Background on case study, University of California

The University of California is a ten-university system with a combined student body of over 280,000 students, over 20,000 faculty, and over 200,000 staff. Each campus is led by a Chancellor, who reports to the systemwide UC President. UC also manages or co-manages three Department of Energy national laboratories. UC has a long tradition of shared governance whereby administrative leaders, faculty, students, and staff share responsibility for guiding the university's operation and management, while preserving the authority of the governing Board of Regents to set policy. Each campus has an Academic Senate, composed of faculty and supported by professional staff, that determines standards and criteria for admission and degrees and is responsible for supervising courses and curricula. The Senate is advisory to the Chancellor on budget and resource issues. Each of these entities, therefore, has a part to play in steering UC in times of change.

UCs 2019 greenhouse-gas emissions for on-campus operations and purchased energy (Scopes 1 and 2) were about 1.0 Mt CO_2 equivalent, down from 1.3 Mt in 2009, while energy use and campus space increased by 2% and 19%, respectively *(1)*. Over 80% of current Scope 1 and 2 emissions are from on-site use of natural gas, which produces heat and also about 55% of systemwide electricity. The portion of scope 3 emissions currently reported by campuses totals about 0.4 Mt CO_2 equivalent and have changed little since 2009. UC prepared its first systemwide Report on Sustainability Practices in 2004; and has been pursuing a 3-part strategy to reduce campus emissions. New buildings are LEED certified; campuses have reduced energy-use intensity by an average 2% per year over the past decade, and 34% of electricity was from renewable sources in 2019. A fourth part of the strategy is to use offsets for emissions not eliminated. UC campuses have taken additional sustainability measures in other areas, including procurement, occupancy, transportation, water, and waste reduction *(20)*.

UCs commitment to sustainability has evolved since the first Earth Day in 1970, and over that time is marked by many advances in education, research, service, and practice. Starting with UC Berkeley in 2007, each campus now has a Climate Action Plan, charting its path to net carbon neutrality and decarbonization. It is also important to note that while each campus is responsible for defining and financing its own path forward, coordination across campuses is also important. For example, UC became a wholesale power provider in 2015, serving electricity to the five campuses and two medical centers that are in locations where they have flexibility in energy procurement; and also investing in biogas projects.

UC currently manages a portfolio of investments totaling approximately $161 billion, which includes retirement, endowment, and cash assets. In 2015 UC sold investments in companies earning revenue from the exploration and extraction of thermal coal and oil sands, and in 2019 further de-risked its investments by selling holdings in companies that earn more than 10% of their revenues from exploring and extracting oil, gas and thermal coal. UC now excludes companies with any amount of "proved and probable" fossil fuel (thermal coal, oil and/or gas) reserves from its portfolio. In 2020, the carbon footprint of UCs public equities portfolio was 86 t CO_2 equivalent per million dollars invested. Through partnerships with other green investors, over the past 5 years UC has committed over $1 billion in renewable-energy and other sustainable investments.

Recognizing this potential of universities to lead on sustainability changes, in 2007, UC President Dynes signed the American College and University Presidents Climate Commitment (ACUPCC) on behalf of the 10 Chancellors. With this pledge, universities across the U.S. and internationally pledged action on climate change, while promising to prepare students through research and education to 'solve the challenges of the 21st century'. Specific targets were left up to each signatory.

In 2013, UC President Napolitano launched the UC Carbon Neutrality Initiative (CNI) — a pledge that UC would achieve net-zero Scopes 1-2 emissions by 2025. The CNI was intended to make the 2007 emission-reduction pledges actionable and add a near-term deadline for achieving emissions-reduction goals. The CNI was envisioned to leverage the UC's infrastructure to demonstrate how decarbonization could be achieved within a large, diverse, and complex institution, and to serve as a model for other universities while remaining true to the mission of teaching, research, and service. Each campus was largely responsible to define its own path to the CNI goal.

