Report of the Task Force on the Climate Crisis

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INTRODUCTION

Planet Earth is undergoing a climate crisis. The Intergovernmental Panel on Climate Change prescribes that we must reduce greenhouse gas emissions by 45% by 2030 from 2010 levels[1]. In 2019 the UC Academic Council endorsed a set of principles[2] addressing the climate crisis, and UC President Napolitano offered her support, reiterating her earlier emergency declaration, signed by all 10 chancellors[3], calling for a "*drastic societal shift to combat the growing threat*".

To address the climate crisis, an initial framework —"10 scalable solutions"[4] — was developed at UC San Diego (hereafter UCSD). However, implementing emissions reductions is a challenge that has mostly eluded both governments and institutions. The UC plan to reduce its emissions with "carbon neutrality by 2025"[5] is inadequate. Problems include a lack of accountability[6], a reliance on inadequate offsets[7] and biogas[8], and a very delayed reduction of emissions from aviation and transportation. As highlighted by the 10 scalable climate solutions, what is needed is not carbon neutrality, but genuine decarbonization (i.e. actual emissions reductions), achieved by setting specific goals and creating accountability. The UC should also align its teaching, research and health preparedness missions.

Although UCSD is currently one of the biggest carbon emitters within the 10-campus UC system, it is also in a unique position to lead on this issue:

- It has a supportive leadership and has had remarkable success in targeted fund-raising.
- It hosts the Scripps Institution of Oceanography, where many of the original insights into modern climate science were developed, and is a home for climate research (CASPO) and teaching (climate change studies minor).
- The Deep Decarbonization Initiative, the Center for Climate Change Impacts and Adaption, and the Understanding and Protecting the Planet Coordinating Committee, demonstrate a campus commitment to climate change issues.
- It has unrivalled cross-disciplinary resources spanning engineering, climate sciences, social sciences, natural sciences, medicine and humanities that are necessary to address the climate crisis.
- It is currently building on-campus housing to construct a city-like environment that can serve as a 'living laboratory' for doing decarbonization experiments.
- It has a health system capable of mitigating the predicted health crisis that will accompany the climate crisis including eco-anxiety, emergent infectious diseases, population migrations and increased disparities.

Effective decarbonization and changes to teaching, research and health preparedness will require significant changes in campus culture. The task force took inspiration from UCSD's success in its broad-based promotion of diversity, equity and inclusion, which also required a fundamental change in campus culture and an integration of leadership with other campus members. We suggest UCSD now put emissions reductions into the fabric of all operations.

The current COVID-19 pandemic also holds important lessons. To quote the Economist[9]: "*[It] has demonstrated that the foundations of prosperity are precarious. Disasters long talked about, and long ignored, can come upon you with no warning, turning life inside out. The harm from climate change will be slower than the pandemic but more massive and longer-lasting. If there is a moment for leaders to show bravery in heading off that disaster, this is it*". Indeed, the pandemic has powerfully demonstrated how poor leadership exacerbates disaster whereas effective leadership mitigates it. Now is the time to reflect on which type of leadership our campus wants on the climate crisis. The pandemic also shows that behavioral changes, such as reduced travel, and increased teleworking and telehealth (the same behaviors needed to reduce emissions) can be quickly implemented, and often have significant benefits. The pandemic also reinforces the importance of reorienting our ethos from expansionary growth to stewardship – taking care of what we already have: people, buildings, biosphere.

This report articulates some over-arching principles for how UCSD can address the climate crisis along with suggestions for concrete actions. UCSD is poised to give us genuine hope by leading the UC system, one of the biggest employers in the 5th largest economy in the world. The wider world will need to follow, and soon.

