

From: UC Academic Senate
To: President of the University of California, for transmission to the Regents
Re: Memorial to the Regents

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.

EXPLANATION OF THE PROVISIONS OF THE MEMORIAL TO THE REGENTS

The Memorial states: *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.*

This Memorial is concerned with Scope 1 emissions, i.e., carbon that is actually released into the air at UC. Scope 2 emissions, which are those that were emitted by power plants generating electricity sold to UC, and similar sources, are already decreasing. This is due to efforts by UC to purchase renewable power from the state power grid, as well as the overall rapid electrification of that grid. Scope 3 are emissions by UC students, faculty and staff in their UC roles, such as UC-reimbursed flights, or commuting. While UC needs to do more to reduce these, much depends on actions beyond its control, such as the development of public transport.

The Memorial requests the Regents to reduce on-campus carbon combustion. Carbon combustion varies widely across campuses with the top 6 campuses accounting for >90% of total UC emissions. The 7 campuses with highest emissions use co-generation plants which burn methane to produce electricity, heat and cooling, and these plants are responsible for most of their emissions. Thus, addressing on-campus carbon combustion will eventually require replacing these plants. Other emissions come from single-building boilers, which will probably also need to be replaced by 2035 to meet the goals of this Memorial.

Practically, reducing on-campus carbon combustion will first require financial and engineering evaluation of different options. The Academic Senate is committed to facilitating faculty participation in this process to maximize its breadth, rigor and creativity, including consideration of hydrogen and on-site solar, as well as grid electricity as power sources. After choosing the global solutions on each campus, detailed planning and fund raising, and finally execution will occur. The entire process might take 5 to 10 years.

PROPOSED MEMORIAL TO THE REGENTS

DESCRIPTION

Senate Bylaw 90.B. authorizes the Assembly to initiate “Memorials to the Regents on matters of Universitywide concern to be submitted to The Regents through the President ...” The Memorial would petition the Regents to make 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.

A vote in favor is a vote to instruct the President to transmit the Memorial to the Regents. A vote against is a vote not ask the President to transmit the Memorial to the Regents.

PROCEDURAL HISTORY OF THE MEMORIAL

At a meeting on December 15, 2021, the Academic Council approved a motion to ask the Assembly to initiate a Memorial to the Regents that would petition the Regents to make investments in UC’s infrastructure that will reduce on-campus fossil fuel combustion by at least 95% of current levels by 2030. The proposal was placed on the agenda for the Assembly’s February 9, 2022 meeting as Item VII.A.2 and on its April 13, 2022 meeting as Item III.A.1, together with the proposed text and arguments for and against, as required by Bylaw 90.B.

The Assembly engaged in debate and further amendments. In the course of vigorous discussion, a compromise was proposed that would create a hybrid between the arguments for and against the version of the Memorial passed by Academic Council. The Assembly ultimately voted (46 in favor, 1 against) to distribute a ballot to all Senate faculty members in accordance with the procedures stipulated in Senate Bylaws 90 and 95. The amended Memorial asks the Regents to make 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.

ARGUMENTS IN FAVOR OF MEMORIAL TO THE REGENTS

The climate crisis is an existential threat to human civilization and our biosphere that requires a “rapid, deep and immediate” cut in CO₂ emissions.¹ California in 2017 passed Senate Bill 100, requiring the state to reduce 1990-level emissions by 40% by 2030.² The University of California responded to the crisis by announcing a Carbon Neutrality Initiative in 2013.³ It also declared a Climate Emergency in 2019.⁴ UC scientists are leading research and scholarship about the crisis and how to respond.⁵

However, the University’s response to the crisis has been inadequate:

- The Carbon Neutrality Initiative does not require campuses to cut Scope 1 emissions (CO₂ from burning fossil fuels on campus).
- UC emissions, which have barely changed since 2013, are increasing for some campuses, and now exceed 1 million tons per year systemwide.⁶ (Figure 1)
- The Carbon Neutrality Initiative focuses on purchasing carbon offsets, but the emerging global consensus is that offsets should not be a strategy to reduce emissions. Effectiveness of the offset approach is undercut by concerns about credibility, additionally (that is, the ability to establish that the offset project wouldn’t have happened without UC’s purchase) and verifiability. Essentially, offsets are a dodge by which an institution pays to avoid having to reduce its own fossil fuel consumption.⁷
- UC policy also includes higher targets for ‘directed biogas’ (i.e., we continue to burn fossil-methane on campus and buy credits for waste-methane capture in other states). Apart from the ethical problem, this approach is riddled with problems including a lack of scalability.⁸
- UC burns fracked-methane, which contributes to pollution and environmental injustice across the state (including in the Central Valley where many of our students’ families live), and sustains the economic and political power of fossil gas companies and utilities that oppose a renewable energy transition.