California's current goal is economy-wide decarbonization by 2045, and UC aims to play a part in reaching this goal. Pathways to achieve this statewide goal are still in development, both at the state and city levels. One campus, UC Merced, announced that in late 2020 that it had met the 2025 CNI goal. It's 2018 GHG emissions were about 8000 t CO_2 equivalent, 44% Scope 1 and 56% Scope 2. This was reduced to net zero through two investments in UCs wholesale power program: an 80 MW solar field in California and an out-of-state landfill-biogas project.

However, the other 9 UC campuses face seemingly greater challenges in meeting the 2025 goal (Figure 1). With natural gas relatively inexpensive and dominating UCs Scope 1 and 2 GHG emissions, decarbonization depends on finding alternatives. In 2018 a UC working group concluded that the 2025 carbon-neutrality goal is ambitious but attainable, and recommended further deep-energy-efficiency projects, plus investments in developing new off-campus biogas projects to compensate for emissions from on-campus natural-gas burning. The working group recommended a long-term strategy of electrifying end uses currently depending on natural gas and obtaining electricity from carbon-free energy sources. The current plan to meet the 2025 goal depends heavily on offsets and biogas procurement, with continued energy efficiency, electrification, and renewable-electricity use.

In 2014 UC President Napolitano created a Global Climate Leadership Council (GCLC) to increase awareness of and engagement with campus emissions-reduction goals and programs. The GCLC is comprised of administrative leaders from across the UC system, faculty and student representatives, and outside advisors, to advise UC on achieving emissions reduction while also providing guidance for aligning the CNI and other sustainability goals with UC's teaching, research, and public-service mission.

In November 2019 the systemwide Academic Council, made up of Faculty Senate leaders from across the 10 UC campuses, endorsed a 3-point statement on addressing the climate challenge (Table 1). Climate-solutions working groups have formed or are forming on each campus, and faculty are set up a systemwide climate-crisis working group to both foster communication and assume a greater role in UCs decarbonization strategy.

UC faculty from across the system in 2022 drafted and endorsed a memorial that was sent to the Regents of the University of California. It stated: "The University of California Academic Senate petitions the Regents for investments in UC's infrastructure that will reduce on-campus fossil fuel combustion by at least 60% of current levels by 2030 and by 95% of current levels by 2035."

In 2022 UC President Drake appointed a systemwide Task Force on Pathways to a Fossil Free UC. The task force is charged with advising the President and the ten university Chancellors on accelerating progress toward decarbonizing the UC campus and medical-center operations, and with developing programs and recommendations that can overcome key structural, technical, resilience, organizational, financial, operational, land use, cultural, and legal barriers.
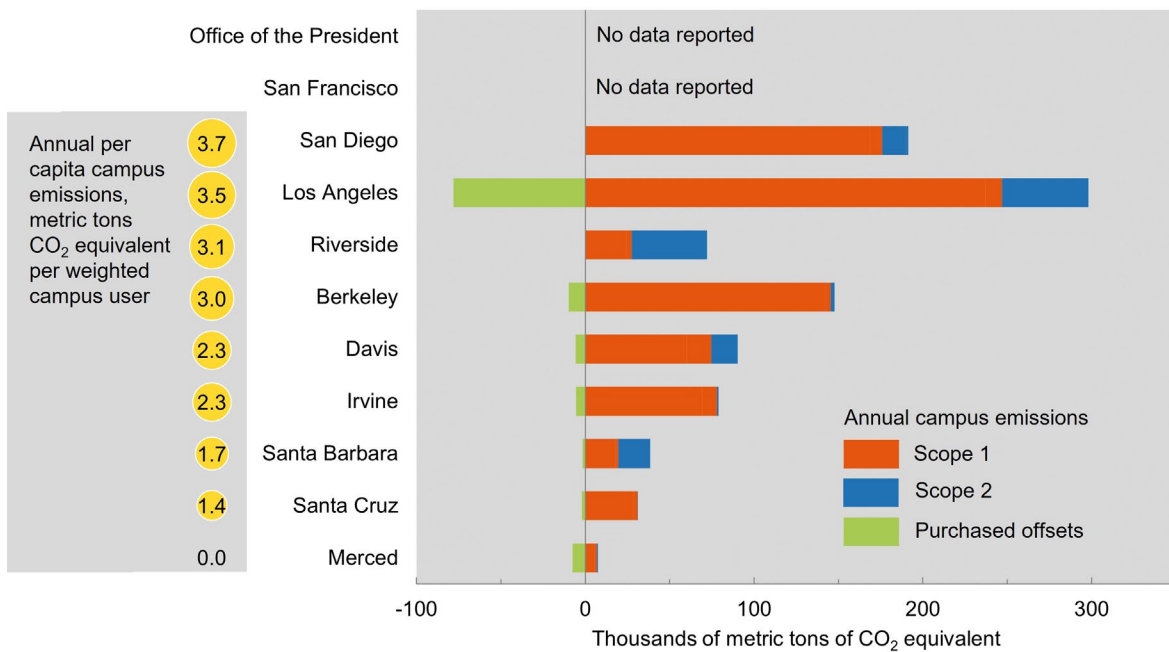
Figure 1. Most recent self-reported annual Scope 1 and Scope 2 greenhouse gas emissions for UC campuses (2018-2019). Note that Los Angeles, San Diego, Davis, and Irvine include medical centers. Data source: The Sustainability Tracking, Assessment & Rating System (STARS), Association for the Advancement of Sustainability in Higher Education. Data are for 2018 (Los Angeles, Davis) and 2019 (other campuses). https://reports.aashe.org/institutions/participants-and-reports/, accessed November 25, 2022. **Paper in review, Dec 2022.**