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[1] https://www.ipcc.ch/sr15/
[2] https://senate.universityofcalifornia.edu/_files/reports/kkb-jn-climate-change-principles.pdf
[3] https://www.universityofcalifornia.edu/news/university-california-declares-climate-emergency
[4] https://www.universityofcalifornia.edu/news/10-scalable-solutions
[5] https://ucop.edu/carbon-neutrality-initiative/index.html
[6] https://www.sandiegouniontribune.com/opinion/commentary/story/2019-12-18/university-california-ucsd-climate-goals-just-hot-air
[7] https://features.propublica.org/brazil-carbon-offsets/inconvenient-truth-carbon-credits-dont-work-deforestation-redd-acre-cambodia/
[8] https://www.nceas.ucsb.edu/files/research/projects/UC-TomKat-Replacing-Natural-Gas-Report_2018.pdf
[9] https://www.economist.com/leaders/2020/05/21/countries-should-seize-the-moment-to-flatten-the-climate-curve

STATEMENT OF PRINCIPLES

UCSD adopted a strategic plan[10] that outlines its efforts to be a student-centered, research-focused, service-oriented public university. Today, nothing is more important in exemplifying this vision than how we address the climate crisis. To foster the most immediate and substantive response to the climate crisis, we present these principles of emissions reduction:

- Acknowledge that the negative impacts of the climate crisis will fall disproportionally on the poor, the vulnerable, and the young, and accept that it is the historical responsibility for individuals, entities and institutions who have emitted the most, and who have the greatest capacity to act, to cut emissions first.
- Decarbonize our campus energy, buildings, food and transportation systems, including commuting and business travel, as comprehensively and as quickly as possible.
- Prepare all of our students with knowledge and training about the climate crisis and climate justice by incorporating it in our teaching.
- Align our research efforts to identify and implement climate solutions and to address the myriad consequences of the climate crisis on all life, including human health and our spiritual, social and economic well-being.
- Implement and enforce policies that promote the fulfillment of these principles.

Shared governance, the bedrock of decision-making at UCSD, is key to moving forward to address the climate crisis. Senior administrators and Deans should be given specific expectations about goals on emissions reduction, the research mission and health preparedness, and should be held accountable to reaching those goals. In parallel, the Academic Senate should form a new standing committee to advise the Academic Senate and administration on matters pertaining to climate change impacts and mitigation, and to study and make recommendations regarding campus actions risis. The Academic Senate should ensure that teaching related to the climate crisis is well-supported on campus.

Resources, both existing and new, should be committed to implement the concrete actions detailed below. The cost of these actions varies tremendously, and funding for big ticket items will be hard to find in the short term due to Covid-19 related budget cuts. We note however that some of the funded actions will incur a long-term recovery of cost, and many other actions require no cost at all, but rather a behavioral change, which in some cases will save money.

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[10] https://plan.ucsd.edu

SUGGESTIONS FOR ACTION

The 34 concrete actions below are flagged in the left-hand column by a color code regarding expense/ease of implementation: RED: large expense; ORANGE: lesser expense; GREEN: little or no expense, or even saves money.

Decarbonization

The current UC plan for emissions reductions relies on "carbon neutrality" and the use of offsets, which means that UC continues to produce emissions while paying someone else to ostensibly reduce them. "Decarbonization" instead refers to actual emissions reductions, which is what UC should do.

UCSD emits more than 300,000 tonnes per year of carbon dioxide[11]. This is categorized into Scope 1 and 2 (emissions related to campus electricity, natural gas inputs and the campus fleet), and Scope 3 (transportation to campus and campus-related aviation). Whereas the UC Office of the President (UCOP) has set "carbon neutral" goals for 2025 for Scope 1 and 2, the timeline for Scope 3 is 2050. The Scope 3 timeline is so far in the future that there is no immediate pressure to act; yet we could, with modest investment and policy changes, achieve substantial near-term emissions reductions quickly in this area.

Most of UCSD's Scope 1 and 2 emissions are related to its energy generation plant (called 'cogeneration'). This currently takes in ~80% natural gas and ~20% electricity and generates campus heating/cooling via high temperature water. It also generates electricity. The emissions are ~200,000 tonnes of C02 per year. "Carbon Neutral by 2025", the official plan for UCSD, aims to reduce this to zero[12]. This will mainly be done in three ways: 1) of the electricity supplied to campus, UCOP will ensure that 100% of it is renewable by 2025, 2) of the natural gas supplied to UCSD, about 40% will be replaced by "directed biogas", which means that UCSD will pay some other site in the country to use biogas instead of natural gas (biogas generates fewer emissions), and 3) UCSD/UCOP will pay for carbon offsets – e.g. cooking stoves will be bought for people in Darfur/Uganda so they burn wood pellets instead of trees, and emissions are therefore reduced.