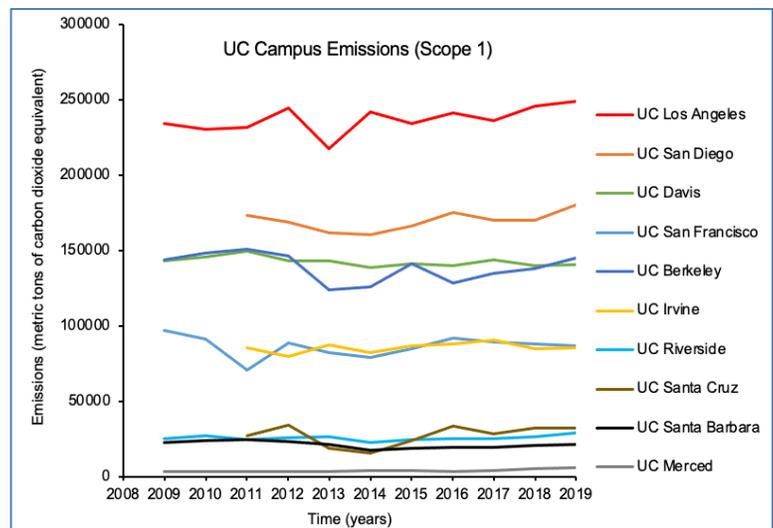


Figure 1. Total CO₂ equivalents emitted by each UC campus 2008-19.

¹ From the latest report of the Intergovernmental Panel on Climate Change which notes that atmospheric CO₂ continues to rise, <https://www.ipcc.ch/>

² https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB32

³ <https://ucop.edu/carbon-neutrality-initiative/index.html>

⁴ <https://www.universityofcalifornia.edu/news/university-california-declares-climate-emergency>

⁵ <https://www.nature.com/articles/s41586-019-1364-3>

⁶ Based on data provided by UCOP to a Public Records Request, and excludes carbon offsets. Although the CO₂ emissions per student have decreased, the climate crisis requires an absolute decrease in emissions. Data available at <https://electrifyuc.org/data/>

⁷ <https://www.vox.com/2020/2/27/20994118/carbon-offset-climate-change-net-zero-neutral-emissions> Rare valid offset projects should be fully funded in any case, but not as alternatives to decreasing emissions. At current prices (~\$4.50/tonne), \$160B/year covers all worldwide CO₂ emissions per year, ~4 cents per gallon of gas covers its emissions. Studies by UCOP since ~2008 have recognized the necessity of electrification, mentioning offsets and waste-methane as ‘last resort’ ‘temporary’ measures, but due to their low cost they are now the main solutions. A petition by 3500 UC stakeholders requesting detailed implementation studies was presented to President Drake in October 2020, but it was rejected.

⁸ <https://www.nceas.ucsb.edu/tomkat-natural-gas-replacement-strategies>

The only way to reduce UC's carbon emissions is to stop burning fossil fuels, electrify campus operations, and purchase or generate renewable electricity. The Memorial asks the University to reduce emissions by 60% from current levels by 2030, and by 95% by 2035—clear, doable, and appropriately aggressive targets for eliminating campus use of fossil fuels.

The reduction targets are technically feasible. UC has many options to source clean electricity, including installing more on-site solar facilities, and purchases through the grid. The California electric grid is already mainly renewables during the day,⁹ and storage is being rapidly added¹⁰ that will make 100% renewable grid electricity available to meet the Memorial's goals.¹¹ During this transition period, the UC should wean itself from reliance on offsets, and only purchase offsets that conform to rigorous standards of quality.

Technology exists for replacing methane with electricity for heating-cooling and cogenerated electricity; such use accounts for ~95% of UC carbon combustion¹². Berkeley plans to electrify by 2028 and Davis soon thereafter; together they account for ~half of the 2030 goal. Other campuses, starting planning now, could finish by 2030.¹³ However, the optimal method and cost requires deep studies which will not take place without a serious commitment to a concrete goal. Other universities, including Stanford, have already retired their fossil fuel plants and transitioned to electric.¹⁴ This Memorial is not an engineering specification or a law; the targets are specific because a simple statement of good intentions is unlikely to change our current disastrous trajectory.

Some object to high opportunity costs associated with this Memorial. We say the cost of inaction is incalculably higher. The consequences of climate change have already encumbered the normal operation and core missions of UC, while aggressive action will gain UC co-benefits in terms of education, research, and reputation. Truly decreasing carbon emissions by UC may require hard choices and postponement of other goals. There are long-standing Administration-Senate consultative mechanisms for establishing priorities, allocating funds, and requesting support from the State and other sources. The Memorial does not replace this process, but urges that decarbonization of the UC energy system be among our highest priorities. UC has an opportunity to leverage its leadership and expertise toward greater public support and funding around these goals. The current state budget surplus includes opportunities for funding energy efficiency projects that the Regents can allocate to electrifying campuses.

