583	29.0	851,059	85,106	39.4	147,689	68.5
FY 15-16	2,154,382	18,967,122	64,716	30.0	947,549	94,755	44.0	159,471	74.0
FY 16-17	2,154,382	19,247,728	65,673	30.5	1,059,312	105,931	49.2	171,604	79.7
FY 19-20	2,154,382	18,310,209	62,474	29.0	851,369	85,137	39.5	147,611	68.5
FY 20-21	2,154,382	13,266,112	45,264	21.0	588,254	58,825	27.3	104,089	48.3

The following graph shows the energy reduction potential for the various investment scenarios identified during the CNR project. SSU has the potential to reduce the campus energy use (EUI) to 33.1 kBtu/sf by implementing most of the building decarbonization projects through 2040. This does not include additional on-site Solar PV generation which would further reduce the campus EUI.



BUILDING DECARBONIZATION PROJECTS

An assessment of the campus building stock was completed by the project team, with projects being identified through an assessment of existing conditions and building energy consumption. The first step involved creating a database of campus buildings that contained information regarding the building mechanical, electrical, and plumbing systems. System type and condition were gathered from existing campus reports and with input from SSU facilities staff. Using this database, energy projects across campus were identified. Projects were grouped into the following categories.

1. LIGHTING

Lighting projects were identified to replace existing lighting fixtures with LED bulbs and install modern lighting controls. The majority of SSU buildings have non-LED lighting. Projects were identified from the campus lighting database. This includes 0.9 million SF of residential buildings and 1.2 million SF of other academic and support facilities.

2. RETRO-COMMISSIONING

1 million SF of buildings were identified to be included in a future campus RCx / Continuous-Cx program at SSU. The RCx process involves identifying operational deficiencies and optimizing building control systems. RCx is most effective for newer facilities with modern variable volume HVAC systems and DDC-controls.

3. HVAC RETROFITS

HVAC retrofit projects were identified for buildings with older, inefficient mechanical systems. These are generally more capital intensive energy projects that require upgrading legacy HVAC equipment to modern variable volume systems. Most HVAC Retrofit projects identified at SSU are for systems that are already beyond the expected useful life and can be considered deferred maintenance.

4. ELECTRIFICATION (BUILDINGS)

Electrification projects were identified for building with existing natural gas heating and domestic hot water equipment. Additional engineering studies will be required to assess electrical system impacts.

5. ELECTRIFICATION (CENTRAL PLANT)

The central utility plant has natural gas boilers that provide heating and domestic hot water to roughly one million square feet of buildings. Electrifying the existing central heating system will be critical for reducing carbon emissions as roughly 50% of SSU's natural gas use is at the central plant. A phased approach to decarbonizing the central plant system has been identified for SSU. An additional detailed engineering study is required to establish a full implementation roadmap.

The project team has identified (164) different energy projects on campus aimed to reduce overall campus EUI over the next 20 years. Reduction in energy consumption on campus, both electrical and natural gas, is vital to ensure SSU can economically meet its carbon neutrality goals, whilst investments made to reduce energy consumption may also improve building operations and allow campus buildings to operate in line with current engineering and energy codes. The following table shows the project identified for each building on campus.

Building Number	Building Name	Building Category	Age	Area	Electrification (Heating)	Electrification (DHW)	HVAC Retrofit	Retro-Commissioning	Lighting
001	Stevenson Hall	07 - Classroom - General	1967	130,160			Y	Y	Y
002	Darwin Hall	26 - Science	1967	111,821				Y	Y
003	Field House	22 - Physical Education	1965	15,826			Y		Y
004	Ives Hall	19 - Music	1967	48,510			Y	Y	Y
005	Physical Education	22 - Physical Education	1969	65,985			Y		Y
006	Ruben Salazar Hall	01 - Administration	1969	117,384				Y	Y
007	Student Health Center	13 - Health Clinic	1975	18,573			Y	Y	Y
008	Rachel Carson Hall	07 - Classroom - General	1975	20,000		Y	Y	Y	Y
009	Nichols Hall	07 - Classroom - General	1975	27,892			Y	Y	Y
010	Plant Operations Office	99 - Other	1974	2,692		Y			Y
011	Corporation Yard Shops	09 - Corporation Yard	1967	8,300	Y	Y			Y
012	Boiler Plant	99 - Other	1967	11,500		Y			Y
013	Wastewater Equalization	99 - Other	2009	1,200					Y
014	Corporation Yard Support Service	09 - Corporation Yard	1975	8,000					Y
015	Campus Residential Housing	24 - Dormitories	1972	684,560					Y
038	Tuscany Village	24 - Dormitories	2009	215,512	Y	Y			Y
016	Wine Spectator Learning	35 - Food Sales/Vendor	1968	18,500					
018	International Hall	07 - Classroom - General	1975	17,600			Y	Y	Y
019	Art Building	03 - Art	1978	46,604		Y	Y	Y	Y
020	Pump House	09 - Corporation Yard	1967	960					Y
021	Pump House Fire	09 - Corporation Yard	1967	1,225					Y
022	Shop North	30 - Warehouse	1978	9,600	Y				Y
023	Physical Education Storage Building	22 - Physical Education	1967	1,480					Y
024	Child Care Center	37 - Day Care Center	1977	3,884	Y	Y			Y
025	Athletic Field Facility	22 - Physical Education	1979	860					Y
027	Evert B. Person Theatre	28 - Theater Arts	1987	20,655			Y	Y	Y
028	Aquatic Facility	22 - Physical Education	1982	6,000					
029	Anthropology Studies	07 - Classroom - General	1996	5,440	Y	Y			Y
032	Schulz Information Center	18 - Library	2000	215,500	Y	Y		Y	Y
035A	Student Recreation Center	08 - University Union	2004	53,442	Y			Y	Y
035B	Student Center	08 - University Union	2010	130,065				Y	Y
036	Police Services Building	99 - Other	1990	3,860	Y	Y			Y
039	Green House	26 - Science	2004	5,160	Y				Y
041	Recycle	99 - Other	1999	900					Y
042	Stadium	99 - Other	1999	1					
043	Baseball Field	99 - Other	1969	250,000		Y			
046	Environmental Technology	26 - Science	1905	3,120		Y			Y
049	Pre-College Programs	99 - Other	1996	6,750	Y	Y			Y
050	Green Music Center	19 - Music	2008	49,724	Y	Y		Y	Y
050A	Music / Faculty Office Building	19 - Music	2008	37,920	Y	Y			Y
051	Restaurant / Meeting Facility	35 - Food Sales/Vendor	2011	28,560	Y	Y			Y
001	Osborn Education Center	07 - Classroom - General	1996	2,837	Y	Y			Y
001	Ukiah Center	07 - Classroom - General	1998	2,880					Y
017	CAPS and Four Classrooms	31 - Student Services	2019	6,480					Y

LIGHTING

Existing Conditions

The project team was provided a database from SSU that outlined the (3) major lighting fixture types and percent within building. This database indicated that only (2) buildings on campus have undergone full LED retrofits, with the majority of campus buildings being lit through fluorescent lighting fixtures.

Project Description: Two lighting energy projects were assessed:

1. LED Lamp Retrofits

- Retrofit existing fixtures with LED lamps, fixtures and controls remain.
- This approach is well suited when fixtures are in good condition and lighting occupancy controls have already been installed

2. LED & Controls Retrofit – replace existing fixtures with new LED fixtures and modernize lighting controls in alignment with current code requirements

- Installation of modern lighting fixtures will allow for integration of lighting control systems into the building automation system and may allow for the HVAC zone systems being integrated into the occupancy sensor, shutting down airflow to the zone when it's unoccupied. This control strategy is mandated in certain occupancy types by the 2019 California Energy Code and can result in significant energy savings in spaces with fluctuations in occupancy over the course of the day.

Building		GSF	Occupancy	Project	Existing Lighting
015-	RESIDENTIAL HALL AND DINING	684,560	Residence Hall	Yes	CFL Can Light
043-	BASEBALL FIELD	250,000	Outdoor Field/Area		
038-	STUDENT HOUSING GROWTH-TUSCANY VILLAGE	220,025	Residence Hall	Yes	4Pin CFL Can Light
032-	SCHULZ INFORMATION CENTER	215,500	Library	Yes	T8 Troffer
001-	STEVENSON HALL	130,160	Classroom	Yes	Troffer T8
035B	STUDENT CENTER	130,065	University Union	Yes	Linear 4Ft T5
006-	RUBEN SALAZAR HALL	116,186	Administration	Yes	Troffer T8
002-	DARWIN HALL (SCIENCE)	111,821	Science	Yes	Linear/ troffersT8
005-	PHYSICAL EDUCATION	65,985	Physical Education	Yes	Troffer T8
035A	STUDENT RECREATION CENTER	53,442	Recreation Center	Yes	Troffer T8
050-	DONALD AND MAUREEN GREEN MUSIC CENTER	49,724	Music	No	
004-	IVES HALL (MUSIC)	48,510	Music	Yes	Troffer T8
019-	ART BUILDING	46,604	Art	Yes	Troffer T8
050A	MUSIC/FACULTY OFFICE BUILDING	37,920	Music	Yes	Troffer T8
009-	NICHOLS HALL (CLASSROOM)	30,700	Classroom	Yes	Troffer T8
051-	RESTAURANT/MEETING FACILITY	28,560	Food Sales/Vendor	Yes	A19 Chandelier
027-	EVERT B. PERSON THEATRE	20,655	Theater Arts	Yes	Troffer T8
008-	RACHEL CARSON HALL (CLUS)	20,000	Classroom	Yes	Troffer T8
007-	STUDENT HEALTH CENTER	19,457	Student Health Center	Yes	Troffer T8
016-	WINE SPECTATOR LEARNING CENTER	18,500	Business Administration	No	Troffer LED
018-	INTERNATIONAL HALL	17,600	Classroom	Yes	Troffer T8
003-	FIELD HOUSE	15,826	Field House	Yes	Troffer T5
012-	BOILER PLANT	11,500	Central Plant	Yes	Linear T5
022-	CORP YARD WAREHOUSE	9,600	Warehouse/Storage	Yes	Linear T8
011-	CORPORATION YARD SHOPS	8,300	Corporation Yard	Yes	Linear T8
014-	CORP YARD SUPPORT SERVICE	8,000	Corporation Yard	Yes	Troffer T8
047-	CAMPUS STORAGE BLDG	7,350	Warehouse/Storage	Yes	Linear T8
048-	GORDON SMITH TRAINING FACILITY	6,963	Physical Education	Yes	Linear T5
049-	PRECOLLEGE PROGRAMS/NWIC-NORTHWEST INFORMATION CTR	6,750	Other	Yes	Troffer T8
017-	CAPS AND FOUR CLASSROOMS	6,480	Classroom	Yes	Troffer T8
028-	AQUATIC FACILITY (POOL)	6,000	Outdoor Swimming Pool	Yes	Linear T8
029-	ANTHROPOLOGY STUDIES	5,440	Classroom	Yes	Linear T8
039-	GREEN HOUSE	5,160	Science	Yes	Vapor Tight T8
024-	CHILD CARE CENTER	3,884	Child Care Instruction	Yes	Troffer T8
036-	POLICE SERVICES BUILDING	3,860	Public Safety	Yes	Linear T8
046-	ENVIRONMENTAL TECHNOLOGY CENTER	3,120	Social Science	Yes	Linear T8
010-	PLANT OPERATIONS OFFICE	2,692	Corporation Yard	Yes	Troffer T8
023-	PHYSICAL ED STORAGE BLDG	1,480	Physical Education	Yes	Linear T8

Recommendations

It is recommended that LED retrofits are prioritized based on buildings with longer hours of operation to maximize energy saving. These buildings have the highest lighting energy consumption, thus have the greatest potential for energy savings. Through discussions with SSU facilities staff, the buildings with the longest operating hours are as follows:

- Shultz Information Center
- Student Center
- Music Building
- Nichols Hall
- Rachel Carson Hall

Analysis Methodology

Energy savings as a result of LED retrofits were determined based on the typical building occupancy schedule and the anticipated lighting power density (watt / sf) reduction. SSU facilities staff provided the building HVAC schedules for the campus building stock. Using this schedule, the lighting equivalent full load hours (EFLH) per year was determined, with the EFLH per building then adjusted to account for the lighting controls per ASHRAE 90.1 guidelines.

To estimate project costs the project team compiled cost data from several CSU campuses that have undergone lighting retrofit projects to determine a $ / sf that could be assigned to each building. The retrofit cost will be dependent on the lighting fixture density within the building, along with the configuration of fixtures and their ease of access, thus the lighting costs estimates should be used as a guideline. It is recommended that SSU work with a local contractor and gather project cost estimates for the larger buildings on campus.

RETRO-COMMISSIONING

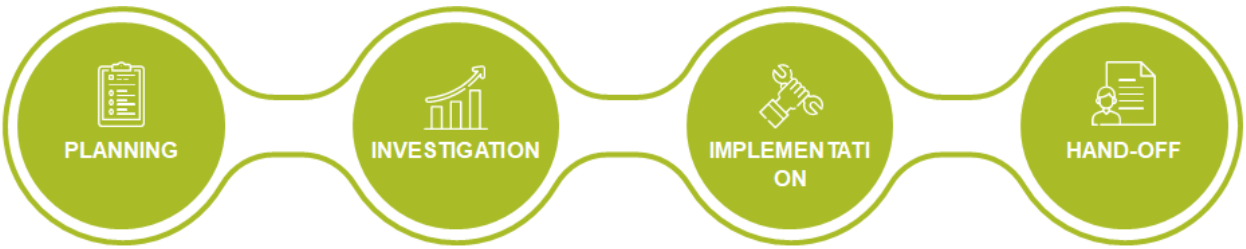
Existing Conditions

SSU has multiple campus buildings with full DDC controls that are 10-15+ years old. These facilities are good candidates for a retro-commissioning process to optimize the existing building systems and control sequences.

Project Description

Retro-commissioning is a term that refers to the commissioning of a building that has either not been previously commissioned, or operations have changed over time and the building has diverged from the original commissioned operations. The goal of retro-commissioning is to find ways to make a building and its equipment operate more efficiently and effectively, saving the owner money, reducing environmental impact, and increasing occupant comfort. Retro-commissioning measures are typically controls based, meaning that the changes require less capital investment to implement than equipment or structural changes. For example, retro-commissioning measures might include adjusting temperature setpoints, equipment schedules, damper operation, or address problems of simultaneous heating and cooling. It would not include upgrading old equipment to more efficient ones. As the changes are to the operation of the equipment and can normally be implemented by the owner, retro-commissioning changes typically do not have significant capital investment yet can drastically improve the operations and efficiency of equipment.

The typical retro-commissioning process is outlined below.



	PLANNING	INVESTIGATION	IMPLEMENTATION	HAND-OFF
SCOPE:	• Data Collection • Facility Review • Site Walkthrough • Utility Benchmarking • RCx / Audit Plan	• RCx Testing • Site Assessment • Identify Deficiencies & Efficiency Measures • Energy & Financial Analysis	• Implementation Plan • Project Scoping • Design Review • Post-Implementation Testing	• Training • Final Reporting • Measurement & Verification (M&V) • Utility Incentives

Recommendations

As RCx focuses on updating equipment controls and operations it is best suited to centralized HVAC systems that can implement advanced control strategies. Variable speed air handling units with DDC controls are optimal for RCx as they can operate with more complex control strategies, thus RCx energy projects focused on buildings with modern HVAC system. Constant volume systems with pneumatic controls throughout are not able to operate with advanced control sequences, resulting in less savings potential in these buildings. Likewise, buildings with small, non-centralized systems such as packaged unit have a lower savings potential as fewer control sequences are available. Although this is the case, RCx does present potential for energy savings in all buildings through projects such as updating HVAC scheduling, thus some older buildings with pneumatic controls have been identified with potential for RCx savings.

Analysis Methodology

Energy savings for all RCx projects were identified on a building-by-building basis. Building HVAC energy usage was broken into heating, cooling and electricity, which includes items such as fan and pumping energy. Once end uses EUIs were either calculated from trended data or benchmarked based on campus energy consumption, RCx savings were estimated.

Retro-commissioning project costs vary depending on the size complexity of a building. The initial stages of a project, investigating and documenting issues with existing operations may identify several issues, or very few. Costs for potential projects were estimated based on a typical cost ($ / sf) for a full RCx process. This cost does not include any implementation replacement costs, such as upgrading from pneumatic to DDC controls.

HVAC UPGRADES

Existing Conditions

SSU's building stock consists of several buildings that have either pneumatic controls at the zone level, or pneumatic controls throughout the building. Replacement of pneumatic systems has been prioritized as these systems are typically the oldest on campus, and do not allow for advanced control sequences to be implemented. Constant volume systems were also prioritized for replacement, whether they were larger air-handling units or small packaged units. Replacement of constant volume system with variable flow has significant energy saving potential, both in fan energy and heating energy. Constant volume systems cannot adjust flowrate to space temperature, thus during periods that a building requires heating a higher volume of airflow needs to be heated. The latest sequences for variable flow systems have a dual maximum airflow setting, one for heating and one for cooling. This cannot be achieved in a constant volume system and leads to excessive loads being put on the heating distribution system. As campus heating is primarily provided by natural gas, conversion of constant volume systems to variable volume will have a direct impact on campus Scope 1 emissions.

Project Description

The HVAC upgrade projects focus on upgrades of older air-handling units that are either constant volume and/or pneumatically controlled. HVAC upgrades vary in scope dependent on existing conditions. In some locations a controls upgrade may suffice, with existing air handling unit fans, coils and dampers remaining in place. Other buildings will be better suited to full air handling unit replacement projects with custom packaged units. Projects will be scoped on a project-by-project basis dependent on site conditions within the building.