Unfortunately, the prospect that these solutions will, in fact, yield carbon neutrality at UCSD, or any of the UC campuses, by 2025 appears remote for the following reasons:

a) There appears to be little accountability[13]. Greenhouse Gas emissions were supposed to be reduced to 1990 levels by 2020[14]. While the Task Force has not been able to ascertain exactly where we are in this regard, we can report the answer given to the UCSD Graduate Student Association Climate Action Group after their persistent enquiries to VC Matthews' office (Facilities): *"We should know our final 2020 emissions levels by late 2021. At that time, if the mitigation measures have not lowered emissions enough to meet the 2020 goal, VC Matthews will discuss with campus leadership the option of buying high quality offsets to make up the difference. In the meantime, there is discussion among UC campuses and UCOP to remove the 2020 goal as it was set as an interim target en route to 2025"[15].*

b) The reliance on directed biogas is problematic because it is unclear if there is enough to be bought for the UC campuses over this period. Further, biogas is also subject to methane leaks just like natural gas[16] - as it uses the same piping. Methane is ~80 times more potent a Greenhouse Gas compared to Carbon Dioxide[17].

c) There is much well-motivated skepticism about carbon offsets[18]. Even when carefully sourced, as they are by the UCOP, to ensure that the emissions reductions would not have occurred had we not paid for the project, there is much uncertainty about their effectiveness[19], and in some cases they are actively harmful[20]. As things stand, for the entire UC system,

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[11] See page 58 of https://www.ucop.edu/sustainability/_files/annual-reports/2018-annual-sustainability-report

[12] https://sustain.ucsd.edu/_files/focus/UCSD-Climate-Action-Plan-2019-final.pdf

[13] The accountability problem is clearer for Waste Goals than Greenhouse Gas emissions. Earlier this year, UCSD was only 38% of the way to meeting its 2020 goals. https://www.sandiegouniontribune.com/opinion/commentary/story/2019-12-18/university-california-ucsd-climate-goals-just-hot-air

[14] See page 16 of https://sustain.ucsd.edu/_files/focus/UCSD-Climate-Action-Plan-2019-final.pdf

[15] We are grateful to the UCSD Graduate Student Association Climate Action Group for sharing information: https://tinyurl.com/t38ztwn

[16] https://www.nceas.ucsb.edu/files/research/projects/UC-TomKat-Replacing-Natural-Gas-Report_2018.pdf

[17] https://en.wikipedia.org/wiki/Atmospheric_methane

[18] https://features.propublica.org/brazil-carbon-offsets/inconvenient-truth-carbon-credits-dont-work-deforestation-redd-acre-cambodia/

[19] https://law.stanford.edu/publications/managing-uncertainty-in-carbon-offsets-insights-from-californias-standardized-approach/

[20] https://www.technologyreview.com/s/614216/whoops-californias-carbon-offsets-program-could-extend-the-life-of-coal-mines/

there are 12 pilot projects that have been vetted for offsets[21], and only two of these appear to have any promise for scaling up to tens or hundreds of thousands of tonnes of C02 equivalent. There is also an important moral argument to be made that we can and should reduce emissions at their source rather than relying on third party carbon offsets – we need to keep fossil fuels in the ground, not burn them and hope we can make good in some other way.

We conclude that "carbon neutrality by 2025" is not an accountable, realistic or moral solution for UCSD.

Apart from the cogeneration plant, a major source of UCSD's emissions is campus aviation and transportation[22]. Because these Scope 3 emissions have been given a 2050 time frame, there does not appear to be any accountability to make reductions. Having said that, we acknowledge that UCSD has one of the largest electric vehicle infrastructures of any campus[23], that it has facilitated staff/faculty leasing of Electric Vehicles[24], and that it also has a cutting-edge microgrid, and some installed solar and battery storage. To build on this foundation, and propel UCSD forward to genuine decarbonization, we propose the following concrete solutions.