Table 1. Academic Council principles

Academic Council Principles and Recommendations For Addressing the Climate Change Challenge November 2019
1. Formally support UC's lead in demonstrating carbon neutrality with the intent of decarbonization. While achieving carbon neutrality is a core initiative within UC, there is concern that some activities are perceived as symbolic and that more significant and tangible approaches should be considered, for example decarbonization (Meier 2018). Academic Senate members across all UC campuses and programs can help advise and prioritize the University's ongoing activities to assure that the 2025 carbon neutral objectives are met, if not exceeded. *To this end, the Academic Senate Council can encourage deployment of faculty's "on the ground" expertise to meet the critical objective of carbon neutrality and decarbonization by actively consulting with ongoing efforts.* 2. Formally support coordination and faculty engagement in developing alternative approaches to address the challenge of climate change. New ideas, new approaches and new systems are needed to mitigate and adapt to climate change. The Academic Council could become more proactive in faculty coordination. *To this end, the Academic Senate Council could assemble a systemwide Senate WORK GROUP to (a) interface with Faculty, (b) promote Faculty participation in climate-change mitigation and adaptation activities and (c) recruit climate-solutions expertise to UC's research, teaching and service missions. The Systemwide Senate can equally urge Divisional Senates to form equivalent Working Groups to coordinate work in concert with this systemwide group.* 3. Foster the mobilization of multi-, cross-, and trans-disciplinary teams to communicate and explain the urgency of sustainability and decarbonization. UCs leadership in research and teaching, and its considerable operational experience in climate action could be shared with professional and lay community networks. *To this end, the Academic Senate, through the deployment of "climate champions" could address the urgent need for (a) the STEM disciplines to interact with the Humanities to help communicate and develop a comprehensive response to the challenge of climate change (Goldstone, 2019), (b) multi-, cross-, and trans-disciplinary teams of Faculty to develop better ways to communicate the scope of sustainability challenges (Aaron, 2019) and (c) sharing scalable climate solutions developed by UC.*

Goldstone H., Pastan E., Why Science Needs Humanities to Solve Climate Change, Aug 2019
    https://www.capeandislands.org/post/why-science-needs-humanities-solve-climate-change#stream/
Aron A, The Climate Crisis Needs Attention from Cognitive Scientists. Trends in Cognitive Sciences 2019
    https://doi.org/10.1016/j.tics.2019.08.001) https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(19)30202-5