Recommendations

Develop an energy efficiency program and establish criteria to fund and finance projects. Determine a plan to implement HVAC upgrade projects to bring campus buildings to current code levels, focusing on buildings that are regularly occupied.

Analysis Methodology

Energy savings were derived from the existing HVAC end use energy from heating, cooling and electricity. The project team assessed each end-use against a benchmark, whilst analyzing the existing HVAC system and potential replacement options. Energy savings were then estimated once and understanding of existing systems

Estimating HVAC upgrades project costs was completed on a project-by-project basis, with HVAC system types and replacement scopes being assessed and estimated.

ELECTRIFICATION (BUILDINGS)

Existing Conditions

Heating and campus domestic hot water are currently being provided primarily by natural gas burning equipment. Several buildings are connected to the campus central heating plant for both heating and DHW needs, whilst others are connected for heating alone with natural gas water heaters within the building. Buildings that are isolated from the central heating plant typically have boilers and/or natural gas furnaces for heating needs and natural gas water heaters for water heating needs. The building electrification projects focused on buildings with natural gas consuming equipment within the facility.

Project Description

Heating electrification projects include replacement of existing boilers or furnaces with heat pumps, for both hydronic and airside systems. DHW electrification replacement options were determined based on the anticipated hot water load. In buildings with minimal hot water load, hybrid electric heat pumps are suitable and provide a high efficiency method to generate hot water. These systems often come with integral storage tanks and can be installed with minimal infrastructure upgrades required. In buildings with larger hot water loads, such as residential buildings, high capacity air-to-water heat pumps are suitable alternatives and can be designed to be integrated into a traditional separate storage tank system.

Electrified Equipment	Application
Hybrid Tank Type Water Heater	Buildings with low DHW loads, such as academic and office buildings
Built Up Heat Pump Water Heaters	Buildings with significant DHW loads, such as residential buildings and sports facilities
Air-Source Heat Pumps	Buildings with existing heating hot water boilers that can be replaced, reusing existing distribution infrastructure in place
Packaged Rooftop Units	Replacement packaged DX units with natural gas furnaces
Wall Heaters	Replacement of natural gas furnaces in residential units that may not limited in space for installation of heat pumps

Recommendations

Electrification should focus on buildings with the highest heating and hot water loads, such as the residential buildings, as electrification of these buildings will have the greatest impact on campus emission outside of the central plant.

Analysis Methodology

Replacement of natural gas equipment with heat pumps may result in a significant decrease in building energy consumption due to the increased performance of heat pumps. Typical natural gas equipment will operate in the range of 80-95% efficiency dependent on system type. A heat pump is capable of operating at an average COP > 3.0. With a COP > 3.0, the heat pumps are operating at over 300% efficiency, resulting in significantly less energy being required for the same hot water output.

All electrification projects replace all natural gas consumption with electricity. Heat pumps will operate at different efficiencies over the course of the year, dependent on outside air conditions and system loads. A COP > 3.0 is achievable in the Sonoma climate, however it was assumed that the heat pumps would operate at an average of 3.0. Natural gas energy for each building was converted to electricity consumption using this COP value.

Electrification costs were determined on a $ / MBH basis. The SSU Critical Infrastructure Report provided the system design load for heating and DHW for all campus buildings. It was assumed that the electrified equipment would need to meet these design loads, however it is recommended that the systems are sized correctly for the actual building loads to ensure the heat pumps are not oversized, which is common in old natural gas heating systems. Using the report and design loads, and the $ / MBH values provided by equipment manufacturers, an estimate was made for equipment costs per project. These were then adjusted to account for design and construction costs in Sonoma.

ELECTRIFICATION (CENTRAL PLANT)

Existing Conditions

The existing plant serves several buildings across campus and provides high temperature hot water for heating and domestic hot water needs. Currently, the existing natural gas fired boilers provide 100% of these heating loads, supplying approximately 200F hot water in the summer, with winter supply temperatures reaching 240F.

The existing plant operates continuously throughout the year to maintain loop temperatures. Loop temperature must be maintained as there are issues with the hot water piping distribution that results in pipe leaks when pipe temperatures are reduced. This results in natural gas being burned to maintain loop temperature and not to provide hot water load.

Old heating hot water to domestic hot water heat exchangers within buildings also require high temperature hot water as these have been sized for 240F entering hot water temperature. The use of these heat exchangers results in high temperature hot water being produced at times when heating loads are low.

Project Description

Limitations in the current technologies limit the ability for heat pumps to generate heating hot water at temperatures higher than 165F, thus ensuring that campus heating loads can be met with lower temperature water is key. To understand the required hot water supply temperature the campus should study how different buildings operate whilst in heating, and if higher temperature hot water is required as a result of specific buildings or specific air handling units.

Another key requirement for any electrified heating system is to ensure the systems are sized correctly. It has been identified that the current central heating plant needs to maintain high temperatures within the piping distribution network to avoid pipes contracting and leaking. The plant burns natural gas to ensure there are no leaks, not to provide heating, thus there are significant opportunities to reduce natural gas consumption through optimization of existing operations. Fixing the piping distribution network will allow the existing boilers to shut down when there are minimal campus heating loads, reducing natural gas consumption, and allow engineers to better size decarbonized heating systems based on actual heating loads on campus.

Recommendations

It is recommended that SSU provide a detailed engineering study to assess existing infrastructure and central plant electrification options. This is required to understand the full scope and cost of these projects. The campus should approach electrifying the central plant as a phased implementation. The first phase should provide necessary upgrades to campus hot water infrastructure that will allow heating hot water supply temperatures to be lowered. Making these upgrades will reduce the number of hours the boiler plant operates and will allow the condensing pony boilers to operate in their condensing temperature range, improving the overall plant efficiency.

The first phase of electrification can include the installation of a heat recovery chiller in the CUP. This allows heat from the chilled water return loop to be used to generate hot water using heat recovery technologies. This will partially electrify the CUP as existing gas pony boilers will be required to meet campus heating loads during the heating dominated winter season. The next phase of the CUP electrification process can include additional heat sources to maximize the heat recovery chiller operation and fully electrify the plant. Some potential heat sources include waste water heat recovery, geothermal wells, air-source heat pumps and electric boilers.

The following diagram shows the strategy, approach and rough order of magnitude (ROM) budget for a phased central plant electrification process.

PHASED DECARBONIZATION APPROACH

PHASE 0 BASE UPGRADES

- **STRATEGY:** Provide base heating hot water loop infrastructure & controls upgrades
- **APPROACH:** Fix water leaks, replace heat exchangers, reset supply temperatures
- **ROM BUDGET:** TBD *(requires engineering study)*

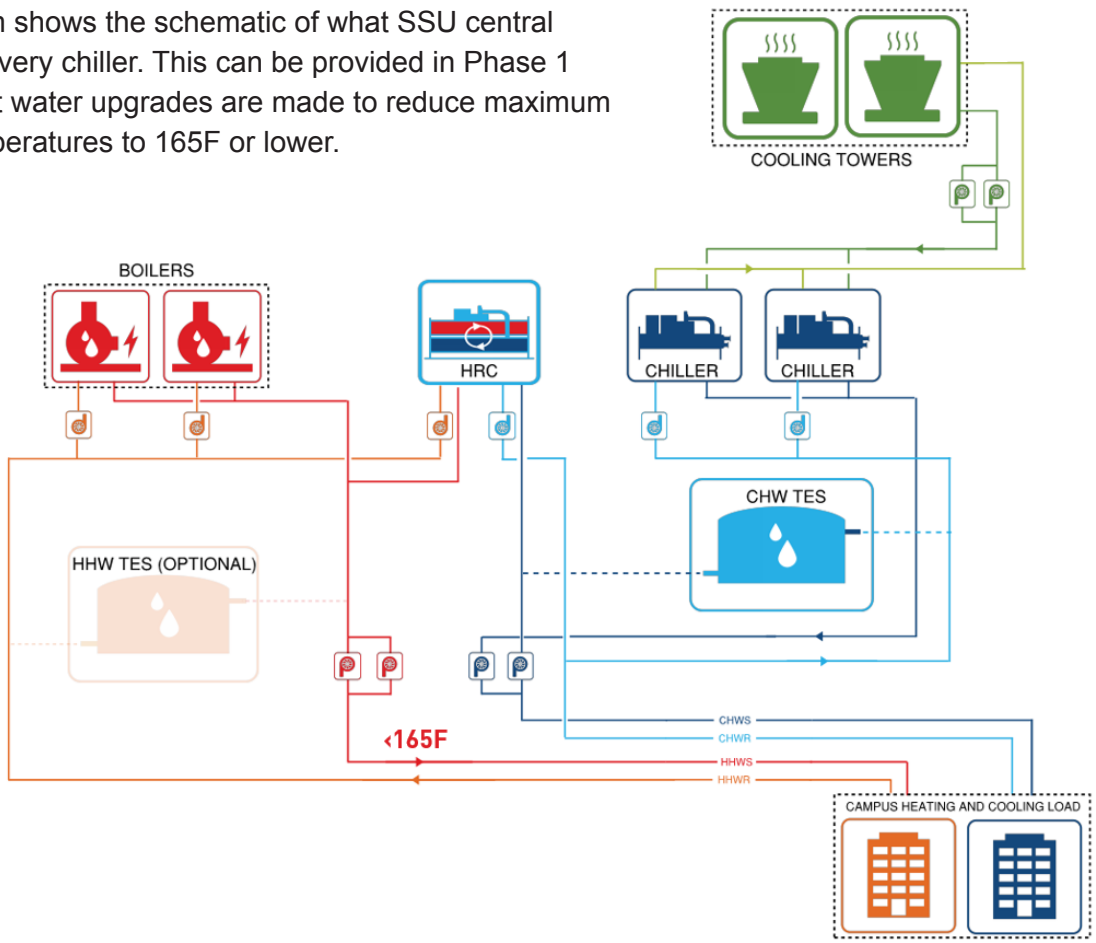
PHASE 1 PARTIAL ELECTRIFICATION

- **STRATEGY:** Partial CUP electrification with heat recovery chillers
- **APPROACH:** Install at central plant (decentralized options are also possible)
- **ROM BUDGET:** $2.5-4 million

PHASE 2 99% ELECTRIFICATION

- **STRATEGY:** Near full electrification with additional heating sources (long term)
- **APPROACH:** Various possible approaches (to be determined with addition assessment)
- **ROM BUDGET:** $4-10 million

The following diagram shows the schematic of what SSU central plant with a heat recovery chiller. This can be provided in Phase 1 after base heating hot water upgrades are made to reduce maximum hot water supply temperatures to 165F or lower.



Analysis Methodology

The campus hot water load profile was developed using a combination of trends from the building automation system showing actual usage and central heating plant natural gas consumption trends. Using these data sources, the monthly heating load profile was determined, and estimates for equipment sizes could be made to electrify the hot water production. Natural gas saved was estimated based on the efficiency of heat recovery and heat pump technologies.

The central plant electrification projects were priced on a $ / MBH basis. Equipment capacities were determined to optimize simultaneous heating and cooling efficiencies and allow the campus to fully decarbonize the hot water production. The base heating hot water plant upgrade (Phase 0) is a deferred maintenance project that includes repairing leaks, heat exchanger replacements and system optimization to reduce heating hot water temperatures. Since little is known about the extent of the leakage in the system, costs have not been estimated for this project.

OBJECTIVE 2 – INCREASE RENEWABLE ENERGY GENERATION

On-Site Solar (Net-Metered Projects)

Where technically and economically feasible, SSU can install solar PV systems on campus facilities and parking lots to decrease the carbon intensity of the campus electricity supply and reduce utility costs. Solar systems installed on campus on the customer side of the meter are eligible for net energy metering (NEM) through Pacific Gas & Electric, as long as the total production of the system is less than or equal to 100% of the campus' electricity usage. Prior to the beginning of the CNR planning process, SSU had already procured a large on-site solar and battery storage project and selected SunPower as the preferred vendor. This project jumpstarts SSU's progress on CNR implementation and will provide important information (e.g. interconnection capacity of PG&E distribution system) and experience to support any future on-site solar development. A summary of potential solar projects identified, divided into phases and including the project already underway, is provided in the table below. Based on 2019 electricity usage, if all projects below are developed solar production will account for 49.5% of SSU's total electricity usage. As electricity demand increases due to vehicle and building electrification, this percentage is likely to fall.

Project Name	Estimated Size (kW)	Estimated Production (kWh)	Estimated NPV ($)
Phase 1			
Lots J & F (contracted)	*5,037*	*7,361,412*	*3,932,995*
Phase 2			
Lot E (Carport)	556	921,647	-137,225
Lot A (Carport)	285	433,204	-134,665
Lots L, M, N & O (Carport)	2,066	3,409,847	178,633
Phase 3			
Green Music Center (Ground Mount)	1,474	2,280,590	267,272
Lot D (Carport)	408	678,694	-94,966

***Table A**: A Summary of solar projects identified and estimated NPV.*

OBJECTIVE 3 –INCREASE VEHICLE FLEET EFFICIENCY & FUEL SWITCHING

Streamlining Fleet Management

There are several policy and procedure changes that SSU should consider to support fleet electrification. First, it may be necessary for the campus to adopt a vehicle purchasing policy that requires electric alternatives to first be considered for each vehicle being replaced. Currently, the campus has no formal vehicle replacement plan or procurement policy and the decentralized nature of vehicle purchasing has the potential to result in purchases that do not align with the campus' larger carbon neutrality goals. Second, while a small vehicle fleet does not require the robust data collection and vehicle monitoring that a larger fleet does, formalizing and improving data collection related to asset usage (fuel, mileage) will help support vehicle purchase decisions. Currently, SSU does not track vehicle mileage and can only access fuel information through fuel card invoices which are difficult to digest. Improving vehicle data by requiring department's to submit monthly mileage reports from their vehicles will provide fleet staff with additional data needed to justify purchases.

Fleet Electrification & Infrastructure Deployment

As discussed previously, the first step in assessing the long-term electrification of the campus fleet was to identify an estimated replacement year for each vehicle and create a "replacement timeline". Currently, the university does not have an established set of vehicle replacement criteria and vehicles remain in use "until the doors fall off". Without established practices, industry best practices for vehicle lifespan (5-10 years, depending on type) and lifetime utilization (70,000-100,000 miles, depending on vehicle type) were used to establish a replacement timeline, shown below in **Figure I**.

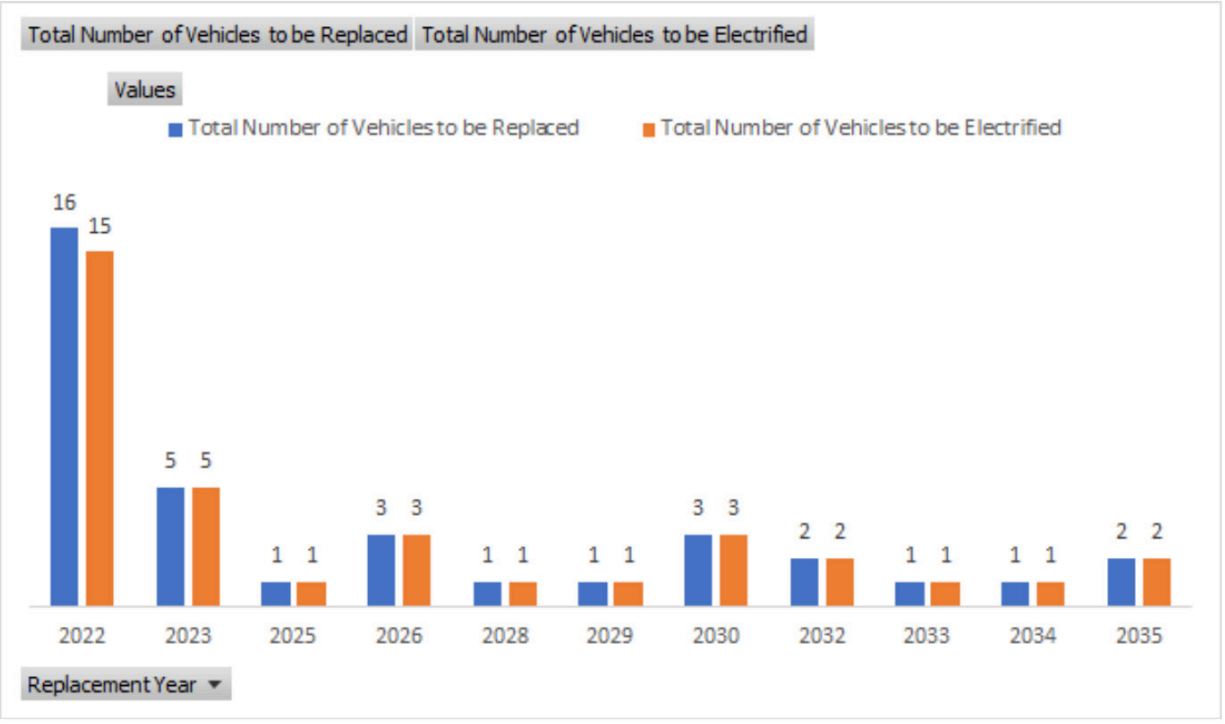


***Table I**: SSU Campus Fleet Replacement Timeline*

There are several challenges relating to additional on-site solar development that will need to be addressed by SSU prior to procurement. First, given the expected development timeline for future Phases, it is likely that these projects will not be installed until after California updates its NEM rules. Thus, the economics of additional solar under the so-called NEM 3.0 regime will need to be understood before Phases 2 and 3 are implemented. Additionally, there is significant uncertainty about the capacity of the distribution grid feeding the SSU campus to accept solar exports. SSU should use the interconnection process completed during Phase 1 to gather additional information from PG&E related to the technical feasibility of expanding on-site solar capacity via NEM interconnection.