Cogeneration Plant

1. Undertake substantial fundraising to replace the cogeneration plant with a mostly electric supply to campus (sourced from 100% renewables as soon as possible), while ensuring resiliency to shutdowns. Instead of using predominantly natural gas (even if 'displaced' elsewhere by biogas), we could run our heating/cooling and local electricity needs from majority electricity input[25]. This will cost a large amount of money[26]. Moreover, an important issue when considering powering UCSD with mostly electricity (instead of mostly natural gas) is to build in campus resiliency in the face of power shutdowns. Such shutdowns will become more likely with the fires exacerbated by climate change. The campus will need backup systems and to use the microgrid to maintain electricity to hospitals, data-servers and critical research infrastructure.

Transportation

2. Make Facilities accountable to Scope 3 transportation goals now (not 2050). Efforts should be made now to reduce emissions from ground transportation and campus-related aviation. Administrators at UCSD should be given specific goals for these emissions reductions, be provided with the appropriate resources, and be asked to report progress. The provision of the light rail trolley to UCSD in 2021 is a propitious movement for UCSD to better connect the campus with public transportation.

3. Replace the campus fleet by majority electric vehicles by 2025. It is part of UCSD's climate action plan to replace the fleet, and the Facilities Department has said: *"over 60% of the fleet is already hybrid, all-electric, compressed natural gas, or renewable biodiesel"[27]*. Still, we note that while hybrid cars are an improvement they are only a partial step towards decarbonization, and, further, natural gas and biodiesel still entail substantial emissions.

4. Measure campus-related aviation and develop a plan for substantial reductions. A plan should be developed for reducing campus aviation[28]. This could include a) changing department cultures to encourage the use of virtual seminar and open-house 'visits', b) adjusting expectations for study-abroad programs, including building in an awareness of climate justice[29] , c) signing up UCSD to the 'flyingless' movement[30], d) encouraging faculty to combine

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[21] https://tinyurl.com/wssgx24
[22] https://sustain.ucsd.edu/_files/focus/UCSD-Climate-Action-Plan-2019-final.pdf
[23] http://rmp.ucsd.edu/strategic-energy/ev/rdd.html
[24] http://rmp.ucsd.edu/strategic-energy/ev/offers.html
[25] UCOP has said it will source 100% of the electricity input to campuses from renewable electricity by 2025. Presumably if the electricity input to a campus such as UCSD was radically increased by 2025, the majority of this could also be sourced from renewables?
[26] For Stanford it was over 450 million https://law.stanford.edu/publications/managing-uncertainty-in-carbon-offsets-insights-from-californias-standardized-approach/
[27] https://tinyurl.com/t38ztwn
[28] Such policy must be mindful not to penalize, e.g. faculty, when there is no reasonable alternative to flying.
[29] Many UCSD students travel to countries such as Tanzania for study-abroad. The per student emissions for a return flight are around 5.2 tonnes of C02, while the mean per capital emissions for one year for a Tanzanian are 0.2 tonnes of C02: https://www.offsetters.ca/education/calculators/flight-emissions-calculator and https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=TZ
[30] https://noflyclimatesci.org/institutions

visits to multiple institutions in longer tours to avoid multiple flights, and also to take the lead to encourage more virtual conferencing in their academic societies both to reduce the need for travel and as a means to enable more broadly-based participation[31].

The Coronavirus pandemic has already led to changes in behavior that will lower the barrier to adopting these recommendations. To change behavior we need to acquire data. Most or all business-related aviation (faculty, graduate students, postdocs, visiting undergraduates for open houses) is logged through MyTravel. It should be possible for Information Technology staff to extract destinations and compute emissions per-passenger and at the department level. This could be communicated regularly to the wider institution for the purpose of creating concrete emissions goals.

5. Make public transportation free at point of use for UCSD faculty, staff and students; incentivize carpooling and bus use; substantially extend campus micromobility

a) UCSD should make Metropolitan Transport System (MTS) passes part of faculty/staff benefit packages. This will be cost-effective because UCSD can obtain MTS passes at about 10% of the cost (~$60/year) that faculty/staff would have to pay if they purchased these passes directly from MTS (~$600/year).

b) UCSD should support a pay-per-use instead of a per month parking program. This system could be structured to reward people who choose to not drive on some days by carpooling, taking public transportation, or telecommuting, while also not penalizing faculty/staff who need to drive to work (for example to facilitate child pick up after school) or those (such as physicians) who have to park at UCSD on weekends as well as workdays. Execution of this pay-per-use parking plan in conjunction with free MTS bus passes would provide a fiscal incentive for people to carpool or take public transportation on days when it is possible for them to do so, without penalizing people for whom it is not feasible.

c) The use of bikes and scooters on campus, and to campus from surrounding areas, should be facilitated through further development of dedicated lanes. This would help with "last mile" transportation to campus – for example, faculty/staff who enter campus at the new trolley stop in the south can then move via bike/scooter on dedicated lanes to the north.