Decarbonization is a serious obligation to humanity, other species, and future generations. UC, by virtue of its central role in discovering that carbon pollution causes climate change, has an obligation to lead by example by cutting actual emissions rather than validating greenwashing with 'carbon offsets.'

⁹ <http://www.caiso.com/Documents/California-ISO-Hits-All-Time-Peak-of-More-Than-97-Percent-Renewables.pdf>

¹⁰ ~60GW in the next half decade, <https://pv-magazine-usa.com/2021/07/15/california-breaks-1-gw-energy-storage-milestone-and-looks-to-a-future-1-21-gw-moment/>

¹¹ Legislation is currently being considered to target 90% carbon-free grid electricity by 2035 and require all state agencies to purchase 100% carbon-free electricity by 2030. <https://sd39.senate.ca.gov/news/20220419-senate-democrats-introduce-legislation-enhance-zero-carbon-goals-meet-needs-working>

¹² The rest is campus vehicles and special uses such as anesthetic gases. This memorial does not address emissions from commuting or aviation. Cogeneration plants burn methane to co-generate electricity, heating and cooling.

¹³ The Memorial would not interfere with individual campuses working out their own best approaches but facilitates: lobbying governments for funding; sharing information, ideas and experiences; and finding creative and optimal solutions, embedded in the University's core research and teaching missions.

¹⁴ Stanford's electrification cost \$485M but expected savings over 35 years is \$425M (https://sustainable.stanford.edu/sites/default/files/ZGF_Stanford_CEF.pdf). Immediate reductions of total emissions was 68%, potentially increasing to 81% by 2025 using scheduling and storage (<https://pubs.rsc.org/en/content/articlelanding/2019/ee/c8ee03706j>).

ARGUMENTS IN OPPOSITION TO MEMORIAL TO THE REGENTS

The scientific consensus is clear that increasing levels of atmospheric CO₂ are causing a severe and accelerating change in our climate with widespread consequences. However, we argue that this Memorial does not address this crisis effectively, but would impose massive costs that could be better spent advancing the University's core mission.

We all agree that the University of California, must do its part to accelerate our transition to a carbon-neutral future. Indeed, UC has played a central role in addressing the climate crisis, through its core missions of research, teaching, and service. UC has made significant progress in reducing campus emissions from electricity and heating, food production and waste, vehicle operation, and commuting. This progress (average 2% per year reduction in energy use intensity,¹ and absolute reduction of 25% in Scope 1 + 2 emissions over the pre-pandemic decade 2009-19, see Figure 1)² occurred even as UC's footprint grew to include essential new buildings and 26% more enrolled students over the same period.³ Nevertheless, the faculty need to support and promote much more change, which will likely include the eventual electrification of many campus operations.

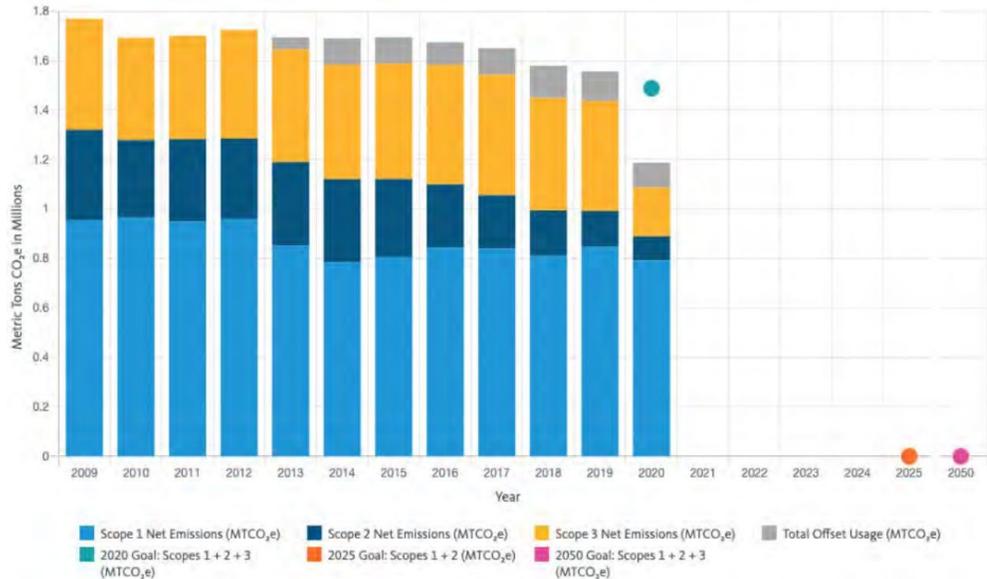


Figure 1. Total CO₂ emissions by UC 2009-2020. Note that the decrease in 2020 was due to COVID, and that the decrease in other years was due to offsets (gray) and increasing renewables in grid electricity (dark blue), not decreased on-campus methane burning, the issue addressed by this Memorial.