RESILIENCE AND BATTERY STORAGE

Since energy storage does note contribute additional renewable energy generation, the role of batteries and other storage technologies was not analyzed in detail during the CNR process. However SSU's current solar + storage project is expected to be converted into a microgrid soon after installation, providing uninterrupted power to five priority building on campus. Additional on-site solar generation will increase the ability for on-site energy storage to provide valuable resilience benefits to SSU, potentially enabling expansion of the microgrid to additional campus facilities.

Given the past impacts of wildfires on SSU's operations and the university's carbon neutrality goal, leveraging on-site renewable generation for carbon-free will continue to be extremely important in achieving SSU's sustainability goals at large.

Potential on-site solar projects were identified, designed and modeled using a licensed solar modeling software called HelioScope. Initial meetings with SSU staff revealed that during past solar efforts carport arrays were preferred over rooftop or ground mount installations. This preference stemmed from a desire to take advantage of the large parking lots on campus, the old age of most campus roofs and the small, relative to carports, potential of rooftop installations. With this prioritization in mind, Initial conceptual solar designs were created and vetted with campus staff. Project locations were then grouped into potential implementation phases based on the ease of installation (proximity to campus switchgear) and desirability of the location. For example, it was identified that a ground mount project located next to the Green Music Center might impact the operations of certain campus events, so that project was included in Phase 3. Once all potential projects were established, expected solar production was simulated in HelioScope and input into the CESA tool.

System costs (both capital costs and PPA rates) were also estimated for each potential solar array based on market data for an all-in dollar per watt ($/Watt) cost.

This replacement timeline could be accelerated or delayed depending on budget availability. Based on historical vehicle replacement practices and budget availability, it is likely to be delayed.

Following creation of the replacement timeline, a recommended EV Type was assigned to each existing vehicle based on EV models currently available in the market. Based on the data provided and understanding of vehicle operations, every on-road vehicle in the campus fleet, except one "bucket truck", has an appropriate electric vehicle currently available in the market. However, some of the university's medium- and heavy-duty vehicles, as well as specialized vehicles (e.g. street sweeper), have limited electric models available or only have custom-built chassis conversions (.e.g the SEA Electric Isuzu NPR) options available, both of which may be financially prohibitive at present.

To understand the costs of owning and operating a new EV compared to a new internal combustion engine (ICE) vehicle, the analysis also assessed vehicle electrification on a total cost of ownership (TCO) basis. TCO is a function of vehicle capital cost, operating costs (fuel, maintenance) and resale value. Generally, as the upfront costs of EVs have fallen in recent years, light-duty EVs have experienced a lower TCO than their ICE counterparts due to reduced fueling (charging) and maintenance costs. In the case of SSU, however, due primarily to the low mileage nature of most university vehicles, only the Campus Police/Safety and Parking Vehicles are likely to experience TCO savings (~$125,000 over the lifespan of the vehicles) if electrified. Since the majority of savings resulting from vehicle electrification stem from reduced operating costs, low usage vehicles without already high operating costs do not have a large savings opportunity when electrified. However, given the rapidly changing nature of the EV market, it is recommended that, prior to any new vehicle replacement, SSU completes a detailed assessment of all available EVs on a TCO basis prior to making a replacement decision.

Regardless of the specific EV models being purchased by SSU, long-term EV charging infrastructure planning is necessary to enable any widespread fleet electrification effort. Accordingly, charging infrastructure needs were identified for each domicile facility currently in use by the campus fleet. Currently, fleet vehicles are scattered across the campus with many domicile locations housing only a single vehicle. After completing an initial infrastructure cost estimate, it became clear that maintaining the current parking strategy would lead to unnecessarily high infrastructure costs, resulting primarily from increased trenching costs and increased project overhead related to managing multiple projects. Thus, after discussion with SSU staff, final infrastructure recommendations included an additional "parking centralization" aspect designed to reduce the infrastructure cost related to fleet electrification. EV infrastructure recommendations were combined into three locations, two of which already house a significant number of vehicles (the Facilities Corp Yard and the Police Lot) and a third (Lot D) that would require changing the parking location of a handful of vehicles around campus. Long-term charging needs for each centralized charging location are included in the table below.

Centralized Parking Location	Estimated Number of Electric Vehicles (2035)	Estimated Number of L2 Charging Ports (2035)
Facilities Corp Yard	14	5
Police Lot (R4)	6	5
Lot D	16	7

Given the high-level nature of the analysis, standard Level 2 commercial charging stations were assumed for all locations. Generally, Level 2 charging is expected to be sufficient given the short daily mileage and long dwell-times common across the fleet. Additionally, a vehicle to charger ratio of 1 to 1 is not likely to be necessary, as vehicles will be able to operate for multiple days on a single charge. In some cases, such as the Campus Police, a single fast charger may be required to ensure vehicle uptime.

Beyond on-road vehicles, an additional project related to cart electrification was assessed and included in the CESA tool. Electrification of the university's 24 remaining gas Kawasaki Mules has been contemplated in the past but was deferred due to budget constraints. It is recommended that this project be implemented as soon as possible.

Analysis

Figure J summarizes the fleet electrification analysis completed to inform the CNR. The analysis addressed all active vehicles in the University's fleet, and was intended as a high level summary of the University fleet's electrification potential. A detailed site by site analysis may still be needed to guide implementation.

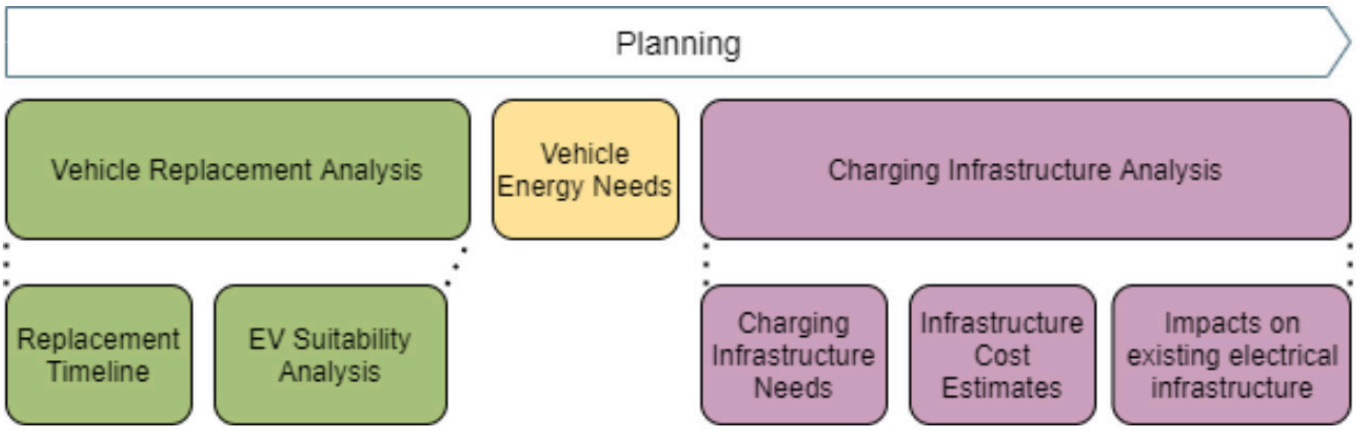


***Figure J**: Fleet electrification analysis*

SSU vehicle data including vehicle body type, vehicle department, gross vehicle weight, expected vehicle lifespan and annual mileage were used to calculate a replacement year, "best fit" electric vehicle type and estimated annual electrical energy required for each existing vehicle. Data was provided by SSU and gathered by the Project Team using an online "VIN decoder" that enables identification of specific vehicle attributes based on the Vehicle Identification Number (VIN). These calculations, combined with data on fuel cost, electricity cost and assumptions on estimated maintenance costs, enabled the creation of a vehicle replacement timeline and total cost of ownership savings estimates. Vehicle parking locations were assigned to each vehicle based on information provided by SSU staff. This data was used to inform vehicle charging infrastructure estimates based on the total electric vehicle charging load expected at each facility/parking lot in question. Infrastructure needs were determined for all parking facilities/locations currently used by the campus fleet. However, as discussed above, in order to minimize infrastructure costs, specifically potential trenching and installation costs, several recommendations were made to centralize vehicle parking into a handful of locations in coordination with electrification. Once the centralization recommendations were established, infrastructure cost was estimated based on charger hardware costs, install costs, trenching costs and contingency to account for university design and engineering costs.

OBJECTIVE 4 – INCREASE IMPACT OF BEHAVIORAL CHANGE PROGRAMS

The CNR has launched a few initial behavioral change programs that will be further developed as part of the 2022 Climate Action Plan. As a result, SSU will further embed sustainability into its operations by streamlining policies and procedures and engaging campus on ways students and faculty might contribute to long term GHG reductions. As a first step, a central communication system will be set up to provide a pathway for each department to communicate, access and measure progress over time.

SCOPE 3 EMISSIONS

Carbon Farming

Carbon farming is a set of agricultural practices that result in increased storage of atmospheric carbon in the soil. The Carbon Reduction Calculator can be used to calculate the emission reduction from compost application to certain types of soils across a specified amount of acres. SSU would like to partner with Sonoma Resource Conservation District to use a section of their Fairfield Osborn preserve for a pilot program to study the benefits of food waste compost application to their soil. "According to Marin Carbon Project research, sequestration of just one metric ton per hectare on half the rangeland area in California would offset 42 million metric tons of CO2e, an amount equivalent to the annual greenhouse gas emissions from energy use for all commercial and residential sectors in California."

Local Food

Food miles emissions are the miles over which a food item is transported during the journey from producer to consumer, as a unit of measurement of the fuel used to transport it. According to CUESA "Cultivating a Healthy Food System: food travels an average of 1,500 miles from farm to plate in the United states, meaning each full semi truck traveling this distance emits an average of 4.85 metric tons of CO2. If SSU commits to local food procurement (within 250 miles) they will cut their food miles emissions down to .81 metric tons of CO2, a reduction of 590%. A study found that people who consume meat have between a 50% - 54% higher carbon-dioxide equivalent (CO2e) each day than vegetarians and a 99% - 102% higher carbon-dioxide equivalent (CO2e) each day than vegans.

Carpooling/Public Transportation

Carpooling programs help reduce vehicle miles traveled, traffic congestion on campus, and parking infrastructure demands. On average, institutions with carpooling programs reduce VMT by 4-%6%. "Carpooling provides a number of financial and tax benefits to both employers and employees. Carpool and public transportation incentive programs may incorporate a variety of means to encourage employees to carpool. Common incentives include direct cash incentives, reduced cost or free parking, preferred parking, or reward programs (such as prize drawings)"

Bike Share

SSU is partnering with Sonoma County Transportation Authority to participate in Shift Sonoma County, a project to define and evaluate strategies to shift transportation choices away from single occupant vehicles towards cleaner, healthier, and more efficient modes of transportation. This project would install bikes and bike infrastructure on campus. These bikes would be part of a county-wide network which students can use to get to and from campus. It is estimated that each bike will travel 1-3 miles per day which will reduce the SSU's VMT.

APPENDIX B: METHODOLOGY

OVERVIEW

SSU utilized the Climate & Energy Scenario Analysis (CESA) Tool to help plan for and visualize the multidimensional impacts of the various options presented in this plan. Designed in Microsoft Excel, the CESA Tool combines user inputs with existing data, performs a series of calculations, and provides output in the form of comparative tables and graphs. By selecting bundles of renewable energy, energy efficiency, and fuel switching projects, SSU can analyze the outcomes of different scenarios and assess multiple pathways towards reaching carbon neutrality by 2043. The tool is designed to be updated as newer data becomes available. The tool performs a series of calculations and computes results based on a set of interacting components: static default assumptions, user-defined inputs, and interim calculations.

Static default assumptions are generally non-changeable assumptions that were provided by SSU and the consultant team during the tool's development. These assumptions are used in various manners by the tool to calculate results and generate output. These assumptions can be changed by the user. These static default assumptions include, but are not limited to:

- Historical energy use
- Historical emissions
- Electricity and fuel combustion emission factors
- Unit conversions

To explore the different ways of achieving SSU's carbon neutrality goal, scenarios were created:
Level I
Level II
Level III

User-defined inputs are inputs defined by the user while building a scenario. These inputs are spread throughout the various subsections which comprise the entire scenario-building process. These user-defined inputs include:

- Global economic assumptions (discount rate, inflation rate)
- Energy costs (electricity and natural gas)
- Energy cost escalation rates
- Target year 2043

[10] *http://comet-planner-cdfahsp.com/*
[11] *https://www.marincarbonproject.org/what-is-carbon-farming*
[12] *https://business.edf.org/insights/green-freight-math-how-to-calculate-emissions-for-a-truck-move/*
[13] *https://www.downtoearth.org.in/blog/going-vegan-can-help-reduce-greenhousegas-emissions-49341*
[14] *https://escholarship.org/content/qt7jx6z631/qt7jx6z631.pdf?t=ph07of#:~:text=CAN%20SAVE%20FUEL%20AND%20REDUCE, CONGESTION%20OF%20GENERAL%20PURPOSE%20TRAFFIC.&text=By%20reducing%20fuel%20consumption%2C%20a, greenhouse%20gas%20(GHG)%20emissions.*

BACKGROUND DATA

Data quality is essential for an accurate representation of historical carbon emissions and to accurately forecast future emissions. To accomplish both tasks data were collected from a variety of sources. Most data for 2019 were collected from the SIMAP tool, a campus carbon calculator available online. SIMAP requires a user to input data, and some assumptions are required. These data were difficult to verify by the typical means of comparison to utility bills and travel reports, if those documents were not available. For 2020, these documents were readily accessible, and data were drawn directly from them. The one exception is student and faculty commuting data. A zip code list was used to calculate the distance driven to campus, but since home zip codes were used for students (rather than zip codes from addresses while attending college) these distances were unreliable. This made relatively little impact on the results given in this report, since the focus is on emission scopes 1 and 2 (only scope 3 considers commuting miles driven). Still, efforts are now being made to develop a survey that will record more accurate commuting miles and practices. The survey will be administered once each year. The calculations in the CESA Tool are based on the following background datasets:

- Building data
  - Electricity and natural gas consumption
  - Gross sq ft
  - Building type
- SSU data
  - Vehicle fleet gasoline and fuel consumption
  - Capital projects
  - Baseline energy (kWh, therms) and fuel (gasoline, diesel, propane) consumption
- Project data
  - Building project data (cost, kWh/thm savings, degradation factors, etc.)
  - Renewable energy projects (cost, capacity, kWh production, etc.)
  - Transportation projects (cost, gasoline/diesel reduction, additional kWh, etc.)

CALCULATIONS

Calculations in the CESA Tool are performed as follows:

1. Baseline energy consumption, renewable energy percentage, and GHG emissions are calculated.
2. Energy savings, generation, and emission reductions from selected EE, RE, and TRN projects are calculated for the years 2022–2043 and subtracted from the baseline.
3. Net cash flow is calculated for each project based on energy prices, costs, and savings.
4. Net present value (NPV) is calculated for each project using net cash flows and a default discount rate of 6%

ASSUMPTIONS

The analysis and modeling done for the plan incorporated a number of assumptions that affect energy and environmental calculations, shown in **Table B**.

ASSUMPTION	VALUE	SOURCE	UPDATE FREQUENCY & ADDT'L SOURCES
		Economic Assumptions	
Discount rate	6%		Update as County conditions change
Inflation rate	2%		Update as conditions change
Electricity price	$0.09/kWh (3.5% escalation rate)	From www.electricitylocal.com (draws from NREL. (Actual bills were not available. The rates published here were deemed reasonable based on a $0.07/kWh electricity rate, plus $0.02/kWh average distribution & capacity charge.	Annually
Natural gas price	$0.6176/thm (5% escalation rate)		Annually
Gasoline price	$4.25/gal	GasBuddy price for Sonoma County, CA, 8/1/21 https://www.gasbuddy.com/gasprices/california/sonoma	Annually
Diesel price	$4.65/gal	AAA average CA price for 10.26.20 https://www.gasbuddy.com/charts	Annually
		Energy Forecasts	
Building electricity growth	CIP-based	Building square footage x Building type EUI x Building type energy split (kWh/therms) x EIA Annual Energy Outlook 2020 growth projections	Update as conditions change
Building natural gas growth	CIP-based	Building square footage x Building type EUI x Building type energy split (kWh/therms) x EIA Annual Energy Outlook 2020 growth projections	Update as conditions change

SONOMA STATE UNIVERSITY

RESILIENCE ASSESSMENT SUMMARY

Prepared by
Regional Resilience Working Group and Center for Environmental Inquiry
for the
President's Sustainability Advisory Council

April 2021

APPENDIX B

CAMPUS COMMUNITY RESILIENCE ASSESSMENT

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APPENDIX B

CAMPUS COMMUNITY RESILIENCE ASSESSMENT

1. BACKGROUND AND PURPOSE

In April 2019 SSU President, Dr. Judy Sakaki, signed the President's Climate Leadership Commitment (PCLC), a signature program run by Second Nature in which university presidents commit their campuses to developing and implementing Climate Action Plans. President Sakaki charged the new SSU President's Sustainability Advisory Council (PSAC) with meeting the goals of the PCLC.

The PCLC Climate Action Plan includes three main components: carbon neutrality, regional resilience and curriculum development. To undertake planning in these three areas, the PSAC established three working groups. One of these, the Regional Resilience Working Group, was charged with collaboratively planning and implementing actions to improve campus and community resilience to climate change.