6. Explore opportunities with Metropolitan Transit System to deliver rapid buses from San Diego areas to campus. UCSD can use its knowledge of where faculty/staff, students and postdocs live to establish express routes from areas with high densities of UCSD commuters to the campus. When the Trolley is ready in 2021 express transport, could be put in, for example, from Ocean Beach to Old Town. This could take hundreds of cars off the road per day from that location alone, for those drivers and passengers who want to live more ecologically[32]. Likewise, connections can be made from key areas in North Country with high densities of UCSD members, and also to other locations in San Diego.

7. Support a telecommuting policy for knowledge workers. Telecommuting has a huge decarbonization benefit due to a reduction in transportation. Allowing one day per week telecommuting could reduce traffic to campus by as much as one fifth. Dramatic behavioral changes under the Coronovirus pandemic clearly demonstrate that telecommuting has been highly effective for many knowledge workers at UCSD.

8. Support location-efficient mortgages to encourage campus members to live close to the trolley/buses. Location-efficient mortgages[33] provide a larger loan when the cost of transportation is expected to be lower—for example for a public transportation-based commute. This could be modeled after the existing program at the University of Washington[34].

Waste

In 2004, UCOP underlined that each UC campus divert 90% of its waste to recycling and compost by 2020. Some UCs are on track, such as UC Irvine, which has achieved 83% diversion. But UCSD falls short at only 38%[35].

9. Organic Waste: Build or source a large-scale composting facility that can recover organic waste. Large amounts of organic waste are generated by our huge campus every day. Facilities is hoping that it will be able to send post-consumer food and other organic waste to EDCO's[36] new facility in 2021. We should pay careful attention to this – if this is not an

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[31] https://pubmed.ncbi.nlm.nih.gov/32272064/
[32] We note that hundreds of UCSD community members per day make use of the Hillcrest shuttle rather than drive.
[33] https://www.cnt.org/projects/rethinking-mortgages
[34] https://en.wikipedia.org/wiki/Location_Efficient_Mortgage
[35] https://sustainability.ucsd.edu/_files/UCSanDiegoZeroWastePlan.pdf
[36] See page 9 https://tinyurl.com/t38ztwn

option soon, a dedicated campus facility should be built.

10. Prohibit single-use plastic from campus vendors and encourage emissions labeling on food.
a) UCSD should incentivize contracts with vendors who use sustainable products (such as single use plastic). Such policy should be applied to vendor contracts when they are up for renewal.
b) UCSD should encourage carbon labeling of food items in our cafeterias[37]. Recent research shows people desire it[38]. Methods for determining such labeling are getting easier. UCSD can help pioneer this.

11. Properly support the Green Labs program. UCSD's Green Labs[39], which started in 2013, is a program that helps laboratories reduce their footprints without compromising research quality or safety. Since there are ~900 research wet labs on campus and the Green Labs program has been able to certify ~100 of them so far[40], it will take close to 30 years at the current rate to certify all labs on campus. Given the obvious cost benefits from reducing energy and water use in these labs, the funding, resources and goals for this program need to be scaled appropriately to promptly enable certification of all research labs, also with regular recertification.

Other

12. Where possible, record the emissions footprint of items acquired through campus procurement. We should try to guide our purchasing decisions with information on carbon impact. If emissions data are available, UCSD purchasers can then instantiate the principles of emissions reduction when they choose between vendors.

13. Make vegetarian meals the default choice in campus dining rooms and start meatless Mondays. Animal agriculture, especially for red meat consumption, is responsible for a large proportion of Greenhouse Gas emissions (13 to 18%)[41]. Some universities such as Goldsmiths London[42] and the University of Portugal[43] have gone so far as to ban red meat outright. UCSD can start with meatless Mondays in campus dining halls. Campus policy can be developed to guide Housing and Dining Services as well as on-campus vendors such as "Soda and Swine".