Let's first consider how much rapid electrification will cost. A 60% reduction in UC emissions by 2030 (and 95% by 2035) cannot be achieved without rapidly replacing UC's natural gas-fired cogeneration (electricity, heat and power) plants, all of which are integral to campus operations and grid resiliency, some of which are still operating very efficiently, and none of which can be replaced without considerable campus disruption. The Memorial places a premium on capital investment in new physical plant, without considering the impact this would have on other desperately needed capital investments.

The capital expenditures implied by the Memorial come at a time when the University has other pressing unmet needs. The State stopped supporting the University's capital needs directly through general obligation bonds in 2006. As a result, infrastructure projects are now financed mostly by campus-level borrowing. In 2021-22, a large budget surplus resulted in the State providing UC with a one-time allocation for capital projects of \$295 million. Given current economic conditions, the University may

¹ <https://sustainabilityreport.ucop.edu/2021/policy-progress/#energy>.

² <https://sustainabilityreport.ucop.edu/2021/policy-progress/#climate>

³ <https://www.universityofcalifornia.edu/about-us/informationcenter/historical-enrollment>

receive a similar allocation for 2022-23. By comparison, the estimated cost to reduce emissions to 5% of current levels by 2035 systemwide is \$5 billion. But even this large amount is dwarfed by the University's needs for deferred maintenance for its educational and research facilities, estimated at \$13 billion through 2026-27 with an additional \$11 billion for seismic safety retrofits.⁴ We will also need \$14 billion for new and renovated hospital facilities on UC's medical campuses.

An appreciation of the scope of the work required to electrify UC's energy systems can be derived by considering Stanford's electrification project, which started in 2011 and whose first phase involved installing massive thermal storage tanks, digging up a large fraction of the campus to install 22 miles of underground pipes, and retrofitting 155 buildings.⁵ The initial cost of \$485 million required an additional \$85 million investment when it became clear the project did not provide adequate cooling during heatwaves that are now part of the new climate normal in the South Bay. Furthermore, that project reduced CO2 emissions by only 68% (far from the 95% ultimately requested by this Memorial). The proposed Memorial would require many projects this size or larger to begin immediately just to reduce UC's carbon emissions by a similar amount. Getting to 95% by 2035 may not be technically feasible, even if it were possible to replicate the Stanford project on each UC campus, some of which have very different heating/cooling requirements, weather, and space availability. Moreover, this approach will inevitably mean less investment over the next decade to repair and maintain the buildings we desperately need to support our core missions, let alone construct new classrooms, laboratories, studios, and housing to accommodate President Drake's commitment for an additional 20,000 students by 2030.

Overall, the goals embodied in this Memorial do not recognize the many financial and practical constraints that each of our campuses must navigate to fulfill our missions. While each campus has a moral obligation to prioritize replacing its most obsolete energy infrastructure components with climate resilient and low- or zero-emission systems, on some campuses this may involve retiring aging energy systems immediately; on others, it might entail building more energy-efficient buildings now and replacing well-functioning energy systems at a later date. Conversion of serviceable, highly efficient university infrastructure with a long useful lifespan is wasteful and will lead to stranded investments in existing electricity and heating facilities. It will not be the best use of resources on our campuses: we may achieve emissions reductions in one sector, at the expense of higher energy consumption in a different sector. In addition, it may not be the best use of State resources. For example, the State may deem that mitigating the climate crisis would be better achieved by investment in projects to replace even less efficient infrastructure outside of the University. It would be irresponsible for UC to insist that its own goals take precedence.

Rather than rush to comply with rigid goals, a staged approach based on local campus decision-making, will lead to the most efficient use of resources to achieve the greatest emissions reduction while enhancing UC's mission as the country's best and most accessible public institution of higher education. Replacing the most obsolete campus systems first will also allow UC to learn by doing, and to use its scarce capital resources to maximize emission reductions per dollar invested. We urge the faculty to reject this largely symbolic Memorial in favor of a practical and strategic approach that incentivizes effective campus-based decision-making.

⁴ https://www.ucop.edu/capital-planning/2021-2027_capital_financial_plan.pdf

⁵ <https://news.stanford.edu/features/2015/sesi/>