Resilience is the ability of a system or community to survive disruption and to anticipate, adapt, and flourish in the face of climate change (24). Sonoma County is characterized by abundant natural, social and human diversity and strong community engagement and entrepreneurship. Overlain on this abundance is an increasing frequency of natural disasters (wildfire, flood, drought) that are accelerating inequalities in income, housing, education and health.

Sonoma State University is a liberal arts and sciences university and Hispanic Serving Institution in Sonoma County that offers degrees in 46 bachelor and 15 master degree programs within six schools: Arts & Humanities, Business & Economics, Education, Extended & International Education, Science & Technology and Social Sciences. The campus was ranked in 2021 by US News and World Report as 14th among top public schools in the U.S. and 48th among top performers on social mobility.

The campus lies in the City of Rohnert Park along Copeland Creek in the Russian River Watershed. Its eastern boundary lies at the wildland urban interface at the foot of Sonoma Mountain. The 269-acre campus is one of the most residential campuses in the California State University system, with 34 percent of the 8,500 students living on campus. Notable facilities include the Wine Business Learning Center, the Cerent Engineering Science Laboratories, the Green Music Center, and the Schulz Information Center which houses one of the largest libraries in the state of California. Innovative sustainable construction and green infrastructure include the Environmental Technology Center and 4,200-acres of natural lands at three preserves. The campus is sometimes referred to as "Sonoma County's 10th city" due to its economic and cultural influence.

APPENDIX B

CAMPUS COMMUNITY RESILIENCE ASSESSMENT

This Resilience Assessment lays the groundwork for collaborative resilience action planning between SSU and Sonoma County communities between 2021 and 2022. This assessment and action plan will be included in SSU's Climate Action Plan (scheduled for completion in April 2022) which will additionally include action plans for carbon-neutrality and integration of sustainability and resilience into the curriculum.

2. METHODS

An extensive and exceptional body of work has been produced on resilience assessment and planning over the last decade by non-profits, agencies, and governments in Sonoma County, the San Francisco Bay Area, the State of California and beyond. This Resilience Assessment Summary derives primarily from these documents to ensure that SSU priorities are aligned with best practices and active initiatives. In particular, we relied heavily on the seminal work of North Bay Climate Adaptation Initiative's "A Roadmap for Climate Resilience in Sonoma County" (27) which received White House recognition for excellence in climate planning and includes a detailed summary of climate projections for the County.

We compiled 42 planning documents into an annotated bibliography (see "Annotated Bibliography and References") and summarized the reports with regards to strengths, assets, vulnerabilities, impacts, and potential indicators of resilience along five dimensions as defined by Second Nature (24):

- **Social Equity and Governance** refers to the systems of governance on campus and in the community, levels of engagement among campus and community members, and the capacity of different groups to adapt and respond to climate change. This includes leadership, transparency and accountability, and communication across stakeholders both on campus and in the community.
- **Health and Wellness** refers to the ability of different groups on campus and in the community to fulfill their basic needs. This includes access to healthcare, food, water, housing, and sanitation.
- **Ecosystem Services** refers to the environmental systems and services that support the campus and community. These may include the natural and geographic features.
- **Infrastructure** refers to the physical structures built, owned, managed, and/or used by the campus and community. It also includes systems such as communication and public transportation. Infrastructure is often the most intuitive dimension of resilience, and many resilience assessments and plans tend to focus on physical infrastructure.
- **Economy** refers to the financial ability of the campus and community to proactively adapt to changing climate conditions and to respond positively to climate change events. This may include high-level trends such as Gross Domestic Product and unemployment rates, and more campus-specific indicators such as the existence of a climate adaptation fund.

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To gather additional input from campus and community, we hosted a series of eight weekly on-line workshops in October and November as part of North Bay Forward, a pan-sector community group. Results of these discussions were reviewed and refined through two discussions with SSU Emergency Operations Center leaders Missy Brunetta and Megan Varnadore. Throughout discussions, special attention was paid to ideas for further collaborative work between campus and community.

3. STRENGTHS AND ASSETS

Strengths and assets are existing features, capacities, characteristics, and resources that help a campus and community cope with climate change. We summarize ten strengths - two from each of the five dimensions of resilience - identified by other initiatives and through workshop discussion. We give examples of these strengths in Sonoma County communities and on campus.

Table 1. Strengths and assets

	Strength or Asset	Community Examples	Sonoma State University Examples
	Social Equity and Governance		
1	**Multi-sector Collaboration**: Multi-sector collaborations help communities anticipate threats, limit their effects, and rapidly restore functionality after a crisis (67). Examples of climate-related collaborations include:	Climate Emergency Resolutions adopted by all cities in the county. City Climate committees formed in Petaluma, Windsor, Healdsburg and Sebastopol. A wide variety of climate forward organizations, agencies and communities collaborating on climate protection and resilience. Over 30 county-specific or regional collaborative planning documents addressing sustainability and resilience (see annotated bibliography), including 5-year recurring County Hazard Mitigation Planning	SSU Presidents' Climate Leadership Commitment, President's Sustainability Advisory Council, staff, student and faculty sustainability positions. SSU faculty and students studying regional resilience challenges (e.g., Center for Environmental Inquiry, Center for Sustainable Communities, Climate Research Center)
2	**Culturally Diverse Leadership**: The more diverse a network, the greater its ability to respond to change (44).	Organizations and Governments: Federated Indians of Graton Rancheria, Sonoma County Office of Equity, Latino Leadership on Climate Change, Hispanic Chamber of Commerce, North Bay Immigrant Youth Union, SSU Office of Diversity Equity and Inclusion, SSU President's Diversity Advisory Council. Programs enhancing diverse leadership include: funding (e.g., United Way Map One Grants, Community Foundation Latino Leadership Fund) and training (e.g., Daily Acts Leadership Institute, Latino Service Providers Promotores Verde) and bilingual communication such as La Voz, County Department of Health press releases. Environmental Justice Organizations: North Bay Organizing Project, Peace & Justice Center of Sonoma County, Daily Act's North Bay Environmental Health Network, Sonoma County Climate Action (part of 350 Bay Area), North Bay Jobs with Justice	Hispanic Serving Institution with culturally diverse leadership. Organizational structure includes Office of Diversity Equity and Inclusion and President's Diversity Advisory Council. Over 20 clubs affirm identity and belonging for students who identify as Black, Chicanx, Disabled, Filipino, Foster Youth, Latinx, LGBTQIA+, and Native American. Support programs include the Basic Needs Initiative, DREAM Center, Educational Opportunity Program and the HUB Cultural Center.Degree programs: American Multicultural Studies, Chicano and Latino Studies, Certificates in Compassion Cultivation, Conflict Management, Counseling, Criminology and Criminal Justice Studies, Global Studies, Latin American Studies, Native American Studies, Queer Studies, Special Education, Women and Gender Studies.

Table 1. Strengths and assets cont.

	Health and Wellness		
3	**Wellness and Outdoor Focus**: Healthy, socially connected, prepared people are better able to withstand, manage, and recover from disasters. Outdoor exposure to nature is an important determinant of health (55).	Health and wellness programs by county and health providers (e.g., Kaiser Thrive, Sonoma County Healthy Habits and Fitness Fun Programs), and fitness centers (e.g., YMCA, SSU Recreation Center). Support for recreation and management of natural lands (e.g., Sonoma County Ag + Open Space District, Sonoma Land Trust, non-profit coalitions management of Sugarloaf and Willow Creek State Parks, green space zoning). Extensive network of outdoor opportunities on coastal and inland areas: State, County and Regional Parks, pedestrian and bike trails, outdoor recreation businesses (e.g., zip lines, boat rentals, horseback riding), non-profit outdoor education programs (e.g., Land Paths, Laguna de Santa Rosa)	Recreation Center, Student Health Center health education services, Employee Wellness Program, policies (bike support, non-smoking campus) and lands (4200 acres of natural lands at three SSU preserves, campus pathways and gardens).
4	**Disaster Response and Recovery Network**: Investments in technology, communication, and staffing improve response and recovery time (76).	Social Networks for preparedness planning such as investments in county staffing, bilingual County Emergency Services Local Assistance Center, Neighborhood Groups (County groups, Neighbors Together, Larkfield Resilience Fund, Listos (Spanish-speaking communities, Map Your Neighborhood, Citizens Organized to Prepare for Emergencies, Fire Safe Councils, Community Emergency Response Team (CERT) programs, Sonoma Community Animal Response Team. Early Warning Systems include North Bay Alert Wildfire Network and Flood Warning Network (sonoma.onerain.com). Mental health services include Mental Health Access Team, Sonoma County Behavioral Health Campus, Suicide Prevention (Project Lifeline), HOPE mental health services for those affected by wildfires. Safety net services include crisis counseling, coordination of care (ACCESS). Notification systems include Nixle, SoCoAlert, Federal Integrated Public Warning and Alert System, public emergency information website (https://SoCoEmergency.org)	Emergency Response Operations, dormitory housing for community members experiencing homelessness during disasters, support for North Bay Alert Wildfire Network at Fairfield Osborn Preserve and high-speed internet access for a portion of the network (www.alertwildfire.org/northbay). Safety Net Services include the SSU Care Team, Lobo's Pantry, CalFresh, Basic Needs Initiative and psychological support via Empathia and counseling services.

Table 1. Strengths and assets cont.

	Ecosystem Services		
5	**Natural and Agricultural Lands**: Protected natural and agricultural lands can create self-sufficient systems for clean energy, water, food production, fiber and carbon sequestration.	Sonoma County General Plan 2020 policies for open space and conservation elements. Conserved lands in State, County and Regional Parks, pedestrian and bike trails. Active land conservation efforts including conservation easements (e.g., Sonoma County Ag + Open Space, Sonoma Land Trust, The Nature Conservancy).	Pedestrian and bike trail on campus, 4200-acres of conserved lands at three education and research preserves, campus garden classroom and native plant gardens.
6	**Expertise in Resilience of Natural and Agricultural Systems**: Application of best practices and research into new solutions can reduce risks from fire, drought, flood and heat (77).	Planning includes Sonoma Water integrated water resources planning, groundwater management planning, end use water efficiency programs, zero carbon water, climate adaptation plans and tools such as UCCE Wildfire Fuel Mapper. Active initiatives and collaboratives include Conservation Lands Network, North Bay Climate Adaptation Initiative, Sonoma County Conservation Council, Sonoma County Forest Conservation Working Group, and the Match.Graze.Good Alliance. Non-profits and support agencies for best land management practices include Resource Conservation Districts, UC Cooperative Extension, Sonoma Ecology Center, Laguna de Santa Rosa Foundation, Land Paths, Sonoma County Conservation Action, and Center for Social and Environmental Stewardship. Demonstration sites and planning tools include the Advanced Energy Center, Pepperwood Preserve, and LandPaths.	Academic degrees and faculty expertise in biology, biochemistry, cultural resources management, earth science, geography, environment & planning, geology, Hutchins liberal studies, forests, fire, remote sensing, land management planning. Centers include Center for Environmental Inquiry, Center for Sustainable Communities. Demonstration sites include SSU Preserves, campus garden classroom and native plant gardens, Copeland Creek restoration project, campus landscaping (e.g., tree-for-tree replacement policy, flammable tree removal). Environmentally-focused student clubs and volunteer programs include JUMP, Sustainability Students, Geography Environment and Planning Student Club. Programs to engage faculty and students in regional resilience challenges include Waters Collaborative, Rising Waters, Fire Collaborative.
	Infrastructure		
7	**Green Building Practices and Development**: Community resilience is dependent on green building practices and innovations such as the use of durable materials, site selection, and rainwater collection (51).	Sonoma County General Plan and Permit Sonoma (smart growth policies and zoning for compact development, Accessory Dwelling Unit policies, Sonoma County CALGreen building codex). Sustainable design and construction including sustainable design and construction businesses, and tiny house businesses. Sustainability initiatives include Zero Waste Sonoma, B-Corp, and Sonoma County Business Environmental Alliance	Sustainable design and construction include minimum LEED Silver building standards
8	**Green Utilities and Transportation** (61,65,81): Support infrastructure (water, energy, transportation) systems that are sustainable, distributed, persistent, adaptable, transformable and redundant enhance community resilience.	Sonoma County planning for renewable energy retrofit program, electric vehicle charging stations, Sonoma Clean Power, North Bay Microgrid projects, low impact Mirabel water collectors, Sonoma Water's zero carbon water, SMART train, Bicycle and Pedestrian Master Plan, Safe Routes to Schools	4 MW Microgrid Project, electric vehicle charging stations, bicycle program, last mile planning from campus to SMART train

Table 1. Strengths and assets cont.

	Economics		
9	**Educated Workforce** (58): Communities with resilient economies have broad availability of quality education accessible to all, solid bridges between enterprises and educators to match skills and demand, workplace training and life-long learning, and mechanisms for anticipating future needs.	Strategic Sonoma's Educate & Support Workforce Goal, North Bay Regional Construction & Building Trades Employment Training Center at Santa Rosa Junior College, Sonoma County Workforce Investment Board, and Economic Development Board Education Progress Reports. Life-long learning programs include Sonoma Environmental Education Collaborative, Daily Acts Leadership Institute for Just and Resilient Communities, Sonoma Resource Conservation District FARMS Leadership, North Bay Organizing Project, and the Leadership Institute for Ecology and Economy	Use of high-impact educational techniques important to resilience (outdoor learning and real-world projects) include SSU Center for Environmental Inquiry, Center for Sustainable Communities, Anthropology Studies Center, School Gardens Network, Maker Spaces. Campus participation in Strategic Sonoma and Sonoma County Workforce Investment Board. Life-long learning programs include the OSHER Lifelong Learning Center
10	**Diversified Economy (73):** The most resilient economies are multi-faceted with a diversity of leading industries.	Economic strengths in advanced technology, agriculture & food, healthcare, hospitality & recreation, outdoor products & craft goods, professional services and information technology. Strategic Sonoma's Diversify Business Clusters, including Economic and Demographic Profile reports. Entrepreneurship support includes Northern California Entrepreneur and Business Network, Makerspaces (SSU, 180 Studios, Chimera, SCOE Design Lab), Incubators and Accelerators (VenturePad, Work Petaluma, Share Exchange, TrimTab Media, North Bay Small Business Incubator, coLAB, Cleantech Open, Keller Street CoWork), loans (e.g., local banks, Small Business Loan Guarantee Program, Jump Start Loan Program) and Economic Development Board Business Development Team	Bachelor degrees in business administration with a concentration in management, Wine Business Entrepreneurship Certificate, Maker Certificate, faculty expertise in economic assessments, Entrepreneur in Residence program, Green Business program, and Maker Space. Campus participation in Strategic Sonoma's Diversify Business Clusters.

4. VULNERABILITIES

Vulnerabilities are ways in which climate change can interfere with the ability of campus or community to create a thriving, just and sustainable future (24). They generally fall into three categories: natural hazards, impacts of these hazards, and exacerbating factors that reduce the ability of campus or community to cope and respond. Here we focus on vulnerabilities shared by campus and community.

Not all impacts and exacerbating factors are distributed evenly among members of the community. Persons that fall into one or more of the following categories are more vulnerable to hazards and impacts and may already bear the brunt of existing inequities (8,27).

- **Infants, Children, Seniors, People in Poor Health or with Mental or Physical Disabilities:** People can be more vulnerable because they lack the physical or mental ability to adapt to changing conditions.
- **Isolated and Rural Populations:** Isolated individuals and populations are more difficult to reach with warnings and emergency services and may depend on sources of food, water, and energy that are more subject to interruption.
- **People Living in or at High Risk of Poverty:** People without adequate financial resources may not be able to afford rising costs of utilities, be more likely to lack sufficient health insurance, have more restricted access to transportation and evacuation during emergencies and be more likely to become homeless.
- **Outdoor Laborers:** Outdoor workers have greater physical exposure to high temperatures and poor air quality.
- **Racial/Ethnic Minorities, Non-Native Speakers, Undocumented Workers:** Language ability, citizenship status, or issues surrounding racial prejudice can increase social isolation, elevate barriers to using emergency or health services, decrease participation in planning and preparation, and slow responses to evacuation warnings.

Climate Change Hazards

Predictions of how local climate is changing in Sonoma County show that the county will be drier, windier, hotter and more flood prone.

1. **Drought (5,8,27,36):** Sonoma County will experience longer and more frequent droughts. Climate models predict that climatic water deficit (CWD), a measure of drought stress, will increase significantly, with some models predicting increases as much as 411% by mid century. The greatest deficits are projected for the south and southeastern portions of the county.
2. **Extreme Heat (5,8,27,36)**: By mid-century, Sonoma County will experience more “very hot days” (above 93 F) and generally higher temperatures over a longer warm season.

Days on which the high temperature exceeds 93°F (considered an extreme event) on the Santa Rosa plain are projected to increase from 39 per year to 148 per year by the end of the century. Average high temperatures and low temperatures overall will also increase.

3. **Rainfall / Flooding (5,8,27,36)**: Rainfall will likely be more intense during a shorter period of time resulting in more frequent and severe floods. Climate scenarios predict 19-25% increases average annual rainfall falling during a shorter rainy season.
4. **Extreme Winds and Wildfire (8,27,36,55)**: Diablo winds, hurricane-like warm winds that move from the Great Basin into California's coastal range, are anticipated to increase in frequency. As a consequence, large wildfires will likely continue to be more common and occur over a longer fire season. By the end of this century, chances of wildfire are projected to increase to 25–33% in the mountainous areas of the county.

In addition to those listed above, areas of the county along San Pablo Bay and the Pacific Ocean are subject to sea level rise and coastal/tidal flooding which can affect delivery of supplies to inland areas.

Climate Change Impacts

Impacts are the outcomes of climate change hazards. Eight impacts are those most likely to affect campus and neighboring communities.