14. Replace most gasoline-powered leaf blowers by electric. Leaf blowers are used dozens, perhaps hundreds, of times per day at UCSD. Replacing gasoline with electric blowers will reduce both Greenhouse Gas Emissions and toxic pollution. There are issues of cost and functionality, but as difficult as it might be, UCSD should replace these polluting devices, which have been banned in many towns in the US, including Del Mar and Encinitas[44] . The state of California is considering banning them[45].

15. Test carbon pricing schemes at UCSD for aviation and cars. Other universities have pioneered tests of carbon pricing[46] , and Yale University has a report on the social cost of carbon[47]. Regarding aviation, Point 4 above called for department-level measurement and culture change; here we go further and suggest experiments with pricing. We could, for example, emulate the UCLA levy[48] on work-related flights, but increase it to a more substantial $25, and ear-mark the proceeds for new graduate student climate crisis projects or faculty teaching workshops. Regarding private car use, one possibility is to impose a carbon impact fee. This would need to have equity at its core, recognizing that campus members who come from further away may least be able to afford it and have worse options for public transportation. The monies raised could be matched by UCSD and funneled to public transportation options such as above.

[37] https://www.sciencedirect.com/science/article/abs/pii/S0306919211001096
[38] https://www.wired.co.uk/article/carbon-labelling-quorn
[39] https://sustain.ucsd.edu/involve/green-labs.html
[40] https://sustain.ucsd.edu/involve/green-labs.html#Green-Lab-Certification
[41] https://skepticalscience.com/animal-agriculture-meat-global-warming.htm
[42] https://www.theguardian.com/environment/2019/aug/12/goldsmiths-bans-beef-from-university-cafes-to-tackle-climate-crisis
[43] https://www.newsweek.com/portugals-oldest-university-bans-beef-fight-climate-change-we-are-experiencing-climate-1461344
[44] https://drive.google.com/file/d/1GR1niTtOs6dTgomyNwGawmRqPS2aBuFc/view?usp=sharing
[45] https://www.sfchronicle.com/business/article/California-s-latest-pollution-push-Banning-14951305.php#
[46] https://secondnature.org/climate-action-guidance/iv-case-studies/#resource9
[47] https://carbon.yale.edu/sites/default/files/files/Carbon-charge-report-041015.pdf
[48] https://secondnature.org/wp-content/uploads/UCLA-case-study.pdf

16. Create transparency rules regarding corporate influence over energy and climate scholarship[49]**.** The UC has policy on conflicts of interest around human subjects research (focused especially on medical research funded by Pharma, and as required by Federal and State law). There is also a Regents Policy (2309) on Tobacco entitled "Policy Requiring Special Review/Approval Procedures Prior to University Submission of Research Proposals to Tobacco Industry Funders" [50]. A similar type of document as 2309, but for Fossil Fuel funding, is now being promoted through the UC systemwide Senate. Given that the consequences and urgency of the climate emergency dwarf those of pharma and tobacco, similarly enhanced scrutiny should be applied to research and other support provided by fossil fuel interests. UCSD should get behind this.

17. Shift campus banking away from large fossil-fuel funders such as Bank of America. In September 2019 the UC declared a climate emergency[51], but its choice of commercial banks is not consistent with this. The three major Commercial Banks that UC uses are Bank of America, Wells Fargo, and Union[52] . These banks have some of the worst records and policies in addressing the Climate Emergency of all major banks. Notably, alternative large commercial banks do exist with much smaller exposure to the Fossil Fuel Industry[53]. A proposal is currently being promoted through the UC systemwide Senate to request that the Chief Financial Officer of UC issues a Request for Proposals for commercial banking services that includes a criterion of adherence to Environment, Social and Governance principles. At UCSD, the office of Business and Financial Services confirmed that Bank of America is our main bank. UCSD should support this systemwide Request for Proposals.

Further, UCSD should develop an ethical leasing policy at the Price Center (see example petition[54]), where there is, for example, a Chase branch. Chase is at number 1 in financing fossil fuel operations[55]. UCSD should promptly renegotiate Chase's contract.

18. Expand campus green infrastructure as a means to decarbonize. Examples of green infrastructure at UCSD includes bioswales for stormwater management, green roofs, urban agriculture, food forests, foodwaste-to-soil and energy biodigesters and composting systems. Green Infrastructure can reduce carbon emissions in various ways, for instance, energy and operational efficiencies gained by integrated organic waste management, water harvesting, flood control, green buildings/green roofs/green walls, tree canopy shading/cooling, climate-friendly regenerative agriculture/aquaculture, sequestering carbon in trees and soil, providing green spaces and trails that encourage walking and human-powered transport.

Teaching

UCSD has a moral and practical obligation to teach tens of thousands of students about the climate crisis. This will prepare students to think critically about what, for many, will be the biggest problem of their lives; to help them be part of collective action on genuine emissions reductions; and to provide them with relevant skills for a workplace that is going to be increasingly affected by climate concerns: from healthcare, to engineering, to insurance.

In our view, teaching about the climate crisis is not the same as teaching about the physical basis of climate change. While teaching the former (the climate crisis) must encompass the latter (the physical basis of climate change) it must also cover: a) psycho-socio-political topics, for example the more than 40 year history of how the fossil fuel industry has systematically distorted the science, misled the public and influenced the political system; and, for example, a sober analysis of how emissions have radically escalated under the current political-economic systems of the US and other major countries; and b) the topic of climate justice – i.e. the recognition that the people who did the least to incur our planetary predicament (the poor, the vulnerable, those in the global South, and the young) are going to incur the worst consequences[56]; and how societal solutions to the climate crisis must be just.

While many departments at UCSD have faculty who are doing outstanding teaching on climate topics, and while UCSD is especially well-positioned to lead in interdisciplinary education on the climate crisis, teaching efforts should be quickly scaled up to reach thousands of students. Here we organize our summary and recommendations into three

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[49] Thanks to Edward Hall and co-authors of the "Harvard University Response to the Climate Crisis" white paper for this suggestion: https://tinyurl.com/wcure4n

[50] https://regents.universityofcalifornia.edu/governance/policies/2309.html

[51] https://www.universityofcalifornia.edu/news/university-california-declares-climate-emergency

[52] Public information request June 2020

[53] See page 12 https://www.ran.org/wp-content/uploads/2020/03/Banking_on_Climate_Change__2020_vF.pdf

[54] https://ucsdgreennewdeal.net/wp-content/uploads/2020/02/Form-Letter-to-JPMorgan-Chase-Company.pdf

[55] https://www.ran.org/wp-content/uploads/2020/03/Banking_on_Climate_Change__2020_vF.pdf

[56] http://www.columbia.edu/~jeh1/mailings/2018/20181206_Nutshell.pdf

categories. Category 1 concerns interdisciplinary courses that run the full gamut of topics under the climate crisis; Category 2 concerns within-discipline teaching focused on climate change; Category 3 concerns the typical classes taught at UCSD, but in which faculty infuse climate change examples into the material.

Category 1: Courses that cover climate change as an interdisciplinary topic

These courses cover the basic understanding of the climate system, how it is changing, the impacts of climate change, aspects of communicating the climate crisis, the socio-political basis of the crisis and economic, social and technological solutions. The main such interdisciplinary course at present is SIO109/POLI117 (Bending the Curve: Climate Solutions). This could be taught more frequently.

19. Increase the frequency of existing interdisciplinary courses on the climate crisis. Departments and colleges should integrate these courses into existing elective and general requirements.

20. Encourage and reward the development of new interdisciplinary courses on the climate crisis. The development of new interdisciplinary courses should be encouraged. Interdisciplinarity is one of the hallmark characteristics of our university; one that has historically differentiated us from others. With its seminal contributions to climate science and its growing research activities across divisions, UCSD is well-placed to develop new interdisciplinary classes.

21. Reduce barriers to co-teaching climate crisis classes across disciplines. This would encourage more faculty to teach these classes, which includes content that is outside of their specific discipline and ensure that faculty can also learn more in the process.

Category 2: Courses that cover an aspect of climate change, or a perspective on climate change, from within a discipline.