1. **Disease and Heat-Related Illness (5,8,16,31,36)**: Climate-related changes in mosquito, tick and rodent populations may lead to increases in animal-borne diseases in humans. Fire or flood damage to wastewater treatment facilities or lack of services for a growing number of people experiencing homelessness can lead to the spread of pathogens. Extreme heat increases incidents of heat exhaustion, heat stroke and death. Air pollution and allergen prevalence is likely to increase, aggravating asthma, lung disease, and allergic reactions. The SSU campus health services may be impacted.
2. **Infrastructure Failure (5,8,31)**: Extreme heat, flooding, drought, wildfire and an increase in post-fire landslides can damage transportation infrastructure (e.g., paved roads, rail lines, bridges), electrical grids, water treatment plants, homes and businesses. Essential facilities during emergencies include emergency operations centers, police and fire stations, hospitals and shelters, transportation systems, lifeline utility systems, high potential loss facilities, such as dams, facilities housing hazardous materials, government facilities essential to disaster response and recovery; schools and other uses that house special needs populations. The SSU campus is vulnerable to flooding from Copeland Creek and wildfires which are most likely to approach campus from the east.

3. **Loss of Biodiversity (5,8,16)**: Drought, extreme heat, flooding and fire will cause declines in terrestrial and aquatic biodiversity and permanent shifts in native species distributions, invasive species abundance or diseases. Warmer water temperature may lead to harmful algal blooms. The need to balance flood control and storage, summer irrigation, and the needs of aquatic species such as salmon and steelhead will likely become more challenging to meet. Movement of some crops to cooler coastal areas may result in loss of coastal species. Biodiversity on SSU Preserves and campus may decline.
4. **Landslide (8)**: Catastrophic landslides will occur more frequently due to intense storms and soil destabilization after wildfires. Copeland Creek watershed is known for its erosive geology. Extensive debris flows have traveled down Copeland Creek towards campus after storms. Landslides, slumps and erosion will likely increase at SSU Preserves.
5. **Poor Air Quality (5,8,36)**: Increasing smoke from wildfires across the western U.S. will cause death and lung damage, and exacerbate eye and respiratory illness. During heat waves, air pollution and allergen prevalence is expected to increase. Poor air quality may impact health services and increase campus shutdowns.
6. **Power Outage (5,8)**: Extreme heat events, flooding, drought and wildfire will cause more frequent energy grid failure due to damage or performance declines in electricity transmission, brown and blackouts, and reduced functioning of thermal power plants and transformers. Hydro and geothermal power is vulnerable to drought. Planned safety power shutdowns (PSPS) will increase as severe fire weather conditions become more frequent.
7. **Water Insecurity (5,8)**: Rising temperatures and more frequent and prolonged drought will put pressure on water supplies and increase the cost of water and food. Groundwater pumping will increase and recharge rates will decline. Households and businesses dependent on wells, such as the SSU campus, are particularly vulnerable as groundwater levels decline and water quality deteriorates with overpumping. Water collection and delivery infrastructure may be impacted by flooding, wildfire and landslides as well as excessive sediment in water.
8. **Food and Timber Shortages (3,5,16,38,45)**: Landslides, wildfires, smoke, loss of freezing temperatures and other disturbances will damage timber, crops, grazing and farm infrastructure. Losses in crops, including wine grapes, and livestock are anticipated due to potentially sudden shifts in populations of pests, weeds, disease, heat-related mortality and morbidity, or loss of access to water.

Climate Change Additional Exacerbating Factors (Existing Stressors)

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CAMPUS COMMUNITY RESILIENCE ASSESSMENT

Exacerbating factors are existing conditions that reduce a community's ability to cope and respond to change and are often in turn worsened by climate hazards and impacts. Nearly all of the 39 Second Nature exacerbating factors (24) are present in our region and on campus to some extent. The following factors likely have the greatest potential to affect campus and offer opportunities for campus-community collaborations.

1. **Earthquake (80):** The Rodgers Creek/Hayward Fault, which lies less than 1 mile east of the SSU campus, has a 33% chance of a magnitude 6.8 or greater earthquake between 2014 and 2043. The impacts of an earthquake of this magnitude can severely affect community preparedness for climate hazards.
2. **Economic Inequality, Unemployment, Poverty & Food Insecurity (5,19,24,36):** High levels of socioeconomic inequity in Sonoma County create large differences in the ability of individuals to prepare for and recover from heat waves, floods, and wildfires. Financial and social resources are important to reduce these disparities.
3. **Inadequate Public Transportation Systems (20,30):** Public transit in Sonoma County is limited and travel distances between housing, jobs, schools, and commercial areas are typically large. Intra-county transit is mostly utilized by people without access to automobiles, the elderly, students, and the disabled. In Sonoma County, 4.9% of households do not have a vehicle and are dependent on public transportation to secure health care and other critical services during a crisis.
4. **Lack of Affordable Housing, Homelessness and Migration (5,20,71):** Sonoma County has a high cost of living and lack of affordable, available housing. As rents and mortgages rise, people are less likely to prepare for climate extremes (e.g., foregoing upgrades to fire-safe building codes or not securing sufficient rates of insurance for homes and belongings) and more likely to become homeless.
5. **Lack of Social Cohesion (5,24):** Inclusive social structures, such as strong social support or family cohesion, play a key role in community preparedness and response and prevent disparities in economic and political power from undermining regional solutions.
6. **Residents in Floodplains (31)** - Floods are already the most frequent natural hazard impacting Sonoma County and cause the greatest property losses. A total of 8,519 Assessors parcels with an estimated 3,508 structures are entirely or partially in the 100-year flood zone of the Russian River. The SSU Campus lies on the alluvial fan of Copeland Creek which periodically jumps its banks east of campus.

7. **Aging Infrastructure (8):** Many built systems and structures within Sonoma County are at risk for failure due to age and deferred maintenance. An example is Sonoma County's local road network. In 2014 the average pavement condition for all roads combined was ranked as "high risk." Rising construction costs, declining gas tax revenues, and vastness of the road network makes it difficult to make roads resilient to extreme events. The SSU campus has identified millions of dollars in deferred maintenance needs.
8. **Energy Insecurity (8):** Populations most vulnerable to electrical shutdowns include people with medical conditions reliant on electrical equipment and families already facing electrical shutdowns due to other factors such as poverty.
9. **Cascading Impacts Across Sectors (8):** An example of cascading impacts is a disruption to the electric grid that impacts the wastewater treatment, heating for residents, and disruption to transportation and transit systems that prevent community members or students from traveling to work, school or health services.
10. **Species Declines (2,8):** Biodiversity in all regions of the world including Sonoma County is declining due to ecosystem degradation. Reasons for species declines include habitat loss (e.g., open space conversion to housing or agriculture), fragmentation, invasive non-native species, disruption of natural water cycles, and air and water pollution.

4. PROPOSED INDICATORS OF RESILIENCE

Resilience indicators are used to assess need for improvement and monitor change. Although measuring resilience is challenging, indicators are critical for identifying goals and how to achieve them. Many resilience indicators are also indicators of greenhouse gas (GHG) reduction. Examples include water efficiency, energy efficiency, local power, local food, natural water infrastructure, compact development, diverse agriculture and biodiversity-oriented forestry.

To identify indicators for the SSU resilience assessment, we compiled resilience planning goals from county, regional, state, national and international resilience planning documents and selected those signficant for the SSU campus. Special attention was paid to identifying indicators that:

- Target changes in the adaptive capacity of the most vulnerable individuals, communities, built assets, and natural systems,
- Ensure the process of achieving resilience is inclusive of all stakeholders, particularly those most vulnerable to climate change, iterative, flexible, and transparent across scales of government and sectors,
- Include the continual exchange of best practices and lessons learned.

Indicators were categorized into the five dimensions of resilience (social equity and governance, health and wellness, ecosystem services, infrastructure and economy) and classified by planning and communication, preparation for extreme events, and reduction in existing stressors (Table 2). Information about the status of each indicator in the community and on campus were collected from websites and planning documents (Tables 3-7).

APPENDIX B

CAMPUS COMMUNITY RESILIENCE ASSESSMENT

Table 2. Resilience Indicators

	Planning and Communication	Preparation for Extreme Events	Existing Stressors
Social Equity & Governance	• Integration of Climate Projections in All Planning • Collaboration • Authentic Representation	(incorporated into all other dimensions)	• Pathways to Meaningful Careers
Health & Wellness	• Efficacy of Urgent Care and Emergency Response Services	• Disaster Preparedness of Vulnerable Populations • Safety Net Services for Vulnerable Populations • Psychological and Emotional Recovery Services	• Baseline Health and Wellness for Vulnerable Populations • Healthy Environments and Activities • Sense of Belonging and Connection
Ecosystem Services	• Plans that Integrate Multiple Ecosystem Processes • Shared Best Practices	• Food System Security • Forest Practices in Wildland and Urban Landscapes • Integrated Water Management	• Biodiversity of Wildland and Urban Landscapes • Availability of Food, Water and Healthy Environments • Water, Agriculture and Forest Management Practices
Infrastructure	• Design that Integrates Ecosystem Processes • Risk Assessments for Infrastructure and Services	• Infrastructure Hardening and Protection • Intelligent Power and Water Infrastructure • Telecommuting and Digital Resources • Services as Educational Opportunity	• Deteriorating Infrastructure • Capturing & Recirculating Natural Resource Waste • Access To Affordable & Convenient Multimodal Transportation • Capacity to Support Vulnerable Populations
Economy	• Use of Climate Projections in Financial Planning	• Resilient Supply Chains • Funding Spent on Resilience Projects	• Support for Diverse Local Economy • Workforce Alignment with Economic Sectors and Climate Resilience Jobs

Social Equity and Governance Indicators

Social equity and governance indicators measure the resilience of systems of governance, levels of engagement and capacity of groups on campus and in the community to adapt and respond to climate change (24).

Table 3. Social Equity and Governance Indicators

	Resilience Indicator	Community	Sonoma State University	Example Metric
	Planning and Communication			
1	**Integration of Climate Projections in All Planning (3,27,35,36)** Preparing communities for extreme events and long-term changes in climate requires ongoing, flexible, transparent, inclusive, and iterative decision-making processes, and planning across all scales of government, and the continual exchange of best practices and lessons learned.	Climate Emergency Resolutions adopted by all cities in Sonoma County. City Climate committees in Petaluma, Windsor, Healdsburg and Sebastopol. Multi-year General Plan update in process (last updated 2008) is opportunity to incorporate climate projections and resilience goals.	Climate projections have not been incorporated into SSU planning documents.	Proportion of guiding documents that incorporate climate projections.
2	**Collaboration (3,24,35,36)** Collaboration is needed for effective response to extreme events and achieving meaningful regional resilience goals. Collaborative efforts include leveraging efforts of state and national organizations engaged in resilience.	Over 30 regional collaborations address sustainability and resilience (see annotated bibliography). Broad diversity of climate-forward organizations, agencies and communities	Engaged in the Sonoma County Climate Mobilization Strategy. Faculty, students and staff study regional resilience challenges (e.g., Center for Environmental Inquiry, Center for Sustainable Communities, Climate Research Center) and convene public symposia (e.g., Fire Conference). List of these collaborations have not been compiled to quantify level of engagement.	Degree to which emergency preparedness and resilience efforts are coordinated with cross-sector partners and leveraged with state and national organizations.
3	**Authentic Representation (3,24,27,35)** Resilient responses require that the needs and points of view of everyone - especially vulnerable populations - are considered in disaster and recovery plans and in building equity needed to enhance resilience.	Strong culturally diverse leadership including Federated Indians of Graton Rancheria, Sonoma County Office of Equity, Latino Leadership on Climate Change, Hispanic Chamber of Commerce, North Bay Immigrant Youth Union. Funding for diversifying leadership includes United Way Map One Grants and Community Foundation Latino Leadership Fund. Leadership training programs include Daily Acts Leadership Institute and Latino Service Providers Promotores Verde. Local bilingual newspapers include La Voz, County Department of Health press releases. Environmental justice organizations include North Bay Organizing Project, Peace & Justice Center of Sonoma County, Daily Act's North Bay Environmental Health Network, Sonoma County Climate Action and North Bay Jobs with Justice. The degree to which vulnerable populations are engaged in climate planning is not quantified.	Hispanic Serving Institution with culturally diverse leadership. Organizational structure includes Office of Diversity Equity and Inclusion and President's Diversity Advisory Council. Over 20 clubs affirm identity and belonging for students who identify as Black, Chicanx, Disabled, Filipino, Foster Youth, Latinx, LGBTQIA+, and Native American. Support programs include the Basic Needs Initiative, DREAM Center, Educational Opportunity Program and the HUB Cultural Center.Degree programs: American Multicultural Studies, Chicano and Latino Studies, Certificates in Compassion Cultivation, Conflict Management, Counseling, Criminology and Criminal Justice Studies, Global Studies, Latin American Studies, Native American Studies, Queer Studies, Special Education, Women and Gender Studies. The degree to which vulnerable populations are engaged in climate planning is not quantified.	Identification of populations vulnerable to climate change and degree to which they are engaged in climate planning initiatives
	Reduction in Existing Stressors			
4	**Pathways to Meaningful Careers (20,37)** Access to education can break the cycle of poverty.	Sonoma County Office of Education provides a list of resources and programs on their website.	Exceptional pre-school, elementary school, middle school, high-school, college readiness and retention (e.g. TRIO, CAASE, Summer Bridge), leadership programs, real-world project learning experiences (e.g., CCE, CEI, SCS) but cumulative impact of all programs has not been evaluated.	Number of Sonoma County children and youth from disadvantaged communities participating in educational programs; number of these students who earn a 4-year college degree

Health and Wellness Indicators

Health and wellness indicators measure the ability of different groups on campus and in the community to fulfill their basic needs. This includes access to healthcare, food, water, housing, and sanitation (24). Health and wellness are inseparable from the other dimensions of resilience which can both impact and be impacted by health conditions.

Table 4. Health and Wellness Indicators

	Resilience Indicator	Community	Sonoma State University	Example Metric
	Planning and Communication			
1	**Efficacy of Urgent Care and Emergency Response Services (3,8,35)** Recovery from trauma requires affordable, culturally and linguistically-appropriate urgent, emergency, behavioral, mental and trauma-informed care.	In response to recent fire, flood and pandemic, the county has increased staffing and emergency services, and early warning networks for fire and flood.	During the last 3 years of wildfire and pandemic, SSU emergency response has become closely coordinated with county response services and includes providing a tower and high-speed internet connection for the North Bay Wildfire Alert System.	A comprehensive evaluation of the effectiveness of response programs with respect to vulnerable populations; specific goals for improvements in early warning systems, communication, hazard mitigation, and disaster recovery.
	Preparation for Extreme Events			
2	**Disaster Preparedness of Vulnerable Populations (3,35,36,45)** Level of preparedness for fire, flood, heat and drought, especially for individuals from vulnerable populations.	Community preparedness groups include neighborhood groups, fire safe councils, community response team certifications.	SSU Emergency Plan follows the standards of the California State Office of Emergency Services and the Federal guidelines of the National Incident Management System. It facilitates multi-agency and multi-jurisdictional coordination between Sonoma State University, the California State University system, the Sonoma County Operational Area and surrounding local governments, including, special districts and other state agencies. Hazard specific plans include Building Flood, Earthquake, IT Systems Outage, Severe Weather and Environmental Flood, Significant Utility Outage, Structure Fire and Wildfire.	Level of awareness of disaster preparedness, access to climate resilience information and opportunities to engage in planning and recovery efforts
3	**Safety Net Services for Vulnerable Populations (27,35)** During and after a disaster, vulnerable populations are the hardest hit and need access to a variety of safety net services: food, translation for non-english speakers, emergency childcare services, and employment opportunities.	Sonoma County Safety Net Services include crisis counseling and coordination of care (e.g., ACCESS).	SSU services include Care Team, Lobo's Pantry, CalFresh, Basic Needs Initiative	Comprehensive disaster support services that include needs specific to vulnerable populations (e.g., translation for non-english speakers, emergency childcare services, employment opportunities) developed in consultation with members of vulnerable populations. Degree of collaboration between campus and community in providing services
4	**Psychological and Emotional Recovery Services (35)** Successful recovery programs address psychological, emotional, and behavioral health needs and connect the recovery of individuals, families, social networks, and communities for all members of the community.	County offers psychological services, including services for suicide, trauma and counseling specific for wildfire-related trauma.	SSU offers psychological services, including services for suicide and trauma. SSU has offered counseling specific for wildfire-related trauma.. Counseling and Psychological Services	Planning preparation for mental health services specific to drought, flood, fire and heat and integrated with beneficial nature experiences. Examples Include informing and educating the community about available services, basic psychological support and crisis counseling, assessment, and referral to treatment when needed for more serious mental health issues.
	Reduction in Existing Stressors			
5	**Baseline Health and Wellness for Vulnerable Populations (1,14,27,35)**	The County and state track health indicators (e.g., asthma prevalence, disease, mortality, health care, financial security and other indicators. County safety net services include coordination of care (ACCESS).	Student Health Center provides outpatient medical care for acute and sub-acute illnesses, injuries, and basic mental health concerns. Most visits are at no additional cost to the student.	Index for tracking baseline health and wellness specific to climate resilience for vulnerable populations. Baseline resilience indicators include direct measures of health (e.g., asthma prevalence, disease,mortality), levels of access to basic needs (health care, food, water, homes) and financial security.

Table 4. Health and Wellness Indicators cont.

6	**Healthy Environments and Activities (27,35)** Programs that protect communities from polluted water, air, and wildfire hazards and provide opportunity for exercise and relaxation give residents a healthy environment for living, growing food and adapting to climate change.	A wide variety of community and campus programs focus on improving health of residents. Health programs are provided by health providers (e.g., Kaiser), Sonoma County, and nonprofits. Opportunities for outdoor activities include outdoor education programs and an extensive network of recreational lands. Environmental justice organizations include North Bay Organizing Project, Peace & Justice Center of Sonoma County, Daily Act's North Bay Environmental Health Network, Sonoma County Climate Action (part of 350 Bay Area) and North Bay Jobs with Justice. The degree to which vulnerable populations are engaged in climate planning has not been quantified.	SSU fitness and wellness programs include the Recreation Center, Student Health Center education services and the Employee Wellness Program	Status of vulnerable populations and degree to which programs protect vulnerable communities from pollution, risk of disaster and enhance quality of life through outdoor activities
7	**Sense of Belonging and Connection (27,35)** Connected communities - those that are connected to each other as individuals, to the public realm, to services, to green spaces and to opportunities - are more resilient.	Examples of community connection programs that target resilience planning in Sonoma County are: Neighborfest, Citizens Organized to Prepare for Emergencies (COPE), Map Your Neighborhood, Listos: California for All, Fire Safe Councils and the Community Emergency Response Team (CERT) program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills	SSU "Noma Nation" programs enhance students' sense of belonging to campus communities and over 20 student clubs and programs provide support for marginalize or disadvantaged populations.	Degree to which SSU works with community programs to enhance student connections to community programs and services

APPENDIX B

CAMPUS COMMUNITY RESILIENCE ASSESSMENT

Ecosystem Services Indicators

Ecosystem service indicators measure the environmental systems and services present in the campus-community, including natural and geographic features of the region (24). Human wellbeing is intimately tied to the "health and wellness" of earth's natural systems. The relationship is reciprocal occurring on both temporal (e.g., disasters vs chronic problems) and spatial (e.g., from a campus to neighborhood to global) scales.

Table 5. Ecosystem Services Indicators

	Resilience Indicator	Community	Sonoma State University	Example Metric
	Planning and Communication			
1	**Plans that Integrate Multiple Ecosystem Processes** Resilient communities integrate land use planning and development in ways that simultaneously address increasing drought (groundwater management), flood (stormwater management), fire and heat.	Sonoma Water integrates water and energy systems (i.e., zero carbon water initiative) and has drafted a climate adaptation plan that incorporates climate projections. There is exceptional collaborative work and expertise in the county on how to integrate multiple ecosystem processes.	SSU has not developed an integrated plan for campus. SSU Preserves have begun drafting land management plans based on ecosystem services, biodiversity and inquiry goals.	Plans and practices that integrate agriculture, water, fire, energy and development and include climate projections.
2	**Sharing Best Practices (3,45, 68)** Communication and collaboration are the backbone of resilient communities. Indicators of communication include incorporation of information on best practices (e.g., science, indigenous knowledge, cultural practices) into land management and land use planning.	The county has exceptional combined expertise in green utilities, agriculture, land management, and sustainable building techniques. Opportunities for sharing best practices are widespread, including those for facilities (e.g., Advanced Energy Center), managed lands (e.g., Pepperwood), biodynamic farming practices (nonprofits, CSAs).	SSU faculty have expertise in green utilities, land management, wildfire, water filtration, hydrology, climate and sustainable communities. The university hosts symposia and workshops in land use planning, wildfire. The SCWA-SSU Waters Collaborative funds students and faculty to address regional water challenges.	The number of people attending events that specifically focus on sharing practices (i.e., scientific papers, practitioner expertise, indigenous ecological knowledge) that increase resilience of communities and ecosystems.
	Preparation for Extreme Events			
3	**Food System Security (27,24,52)** Diverse food systems are more resilient than single sources. To be resilient, food systems must cope with the shocks, complexity and uncertainty by continually evolving and increasing flexibility and "back-up" capacity.	Sonoma County agriculture includes eggs, fruits and vegetables, wool, meats, milk products and is home to a large number of community supported agriculture businesses. Yet, less than 10% of Sonoma County's food is grown within Sonoma County. Local food growers were instrumental in providing food for evacuees during wildfires and there is significant expertise in biodynamic agriculture among nonprofits, farmers and businesses.	SSU food services tracks purchases from local growers.	Measures of food reliability and distribution during disasters, particularly with regards to vulnerable populations; support for farmers growing diversity of crops that enhance reliability and response to changing climate; improvements in services for farm and food workers to recover from disasters
4	**Forest Management for Fire and Heat (54)** Resilient communities minimize fire risk and severity at the wildland urban interface and use urban forestry to prepare for extreme heat events.	Sonoma County is creating a $2-4 million fuel reduction grant program. Organizations and agencies working on fuel reduction issues include Fire Forward (Audubon Canyon Ranch), Sonoma Water, Pepperwood Preserve, UC Cooperative Extension, Permit Sonoma, North Sonoma County Air Pollution Control District, Concern has arisen about the effectiveness of these projects to reduce fire hazards and the possible effects on declining oak woodland ecosystems. Urban forestry projects are underway in various part of the county.	SSU campus has adopted resilient tree policies and restoration projects, and the Center for Environmental Inquiry is launching a lecture and research series on fire policy.	Increases in fire hardening of structures and reduced forest flammability in buffer zones near structures; increased fire fighting capabilities (e.g., water storage capacity); urban forestry goals for campus and communities that minimize illness, extreme heat, and poor air quality
5	**Integrated Water Management (2,3,27,35,36,24)** Resilience increases when both humans and native species have reliable access to water during drought and recover quickly from flooding.	Sonoma Water is a leader in integrated water planning surrounding water storage, ground water planning, fisheries management, and energy use. A collaborative project to capture flood water, increase ground water recharge, creates steelhead habitat and enhances recreational opportunities is proposed just east of the SSU campus.	SSU has not developed an integrated water plan but uses recycled water for irrigation and some restrooms. Dormitories have water conserving plumbing (low-flow showerheads)	Increased rates of water infiltration; increases in flood plain capacity; removal of structures or increase in flood resistance of existing structures in floodplains; increases in water capture and storage capacity especially of floodwaters (e.g., groundwater); reductions in water use (e.g., climate-smart landscaping, conservation, recycled water)

Table 5. Ecosystem Services Indicators cont.

	Reduction in Existing Stressors			
6	**Biodiversity of Wildlands and Urban Landscapes (2,67)** Biodiversity is the foundation of the ecosystem processes that support human well-being. Levels of biodiversity can be used as a measure of integrated ecosystem functions.	Extensive conservation planning by numerous organizations has identified priorities for land conservation and biodiversity monitoring needs and include the Sonoma County Biodiversity Action Plan and Conservation Lands Network. Land conservation organizations include Sonoma County Agriculture and Open Space District and Sonoma Land Trust. Control of invasive species is an important management tool and is supported by Marin-Sonoma California Invasive Plant Council.	SSU manages 4200 acres of wildlands at three preserves with active training programs, manages invasive species, supports educational native plant gardens on campus and has popular biology and geography majors.	Species abundance and diversity in wildland, urban or agricultural systems; habitat quality of indicator species, keystone species or sensitive habitats (e.g., riparian); indicators of function in natural systems (i.e., forests, streams, wetlands, riparian areas, floodplains, and groundwater aquifers); sustainable timber harvesting; carbon sequestration levels; threats, such as habitat loss or fragmentation, invasive species, disease, air and water pollution, global climate change, waste.
7	**Equal Access to Food, Water and Healthy Environments (24,27)** Climate equity includes equal access to environmental benefits for all, regardless of income, race, and other characteristics.	County populations vary widely in their ability to access food, water and the outdoors. Sonoma County has 21 food banks or pantries. Sonoma County Food Recovery Coalition hosts a produce exchange program. The Community Garden Network of Sonoma County coordinates and supports a network of community gardens	Student Affairs runs the Lobo Food Pantry for students. The on-campus garden classroom contributes produce to food pantries.SSU campus and preserves have exceptional outdoor spaces that are not fully leveraged for vulnerable populations.	Affordable, accessible, and culturally-relevant local food and water; types of green spaces used, distribution of urban gardens relative to vulnerable populations; percent children regularly in green spaces, spatial assessments of viewsheds.
8	**Low Impact, Integrated Land Management** Resilient communities adopt low impact agriculture, water and forest management practices that are integrated with ecosystem processes.	Sonoma County is known for its range of organic and biodynamic agriculture, protection of agricultural lands, organic wine industry initiatives, proactive water services, and sustainable forest management practices.	SSU employs sustainable management practices as part of landscaping (e.g., natural pesticides, flammable tree removal), campus gardens (garden classroom and native plant gardens), riparian restoration projects, and land management at SSU Preserves (invasive species control, road and trail erosion reduction projects)	**Agriculture**: Application of low impact agricultural practices (e.g., organic, integrated with livestock, reducing dependence on fertilizers and pesticides, protection of agricultural lands, improved water-holding capacity of soils, reduced erosion, diverse farming systems with native plants and pollinators, composting, enhancing carbon sequestration of soils). **Water** practices that improve function of natural systems (i.e., forests, streams, wetlands, riparian areas, floodplains, and groundwater aquifers), resulting in increased water infiltration, water quality, storage capacity and biodiversity **Forest** management practices that promote biodiversity, such as control of insects, diseases, and invasive species, sustainable harvesting and increase in groundwater water storage, outdoor activities, and carbon sequestration

CAMPUS COMMUNITY RESILIENCE ASSESSMENT

Infrastructure Indicators

Infrastructure indicators measure the condition of physical structures built, owned, managed, and/or used by the campus-community, including systems such as communication and public transportation (24).

Table 6. Infrastructure Indicators

	Resilience Indicator	Community	Sonoma State University	Example Metric
	Planning and Communication			
1	**Design That Integrates Ecosystem Processes** Resilient infrastructure incorporates natural systems in their design and construction	Permit Sonoma uses flood zones, and prevention and flood resistant construction guidelines adopted in 1982. The county allows construction in fire and flood prone areas. New fire building codes were adopted by Permit Sonoma in 2020 and the county provides fire hardening guidelines for homes. The County General Plan is being revised and provides new opportunities for incorporating additional best practices.	Facility plans do not incorporate climate projections or specific solutions for integrating design and construction with natural systems.	Integration of resilient infrastructure design into building permit practices (e.g., developing outside of high risk zones, enhancing water storage capacity, minimizing impact, using recycled materials, reducing greenhouse gasses, pervious pavement to increase water infiltration); demonstration of resilient infrastructure. (e.g., development outside of high risk zones, enhancing water storage capacity, minimizing impact, fire hardening structures, reducing greenhouse gasses, pervious pavement for water infiltration).
2	**Risk Assessments for Infrastructure and Services (3,27,36,45)** Risk assessments incorporate climate projections and other risks into the design and maintenance of infrastructure, services and maintenance and replacement schedules.	Climate risk assessments for infrastructure have been conducted by the state, county and non-profits. The county 5-year plan is currently being updated using a Multi-Jurisdictional Hazard Mitigation Planning approach that involves collaboration with local jurisdictions and the community.	SSU has not conducted risk assessments related to climate projects for infrastructure and services.	Risk assessments for vulnerability of SSU infrastructure to drought, flood, heat, fire and earthquake are incorporated into the design and maintenance of infrastructure (transportation, wastewater treatment, buildings, broadband), services (e.g., water, energy, emergency services, wifi) and maintenance and replacement schedules.
	Preparation for Extreme Events			
3	**Infrastructure Hardening and Protection (2,7,8,13,36)** Resilient responses require that critical infrastructure (e.g., early warning, notification, coordination, and response systems) or infrastructure located in high-risk areas are retrofitted to increase resistance to extreme events.	Sonoma County priority projects include facilitating construction hardening techniques appropriate for wildfire urban interfaces and seismic retrofits for rebuilding and for existing homes through education and grant programs, and working with private utility providers on solutions related to hardening infrastructure and on coping with destroyed utilities in a disaster	SSU campus floods periodically during of after atmospheric river events due to a long-standing flood capacity problem on Copeland Creek. Flood impacts affect the cities of Rohnert Park, Petaluma and Penngrove. Campus is vulnerable to wildfire on its eastern boundary.	Critical infrastructure needed for emergencies (e.g., early warning, notification, coordination, and response systems) is located outside of high-risk areas and is retrofitted to increase resistance to extreme events
4	**Integrated Power and Water Infrastructure (36,45)** Resilient services are fully integrated, distributed, and redundant	Sonoma Water provides carbon free water to residents.	SSU campus has not analyzed utility systems with regards to resilience	Degree to which services are integrated, distributed, redundant and protect critical infrastructure.
5	**Telecommuting and Digital Resources (3)** Organizations and individuals that can continue to work digitally even when transportation is compromised are more resilient to extreme events.	Economic Development Board is working with rural communities to develop broadband service. In response to the pandemic, the County adopted temporary telecommuting policies.	In response to the pandemic, SSU adopted temporary telecommuting policies.	Degree to which individuals can continue to work digitally even when transportation is compromised
6	**Services as Educational Opportunity (45)** Resilient communities mainstream information on climate risks by incorporating critical culturally-unbiased information into the delivery of services and use of infrastructure.	County and utility operators provide educational information about fire, flood and drought as part of customer interaction.	SSU has programs to educate dormitory students about sustainability but does not have a comprehensive plan to use utility delivery to educate faculty, students and staff.	Degree to which culturally unbiased information on climate risks is incorporated into the delivery of services and use of infrastructure.

Table 6. Infrastructure Indicators cont.

	Reduction in Existing Stressors			
7	**Deteriorating Infrastructure (27,36)** Deferred maintenance of critical infrastructure decreases infrastructure resilience to extreme events.	Sonoma County has prioritized upgrades to roads, bridges, communications networks, and public buildings to better withstand impacts of fires, floods, seismic and Public Safety Power Shut Off (PSPS) events.	SSU has identified a comprehensive list of needed maintenance and upgrades including projects that increase reliability of energy services for critical infrastructure. Climate projections have not been included as a criteria in ranking maintenance priorities.	Essential and critical infrastructure is prioritized for maintenance projects
8	**Capturing & Recirculating Natural Resource "Waste" (82)** Reducing and recapturing waste can make households, communities, and cities more resilient by reducing chronic economic and infrastructure stresses.	Zero Waste Sonoma is a coalition of jurisdictions in Sonoma County that have collectively adopted regional goals for waste reduction, reuse, and recycling which are included in Countywide Integrated Waste Management Plan and Sonoma County Regional Climate Action Plan (CAP).	SSU recycles all of its green waste and is working on a composting program for food waste.	Degree to which waste is reduced, repurposed and recycled
9	**Access To Affordable & Convenient Multimodal Transportation (3)** Resilient communities provide everyone with affordable well-connected public transportation options (bike trails, buses, trains) that are aligned with critical needs (food, work, health care) and healthy lifestyles (parks, recreation).	Public transportation in Sonoma County is limited and travel distances between housing, jobs, schools, and commercial areas are typically large. Intra-county transit is mostly utilized by the 4.9% of the households without access to automobiles, the elderly, students, and the disabled. Recent addition of the Smart Train has increased available options. Sonoma County Transit Authority is working on a "unified brand" to integrate bus operators in the county and is developing a new visionary document for pedestrians and bikes. Go Sonoma, funded by the passage of a nominal sales tax increase, supports transportation and climate goals.	SSU participates in Sonoma County Mobilization	Affordability and connectedness of public transportation options (bike trails, buses, trains) aligned with critical needs (food, work, health care) and healthy lifestyles (parks, recreation, education).
10	**Capacity to Support Vulnerable Populations (27,36)**	Sonoma County has a housing shortage. Generation Housing, Sonoma Ecology Center, Sonoma County and others are working to develop housing using resilient approaches.	SSU purchased an apartment complex in Petaluma to provide affordable housing for faculty and employees.	Availability of affordable, convenient, culturally-appropriate housing, utilities and other infrastructure for vulnerable populations; capacity of new construction to support vulnerable populations

Economic and Financial System Indicators

Economic and financial system indicators measure the financial ability of the campus and community to proactively adapt to changing climate conditions and to respond positively to climate change events (24).

Table 7. Economic and Financial System Indicators

	Resilience Indicator	Community	Sonoma State University	Example Metric
	Planning and Communication			
1	**Use of Climate Projections in Financial Planning (3,19,27,36,24)** Resilient financing incorporates nature-based approaches (e.g., green new deal, doughnut economic recovery, and People, Planet, and Profit Triple Bottom Line, green jobs), market and non-market values (e.g., ecosystem services), disruption when damage occurs and projected climate risks on economic sectors.	Sonoma County economic updates do not typically assess economic health based on green economy models or incorporate the potential impact of climate projections on economic sectors: 1. Advanced Technology 2. Agriculture & Food 3. Healthcare 4. Hospitality & Recreation 5. Outdoor Products & Craft Goods 6. Professional Services & IT	SSU has not incorporated climate projections in financial planning, but has divested from fossil fuel investments.	Degree to which financing incorporates nature-based approaches (e.g., green new deal, doughnut economic recovery, and People, Planet, and Profit Triple Bottom Line, green jobs), market and non-market values (e.g., ecosystem services), and projected climate risks on economic sectors
	Preparation for Extreme Events			
2	**Resilient Supply Chains (3,24)** Resilient supply chains are those that are created proactively and allow organizations to withstand and quickly recover from incidents.	Zero Waste Sonoma is a leading proponent of reusing and producing less waste.	CSU guidelines for sustainable procurement strategies are in development.	Degree to which organizations increase efficiency by producing less or reusing waste, increase redundancy (e.g., diversify suppliers), flexibility (e.g., align procurement strategy with supplier relationships) and culture (e.g., continuous communication, distributed power, passion for work, conditioning for disruptions)
3	**Funding Spent on Resilience Projects (3,24,35,36,45)** Resilient communities scale up funding (e.g, green funds, private sector investments, operating budget allocations) for resilience projects - especially those that support vulnerable populations - and use California vulnerability indicators to prioritize funding, community engagement, jobs, and services for communities facing disproportionate climate and health risks. Similarly, resilient communities scale down investments in non-resilient practices (e.g., fossil fuels divestment).	Sonoma County recently received PG&E settlement funding and is spending $2-4 million to reduce fuel loads in buffer zones.	SSU has established a green fund, sustainability donor fund, and provides faculty-student grants to engage in priority resilience projects on campus and in the community	Increases in funding (e.g., green funds, private sector investments, operating budget allocations) for resilience projects - especially those that support vulnerable populations; use of California vulnerability indicators to prioritize funding, community engagement, jobs, and services; decreased investments in non-resilient practices (e.g., fossil fuels divestment).
	Reduction in Existing Stressors			
4	**Support for Diverse Local Economy (27,35,36,37)** Creating a resilient local economy requires buying local across a range of economic sectors.	Go Local promotes purchasing from local businesses.	For SSU, some CSU statewide purchasing agreements require purchasing from nonlocal sources. Although local spending does occur, the amount of local spending has not been assessed.	Degree of investment and purchasing from local businesses across a range of economic sectors.
5	**Workforce Alignment with Economic Sectors and Climate Resilience Jobs (3,35,36)** Resilient communities develop a high-quality equitable workforce for local businesses, rebuilding efforts, and resilience jobs.	The county has built solid bridges between enterprise and educators through Strategic Sonoma, the Santa Rosa Junior College Employment Training Center, Economic Development Board Workforce Alignment Team, and the Sonoma County Workforce Investment Board	SSU participates in the Economic Development Board Workforce Alignment Team and the Sonoma County Workforce Investment Board.	Availability of a high-quality equitable workforce for local businesses and resiliency jobs (e.g., green infrastructure, brownfield cleanup, urban agriculture, green energy technologies, energy efficiency, weatherization and retrofitting, urban forestry, habitat restoration, sustainable timber harvesting, biomass utilization).

5. CAMPUS-COMMUNITY OPPORTUNITIES FOR SHARED RESILIENCE

This assessment sets the stage for campus-community resilience action planning. The action plan will be led by the PSAC's Regional Resilience Working Group and include efforts internal to campus and between campus and community. The effort will be inclusive with representation from vulnerable populations and cross-sector with participation from social, health, environment, and economic disciplines and sectors. The assessment and action plan will be part of the SSU's Climate Action Plan (targeted for completion on April 5, 2022).

Here, we provide a list of initial campus-community opportunities for shared resilience. Opportunities fall within four areas of strength that universities bring to their communities:

- Sharing Knowledge - Through faculty expertise, libraries, neutral convening spaces, and symposia, workshops, and conferences
- Skilled Workforce - Diversity of student backgrounds, experiences and ideas, and workforce potential of graduates
- Innovation and New Knowledge - Multi- and interdisciplinary research on regional challenges
- Operational Synergies - Significant purchasing power and collaboration opportunities

To be effective, these collaborations must be ***inclusive with representation from vulnerable populations*** **and cross-sector with participation from social, health, environment, and economic sectors.**

1. **Equity for Vulnerable Populations:** Health, wellness and basic needs for vulnerable populations. Collaborations address identification of climate equity issues, informing campus and community about climate change and disaster preparedness, and development of social connections and support networks between students and community.
2. **Workforce Development and Job Opportunities**
    a. ***Pathways to 4-Year University Degrees:*** Opportunities for members of vulnerable populations to achieve 4-year university degrees. Includes comprehensive educational pathways, from preschool to career training
    b. ***Alignment with Workforce Needs and Resilience Jobs:*** Alignment of student knowledge, skills and experience with employer needs and climate resilience jobs. Includes collaborations with private employers, government, Santa Rosa Junior College, K-12 Districts, Economic Development Board, Sonoma County Workforce Investment Board (WIB) and maker spaces

c. ***Entrepreneurship:*** Success of students, graduates, and small businesses, including loans for individuals with entrepreneurial aspirations.

3. Disaster Preparedness and Recovery

a. ***Hazard Mitigation***

- Risk assessments. Includes work with Rohnert Park, Penngrove, Petaluma and the County on Copeland Creek flooding, groundwater storage, wildfire, and extreme heat.
- Implementation of solutions integrated with natural systems, including building and utility retrofits and upgrading of deteriorating infrastructure

b. ***Multi-Sector Emergency Coordination and Recovery***

- Long term regional planning to improve continuity of critical services during flood, fire, drought and heat.
- State of the art emergency response facilities and technology, including early warning (e.g., Alert North Bay, flood warning) and notification systems
- Workforce and students aware and prepared for climate hazards, such as neighborhood and dormitory preparedness programs
- Loans and financial programs for individuals and businesses impacted by disasters

4. Innovation and Knowledge

a. ***Awareness and Application of Best Practices in Resilience***

- Demonstration sites on campus, SSU Preserves and throughout the county that enhance understanding of resilient infrastructure (e.g., Environmental Technology Center), human connections to ecosystems (e.g., SSU Preserves, campus gardens, Copeland Creek), communities (e.g., transportation and housing), agriculture and landscaping (e.g., Garden Classroom) and operations (e.g., waste).
- Workshops, conferences and symposia targeting best practices and implementation opportunities in sustainability and resilience

b. ***Regenerative Economics:*** Reimagine and realize economic indicators within the context of regenerative economics (e.g., Green New Deal, Doughnut Economics, Butterfly Economic Models, Theory U, Prosocial, Circular Economy, Triple Bottom Line of People, Planet, and Profit)

c. ***Multi-Sector Inquiry and Assessment:*** Robust campus-community platforms (e.g., Rising Waters approach and Centers with sustainability and resilience focus) for multi-disciplinary solution-oriented research that address, implement and track priority resilience challenges

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of board workshops, community groups, stakeholder meetings, recovery planning community meetings and online surveys

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APPENDIX C

POLICY RECOMMENDATIONS

	POLICY OR PLAN	EXISTING	RECOMMENDED	TEMPLATE	SAMPLE LANGUAGE
Safety and Facilities	**Facility Maintenance and Renovation Policy**	SSU policy: Construction of New Buildings and/or Structures CSU policy: EO 987 Statement on Energy Conservation, Sustainable Building Practices, and Physical Plant Management for the California State University. CSU Sustainability Policy Requires new buildings to exceed state energy code minimum performance by 10%. D. State policy: CA AB262 Buy Clean Air Act Requires Environmental Product Declarations (EPD) when purchasing certain construction materials including steel, glass, and mineral wool insulation.	Prepare for future conditions by integrating climate forecasts (ie., increasing flood, fire, drought and heat) into facilities planning. Sustainable materials purchasing guidelines and a list of construction materials with low embedded GHG emissions. This list may be applied to any updated annually by student interns (Action A.1.2). Construction waste diversion. Energy efficiency best management practices and metering guidelines, including tracking building performance in ENERGY STAR Portfolio Manager (Action A.1.1). Water efficiency best management practices and metering guidelines. Identify areas where Facilities Student Intern may assist with implementation. Target LEED O+M Silver or above for campus and all existing buildings - CSU policy stipulates LEED equivalency for newly constructed buildings leaving an opportunity for SSU to create its own standard for existing buildings, small construction projects, and site infrastructure projects. LEED O+M provides a framework to See the LEED sidebar for more detail.		

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	POLICY OR PLAN	EXISTING	RECOMMENDED	TEMPLATE	SAMPLE LANGUAGE
Safety and Facilities	**Emergency and Recovery Plans**	SSU Emergency Plan	Incorporate climate projections and risk assessments into all planning.		
Human Resources	**Diversity and Equity Plans**	SSU Diversity Statement	Incorporate climate projections and sustainability goals into diversity and equity planning.	Write a Plan	
Business and Finance	**Landscape Management Plans**	Copeland Creek Master Plan SSU Preserves Management Plan Integrated Pest Management.	Policy for landscape management setting sustainability targets for plant and tree species, equipment, fertilizer and pesticide use, carbon sequestration, erosion control, plant waste, mulch application, etc. Develop an integrated plan that enhances biodiversity and educational use of campus gardens, Copeland Creek, and SSU Preserves. Need to include biodiversity, water and energy systems; resilient tree policy.	SSU Sustainable Landscape Management Policy (meets LEED O+M, STARS requirements)	"Reduce noise and air pollution resulting from gasoline-powered equipment." "100% of new plants and trees will be drought-tolerant, native species" "Implement erosion and sedimentation control measures 100% of the time." "Compost 100% of plant material waste." "Offset 25% of annual emissions through carbon sequestration on campus and lands." "Add one or more inches of organic matter mulch, such as compost, to soil surfaces in planting areas annually."
	Stormwater Management Plan	SSU Stormwater Guidelines	O&M manual covering landscapes and vegetation, hardscapes, porous pavement, infiltration, safety, pollution, and pest control and monitoring of Copeland Creek water quality also need to comply with new State regulations (e.g., plastics).	Sample Green Stormwater Management Manual.pdf CSU: No applicable policy	VEGETATION: * 100% of the swale bottom is covered with healthy, wetland vegetation. * No bare spots INFILTRATION: * Soil is well aerated, no evidence of compaction * Water drains within 48 hours MAINTENANCE: * No erosion, channelization or scouring * No significant sediment or debris accumulation"

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POLICY RECOMMENDATIONS

	POLICY OR PLAN	EXISTING	RECOMMENDED	TEMPLATE	SAMPLE LANGUAGE
	Purchasing Policy	CSU Contracts and Procurement Policy including CSU Buy-Recycled Products Campaign and CSU Single-Use Plastics	Policy for purchasing ongoing consumables, food and beverages, garments & linens, and office equipment, including sustainability targets.	SSU Sustainable Purchasing Policy (meets LEED O+M, STARS, and CSU criteria)	"75% of ongoing consumables purchases will meet the sustainability criteria described in this policy" "15% of food and beverage purchases will meet the sustainability criteria described in this policy" "50% of durable goods purchases will meet the sustainability criteria in this policy" "50% of lamps contain no mercury (with equivalent energy efficiency as mercury containing lamps) or have an average of 25 picograms of mercury per lumen-hour or less"
	Green Cleaning Policy	Laboratory Housekeeping Guidelines	Policy for cleaning procedures, cleaning material purchases, cleaning equipment purchases, and cleaning services with quantitative targets based on sustainability criteria.	Green Cleaning Policy Template (meets LEED O+M criteria)	"75% of cleaning materials and products will meet sustainability criteria, 40% of cleaning equipment meets sustainability criteria. Limited use of toxic chemicals."
	Waste Audit Guidelines	California state-mandated SB 1383	Guidelines for conducting waste audits to identify opportunities to increase waste diversion from the landfill through recycling, composting, and other means.	SSU Waste Audit Guidelines (meets LEED O+M criteria)	"Conduct an audit of the building's entire ongoing consumables waste stream. Use the audit results to establish a baseline that identifies the types of materials in the waste stream and the amounts of each type by weight. Identify opportunities to increase recycling, composting, and waste diversion, as well as opportunities to reduce waste. Share the audit results with the building manager and occupants and implement new recycling or composting initiatives, if needed."

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POLICY RECOMMENDATIONS

	POLICY OR PLAN	EXISTING	RECOMMENDED	TEMPLATE	SAMPLE LANGUAGE
	Integrated Pest Management Plan	SSU Residential and Campus Housing IPM Guidelines	Integrated Pest Management (IPM) Plan to minimize the impact of site management practices on the local ecosystem, and to reduce exposure of occupants, staff and maintenance personnel to potentially hazardous chemical, biological and particle contaminants.	IPM Plan Template and IPM Pesticide Log Template (meet LEED O+M criteria)	"Integrated methods that make use of monitoring and non-toxic preventative measures (e.g., site inspection and maintenance, cultural controls, pest inspection and population monitoring) will be used to proactively manage and minimize pest issues. In the event that monitoring activities reveal a need for the use of pest controls, appropriate control options will be evaluated, and the least-toxic option likely to be effective will be employed. Least-toxic pesticides are defined by the City of San Francisco's Hazard Tier 3 criteria (least hazardous)."
	Transportation Demand Management Plan	CSU Transportation and Parking Policy Telecommuting Policy	Develop a plan to use transportation options - including telecommuting - that have the lowest total cost of ownership, lowest carbon emissions and best fit for regional transportation needs to mitigate congestion and pollution while maintaining access to campus.	Sample: Fresno State's Active Transportation Plan	"This Plan provides recommendations – both broad and site specific – to allow the University to better accommodate active and healthy transportation modes for the entire campus community to move to and around campus. Investing in active transportation is a sustainable and cost effective strategy to manage demand and provides choices for access to the campus in addition to the automobile."
Human Resources	**Health and Wellness**		Planning preparation for mental health services specific to drought, flood, fire and heat and integrated with beneficial nature experiences. Basic Needs Initiative - Write a Health and Safety Plan. "Noma Nation" Student Health Center, and Employee Wellness program needs to include outdoor and connectivity components.		

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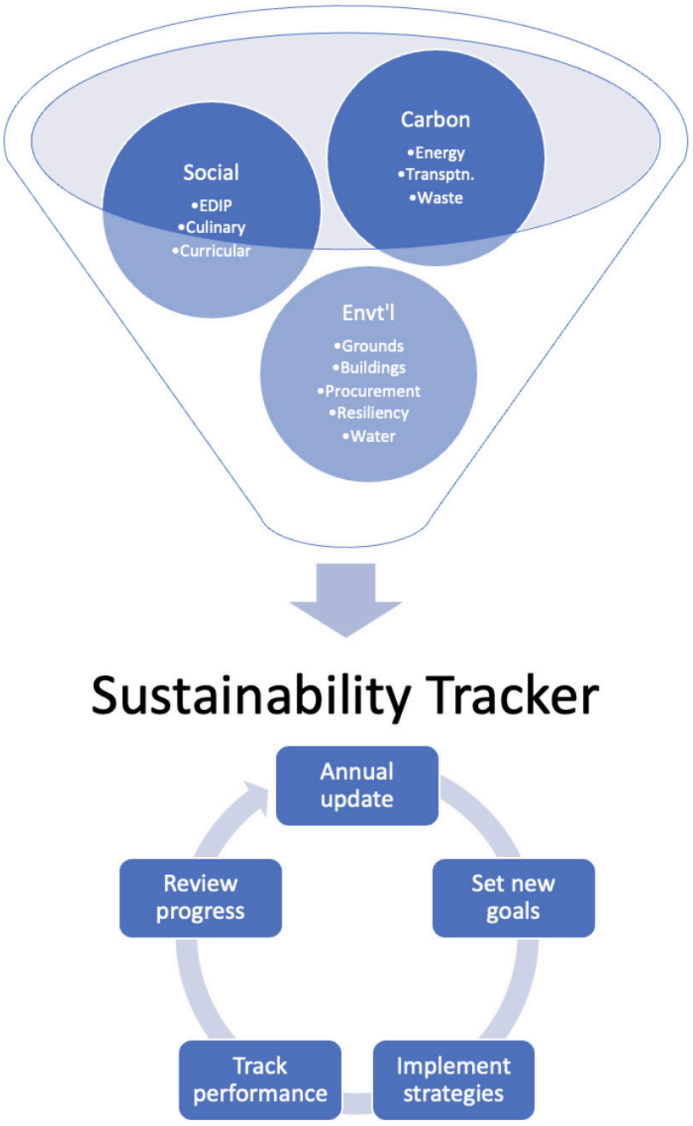
POLICY RECOMMENDATIONS

	POLICY OR PLAN	EXISTING	RECOMMENDED	TEMPLATE	SAMPLE LANGUAGE
	Financial Planning		Incorporate nature-based approaches (e.g., green new deal, doughnut economic recovery, and People, Planet, and Profit Triple Bottom Line, green jobs), market and non-market values (e.g., ecosystem services), and projected climate risks on economic sectors.		
	Academic Plans		Include climate projections in academic planning.		
	Strategic Plan	SSU Strategic Plan 2025	Include climate projects in strategic planning.		

APPENDIX D

COMMUNICATION AND ENGAGEMENT PLAN

CAP goals have broad implications for business-as-usual operations across divisions, academics, and programs. Infusing these new approaches into standard procedures will require new ways of communicating and engaging administrators, staff, faculty, students, and community partners. Communication and engagement strategies in this Plan address mechanisms for distributing information on key concepts, promoting behavioral change, and tracking and reporting on progress.



Strategy 1: Maintain central Tracking Tool to Monitor and Share Implementation

SSU has established a Sustainability Tracker that functions as a workbook and serves as the single point for planning and reporting. The Tracker: (1) establishes a "starting point" for future comparisons; (2) tracks strategies and actions identified in the CAP; (3) ensures contributions and actions of multiple campus leaders; and (4) summarizes results and impacts. The Tracker allows access by multiple employees across campus to take leadership in reviewing current sustainability strategies and initiatives, assessing policies and procedures, and tracking performance metrics over time. The Tracker can also be used to identify new initiatives and to assign specific staff to oversee the implementation.

Strategy 2: Evaluate, track, and report progress over time

The Director of Sustainability and Resilience Operations will be the primary person responsible for assigning access to the Sustainability Tracker (e.g., Sustainability Programs Director, chairs of the Regional Resilience, Academics & Student Life, Net-Zero and Strategy Advancement & Communications Working Groups, and others as needed) and overseeing updates to Sustainability Tracker content. Reporting on these metrics will be done annually by November 30th each year. Once reporting is complete, the Director of Sustainability and Resilience Operations can pull metrics into annual CAP reports, such as those required by Second Nature, STARS, and the annual SSU Sustainability Snapshot.

The Director of Sustainability and Resilience Operations is also responsible for expanding and maintaining the sustainability dashboard on the Sustainable SSU webpage to include metrics identified in the Sustainability Tracker (e.g., energy saved, % renewable energy, carbon emissions reductions, waste diverted from the landfill, etc.). The sustainability dashboard should use Microsoft PowerBI for data entry, tracking, and display following the format used for the CSU Energy Dashboard.

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COMMUNICATION AND ENGAGEMENT PLAN

Strategy 3: Embed CAP goals into policies and procedures

A key approach for infusing CAP goals into business-as-usual processes is by updating applicable policies and procedures with best practices and best available climate forecast predictions. Each of the PSAC working groups will be responsible for pursuing appropriate chain of command processes to update policies and procedures in their areas. Appendix C includes a list of relevant SSU policies and recommendations for adjusting language to better align with new sustainability and resilience goals and strategies.

Strategy 4: Increase distribution of information on sustainability and resilience needed to achieve CAP goals

PSAC monthly meetings are used to coordinate activities among working groups and disperse information via PSAC members to divisions across campus. The PSAC is also generally responsible for updating the Climate Action Plan every 5 years and ensuring compatibility with SSU Strategic Plan

The Strategy, Advancement, and Communications Working Group are responsible for collaborating with groups across campus to boost awareness, engagement, and implementation of the three core CAP goals (see Table A):

- **Carbon** - Achieve climate neutrality by 2043
- **Resilience** - Increase community resilience to climate change through our actions
- **Curriculum** - Build curriculum and co-curriculum learning for students in environment, equity and engagement

Collaborative projects needed to achieve these goals are identified in Table A. A broad information campaign that generally promotes awareness of CAP adoption and the need for increased campus efforts around sustainability and resilience is recommended for Fall 2022, A suite of communication venues to reach audiences on campus are included in Table B. Roles of the Working Group include:

1. Raising awareness and understanding of campus and community members about key concepts, the information needed to effect the change needed to achieve CAP goals (including general information on how we are connected to the earth), and how to participate, especially with regards to diversity, equity, and inclusion. This includes the development of regular updates by PSAC members to all divisions, schools, and departments.
2. Developing campus and preserves as demonstration sites for education on sustainability and resilience
3. Branding all communications with consistent branding elements (e.g., the Sustainable SSU mark) to raise awareness of the breadth of campus activities
4. Updating and improving SSU's sustainability webpage with a focus on communication surrounding the status of existing efforts (e.g., Sustainability Dashboard) and needs.
5. Supporting behavioral change initiatives:
   - Annually advertising and providing information on the cumulative impact of Sustainability Pledges.
   - Updating and supporting pledge participation through regular action messaging (Table C)
6. Promoting awareness of faculty and student expertise in sustainability and resilience with local communities, businesses, agencies, and other universities. All communication venues that target off-campus audiences should include information about ways to participate in CAP goals - including ways to engage students or funding needs.
7. Tracking efficacy of communication efforts and programs

Strategy 5: Encourage participation by campus and community in CAP strategies and actions

PSAC Working Groups will take the lead in undertaking communication needed to recruit participation in CAP strategies and actions. Each Working Group is responsible for encouraging campus and community collaborations within their sectors of responsibility (Table A1). Off-campus communication sustainability is particularly critical to achieving CAP goals since partnerships on regional initiatives are needed to secure extramural funding and create opportunities for faculty and student engagement in regional challenges. Working group role in encouraging participation includes:

1. Serving as an information resource about all projects and activities on campus within their sectors of responsibility
2. Communicating CAP project needs to divisions, departments, student groups, faculty (e.g., service-learning or research opportunities), and staff
3. Promoting lectures, discussions, and events that focus on CAP goals.
4. Developing off-campus partnerships. A primary venue for engaging off-campus partners is CEI's North Bay Forward Lunch Series, a monthly discussion that promotes regional collaboration, authentic representation, and creating best practices in sustainability and resilience

APPENDIX D

COMMUNICATION AND ENGAGEMENT PLAN

SECTOR	GOAL	STRATEGY	KEY COLLABORATORS
ACROSS ALL SECTORS	Standardize formats and approaches for conveying sustainability and resilience information	Develop a tabling display that can be regularly deployed for campus events	Strategic Communications
		Hire a new Facilities Department Student Intern to work with the SSU Sustainability Communications Intern to develop and distribute information about infrastructure and operations	Facilities
		Create a branded approach for any on-campus signage (e.g., wayfinding, information signs on grounds, preserves, events, culinary, etc.) with Sustainable SSU marks and QR codes.	Strategic Communications
		Develop handout and ppt formats that enable all PSAC members to provide regular updates to divisions and departments across campus	Strategic Communications
ENERGY	Develop campus and preserves as demonstration sites for education on sustainable and resilient energy sources	Distribute information via signage (e.g., QR codes) and tours	Facilities, CEI
	Increase communication around energy reduction, where energy comes from, and energy resilience projects	Distribute energy use data and guidelines to divisions and departments via the PSAC	Facilities
		Provide near real-time information about energy with the website dashboard, QR code signage, and interactive touch screens	Facilities
WATER	Develop campus and preserves as demonstration sites for education on sustainable and resilient water sources	Distribute information via signage (e.g., QR codes) and tours	Facilities, CEI
	Provide information about water use, where campus water comes from, and the risk of drought and flood to people using campus infrastructure	Distribute water use data and guidelines to divisions and departments via the PSAC	Facilities, Sonoma Water
		Provide information about campus water systems and connections with the Copeland Creek watershed on the website and QR code signage. Install interactive touch screens in key building locations	Facilities
		Capture information about impervious surfaces (e.g., parking lots), stormwater management	Facilities, Environmental Health & Safety
WASTE	Improve communication around "What Goes Where" to reduce, reuse, and recycle and sustainable product initiatives	Develop a student-led training for divisions, departments, and classrooms	Recology, Sustainability Senator (AS), Student Clubs, Custodial Services
		Develop tabling display for campus events	Recology, Sustainability Senator (AS), Student Clubs, Custodial Services
		Put signs on campus and preserve trash cans with photos showing what is recyclable and compostable, especially common items sold on campus	Recology, Facilities
		Develop protocols and signage standards for all campus events.	Conferences and Event Services, Recology

Table A1. Communication needed to achieve CAP goals.

APPENDIX D

COMMUNICATION AND ENGAGEMENT PLAN

SECTOR	GOAL	STRATEGY	KEY COLLABORATORS
BUILT ENVIRONMENT	Develop campus and preserves as demonstration sites for education on sustainable and resilient building features	Add signage on existing buildings highlighting sustainable features	Facilities, Strategic Communication
		Incorporate new sustainability protocols as part of training for maintenance and repair staff	Facilities
CULINARY	Educate campus about the relationship between the earth and food, including the people who harvest, process, and transport food.	Host events, or partner with existing events	Culinary (Intern)
		Develop sustainable food awareness and behavioral change initiatives (e.g., Pledge) at food venues and other advertising venues (Table B)	Culinary (Intern)
	Create high-visibility agriculture as part of campus landscapes	Expand communication about the Garden Classroom with campus signage (e.g., QR codes) and on the website	Garden Classroom, Landscaping
		Identify edible landscaping, including native plants on campus and at preserves	Landscaping, CEI
PROCUREMENT	Increase communication around sustainable procurement techniques	Identify procurement officer to attend sustainable procurement conferences and report back to staff	Procurement
GROUNDS AND PRESERVES	Increase awareness of how students, faculty, and staff are supported by local ecosystems	Develop signage and website information. Key locations can include Copeland Creek corridor, native plant and butterfly gardens, garden classroom, preserves, and Green Music Center parking lot swale as well as more broadly across campus landscaping (e.g., campus trees and their role in ameliorating increasing heat).	Landscaping, CEI, Garden Classroom, Student Clubs
		Provide students, faculty, and staff with information on the health and academic benefits of outdoor experiences	Health Services, Advising
		Promote public tours of the Campus Gardens (which can be self-guided) and Osborn Preserve	CEI
	Ensure equal access to green spaces and urban gardens on campus	Advertise preserve and campus tours to underserved target audiences and provide bilingual information on signs and flyers.	CEI, Spanish Department, Native American Studies
	Celebrate North Bay culture and biodiversity on campus and preserves	Offer preserve and campus tours focused on culture and environment for faculty, staff, and students as part of the First-Year Learning communities	Orientation, CEI, Academic Affairs
TRANSPORTATION	Incentivize students to live on campus rather than commuting	Include information on carbon savings in recruitment and housing materials	REACH, Student Recruitment
	Identify and share walking and biking routes to campus and from campus to outdoor destinations (e.g, Copeland Creek trail to Crane Creek or Laguna de Santa Rosa)	Create a map and signage campaign	Seawolf Living, Transportation & Parking Services
	Promote the "last mile" Bike Share program and other alternative transportation initiatives	Increase social media, student communication tools, and include information on transportation maps	Transportation & Parking Services

Table A1. Communication needed to achieve CAP goals.

APPENDIX D

COMMUNICATION AND ENGAGEMENT PLAN

SECTOR	GOAL	STRATEGY	KEY COLLABORATORS
ACADEMIC INSTRUCTION AND STUDENT LIFE	Increase student awareness of sustainability and resilience academic opportunities	Develop a list of academic opportunities and Infuse into orientations, including freshman orientation, new faculty orientation, campus tours, and new staff orientation (ASL bi.).	FYE Programs, Orientation, Human Resources
		Promote opportunities at School Meetings each semester. Encourage faculty to include at least one lecture in every course related to sustainability and resilience issues and provide students information on opportunities within their discipline	Academic Affairs
		Hold sustainability event in early Fall as well as Earth Week and provide information to students about how they can participate during the year	JUMP, Academic Working Group
		Create regular content about academic accomplishments and opportunities on campus in SSU newsletters, newspapers, and social media	Communications Department, Sonoma State Star, Strategic Communications, Alumni Relations
	Promote faculty and student sustainable and resilient behaviors	Promote dormitory challenges surrounding carbon and environmental impact reduction	REACH
		Focus behavioral change (e.g., Pledge) signage and other communication at overnight facilities (e.g., dormitories, housing, and preserves) and in classrooms	REACH, Academic Departments and Facilities
		Make green event practices standard for all campus events	Seawolf Living, Conferences, and Event Services
	Promote faculty and student expertise in sustainability and resilience with local communities, businesses, agencies, and other universities	Increase faculty and student discussions with community leaders at North Bay Forward Lunches and other lecture series	CEI, Geography Environment and Planning
		Develop ongoing series about faculty and student activities as part of a regular newsletter and newspaper and social media (see above)	Communications Department, Sonoma State Star, Strategic Communications, Alumni Relations
	Track efficacy of communication programs	Conduct an annual survey of student, faculty, and staff knowledge and experience on sustainable and resilient practices	Seawolf Living, Associated Students, Faculty Senate, Staff Council, Dean's Council, etc.

Table A1. Communication needed to achieve CAP goals.

APPENDIX D

COMMUNICATION AND ENGAGEMENT PLAN

KEY STAKEHOLDERS NEEDED TO IMPLEMENT COMMUNICATION AND ENGAGEMENT PLAN

Many organizations and individuals on campus (see Table A1) are needed to make sustainability and resilience a highly visible and active conversation on campus. Here we provide a few of the key stakeholders that need to be engaged to raise awareness about SSU sustainability efforts.

President's Office and VP's

A pivotal component of this Communication and Engagement Plan is a long-term commitment from the President's Office to ensure that CAP goals remain a top priority for campus. Key areas of support needed are:

- Embedding CAP goals into organizational policies and procedures
- Regular President communications (e.g, annual Forum, monthly updates) on how sustainability and resilience are central to education at SSU.
- Establish regular processes for sustainability updates across all divisions on campus

Strategic Communications

The Chair of the PSAC Strategy, Advancement, and Communications Working Group coordinates all sustainability communications with Strategic Communications which has primary responsibility for SSU internal and external communications. A half-time Sustainability Communications Coordinator is needed to implement communications required to achieve CAP goals (see implementation section of this CAP). A suite of recommended communication venues are listed in Table B1.

Facilities

SSU Facilities is the lead on all infrastructure projects, modifications, and monitoring. The Director of Sustainability and Resilience Operations works closely with the SSU Facilities AVP in implementing CAP strategies and goals and embeds sustainable elements into organizational policies and procedures. Participation in key communication areas includes campus signage and information on CAP accomplishments.

Human Resources

Human Resource is a point of contact for all university hires and is the lead in developing hiring frameworks that emphasizes sustainability as a core objective, and infusing SSU sustainability values and information into new staff orientation.

Residential Education and Campus Housing (REACH)

REACH is the lead on information and programs for those living on campus. They have already piloted several projects to enhance awareness and encourage behavioral change for carbon reduction and lowering environmental impact.

Associated Students

The Student Sustainability Senator plays a key role in engaging students in CAP activities and generally raising awareness about sustainability and resilience among students. The person filling this position is responsible for raising awareness among Associated Student activities. The Senator also usually plays a leadership role in annual Earth Week events - creating events that enhance understanding of sustainability, soliciting participation, and advertising. Funds are made available to support student efforts during Earth Week through the Sustainable SSU IRA grant.

Conference & Event Services

Participation in Conference and Event services will need to adopt green event practices as a standard for all events on campus.

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TOOL	WHEN	WHAT
ALL-STAFF EMAIL	April 2022	Email announcing: "adoption of the Climate Action Plan"; asking staff to "I Pledge".
EARTH DAY WEEK	April 2022	Set up a table to showcase Climate Action Plan goals and use a chalkboard where students and staff can write down what they pledge to do.
DIGITAL SIGNAGE *(screens in building lobbies)*		Series of digital signs that circulate: **CORE Goals:** One sign dedicated to announcing each CORE goal **Energy:** Photo of staff plugging into a power strip "I Pledge to Unplug": Some electronic devices never fully power down. **Culinary:** Photo of basket of produce "I Pledge to eat plant-based meals 6 days out of the week" **Transportation:** Photo of student riding the Smart Train "I Pledge to take the Smart Train once a week to campus" **Waste:** Photo of student using a SSU branded reusable water bottle "I Pledge to use a reusable water bottle every day"
POSTER AND/OR TABLE TENT		Make a series of posters and/or table tent cards to highlight performance metrics "We Pledge: Did you know SSU has reduced xxx of its energy use since 2008."
PRESIDENT'S FORUM		Include one sentence into the message: "I Pledge" to...
PRESIDENT'S MESSAGE/VIDEO		Same approach as Forum
SOCIAL MEDIA PAGE	Monthly	Follow same photo campaign and timeline as "Digital Displays"
NEWSLETTER	Monthly	Build a section within the campus newsletter to highlight the "I Pledge" campaign. Follow same photo campaign and timeline as "Digital Displays"
	Annual	Executive Summary/Sustainability snapshot progress and next steps for 2023. Link to sustainability web page

Table B1: Communication Tools and campaign ideas

COMMUNICATION AND ENGAGEMENT PLAN

SOCIAL MEDIA LEAD**

CARBON NEUTRALITY	**PLEDGE TO:** › Ride your bike or carpool to work. › Take public transportation as often as possible › Telecommute when possible › Reduce meat consumption
ENERGY	**PLEDGE TO:** › Turn off the lights when you leave if your office does not have occupancy sensors. › Skip the elevator and take the stairs for exercise and energy savings. › Unplug or use a power strip › Obtain an energy audit for your home › Change your home energy provider to a green energy provider
WATER	**PLEDGE TO:** › Bring a reusable water bottle to campus each day › Reduce meat consumption (biggest water user) › Learn about local collaborations between SSU and Sonoma Water ? (link to CEI page)? › Reduce water use at home?
CULINARY	**PLEDGE TO:** › Say no to plastic by bringing a reusable to go container to campus each day › Not asking for a straw › Only taking what you can eat. › Eat a plant based diet
GROUNDS	**PLEDGE TO:** › Be a good steward to the earth by planting a tree › Replace residential landscaping with native plants options › Learn about our local environment by taking a tour of the Fairfield Osborn Preserve
PROCUREMENT	**PLEDGE TO:** › Prioritize local and minority owned businesses and support those with a climate mission. (American Airlines) › Shop local › Print double sided › Reduce use of paper copies
TRANSPORTATION	**PLEDGE TO:** › Take a mode of public transportation at least once a week › Plug in! (photo of EV charging station) › Use an ebike if it makes sense for you (link to film MotherLoad ?) › If appropriate, reduce trips to SSU by working from home when possible

Table C: Proposed pledge content related to behavioral change needed to achieve CAP goals

APPENDIX D

COMMUNICATION AND ENGAGEMENT PLAN

WASTE	**PLEDGE TO:** › Reduce use of plastic bags (e.g., maybe don't put oranges in a plastic bag when shopping, for example) › Reduce food waste. › Purchase second-hand clothing when appropriate.
BUILT ENVIRONMENT	**PLEDGE TO:** › Volunteer your classroom for the Green Classroom environmental certification › "Shut the Sash" in all laboratories
ENVIRONMENTAL JUSTICE & EQUITY	**PLEDGE TO:** › Consider the social and economic impacts of the purchasing decisions you make
PERSONAL RESILIENCE	**PLEDGE TO:** › Understand how mental health is aligned with natural spaces › Volunteer at Lobo's pantry to help fellow students who are food insecure
CURRICULAR AND CO-CURRICULAR	**PLEDGE TO:** › Learn about the most effective things you can do in your personal life for sustainability (Take the Pledge) › Talk to others about your choices when asked (family and friends) › Become involved in local issues, for example by attending City Council meetings › If you are a professor, teach students how their discipline or class can be used to help address issues of sustainability

Table C: Proposed pledge content related to behavioral change needed to achieve CAP goals