22. Encourage faculty to develop new courses on climate change within their disciplinary perspective. For example, SIO25 (Climate Change and Society) mostly focuses on the physical basis of climate change and is taught by faculty at SIO; MAE119 (Introduction to renewable energy: solar and wind) is taught within engineering; and PSYC185 (Psychology of the Climate Crisis) is taught in Psychology. An attempt at a full listing is here[57], and includes classes in urban studies, economics, and anthropology, to name a few. Recent courses in this area (e.g. Climate Change Studies CCS102, CCS101, SIO190) were developed with funding from the Understanding and Protecting the Planet program[58].

Category 3: Teaching climate change across the curriculum (infusing climate into existing classes)

This approach puts the climate crisis *into* a class rather than making the class about the climate crisis. For example, a biology class, when teaching about plants, could cover bio-sequestration of carbon in topsoil; or a general sociology class could include an analysis of the climate movement. This approach takes advantage of existing courses and ensures that students hear climate change topics from different perspectives.

23. Offer training to help faculty infuse climate change content into existing courses. Workshops could be facilitated through the Teaching and Learning commons, in a collaboration that would support faculty in these efforts and improve the visibility and the outcomes of this project. Adequate support (funding) should be provided to faculty to participate in these workshops and to create and implement new curricula. Course content that is produced as part of these workshops can be highlighted on the developing climate curriculum website at UCSD, and on other UC-wide websites such as through the UC-CSU NXTerra[59].

Category 4: General recommendations, and other comments

24. Within the proposed new holistic teaching evaluations, the senate CAP instructions and department chairs should acknowledge faculty efforts to teach the climate crisis.

25. Acknowledge climate crisis teaching in regular department and college reviews and encourage climate crisis themes in stated learning outcomes.

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[57] https://climatecurriculum.ucsd.edu/demo-home/climate-change-coursework/
[58] https://scripps.ucsd.edu/research/upp
[59] https://www.nxterra.orfaleacenter.ucsb.edu/

26. Incentivize graduate student participation in climate crisis teaching. Interested and passionate graduate students should be able to engage with developing courses on topics related to the climate crisis and be given "extra credit" to incentivize participation, such as a certificate of accomplishment.

While we favor a General Education Requirement for undergraduates on par with the current DEI requirement, after consultation with stakeholders across campus, we do acknowledge practical impediments. This approach would likely lengthen time-to-degree, and also inculcate an undesirable check-box like approach to education. Instead, we endorse the above, creative, approaches.

Another idea is that approval could be given for some climate change classes under the Diversity, Equity and Inclusion requirement[60]. These classes are structured around the experience of, for example, African Americans, Hispanics, Native Americans and others in the United States, and few faculty with expertise in climate science, or the sociology/economics/politics of climate issues, will be equipped to teach them, so this is an area where novel interdisciplinary course offerings that serve both societal goals could emerge.

Under Research, below, we recommend climate crisis hiring – this will naturally increase the number of classes taught, but will take many years to get in place.

Research

UCSD hosts the Scripps Institution of Oceanography where many of the original insights into modern climate science were developed, and the ongoing contributions of its scientists are internationally recognized. Likewise, there are numerous impressive research programs, and highly esteemed individual investigators, on the main campus, focused on aspects of energy, engineering, materials, economics, urban studies and planning, and global policy pertinent to the climate crisis. Yet we note that the climate crisis is fundamentally a problem of human behavior change. Oddly, between 1990 and 2018, globally, only 0.12% of all climate-related funding was spent on social science[61]. To take one example, at UCSD, in the Psychology department, only a single faculty member of 32 is so far doing research on the climate crisis, even though a dozen or more are studying social aspects of psychology.

UCSD's research and teaching on the climate crisis should incorporate climate justice[62], an ethical dimension rather than an environmental or physical one. Climate justice recognizes that those who did the least to incur the problem of global heating, the young, the poor, especially those in the global south, will incur the worst consequences. It also recognizes in the United States that indigenous peoples, Hispanics and African Americans are disproportionately affected. These important topics overlap with humanities departments such as ethnic studies, history and philosophy, and provide key research opportunities within them.

UCSD could encourage more research on the climate crisis, especially in these under-represented, yet critical, fields such as social science, humanities and business.

27. Direct a subset of new FTEs to climate crisis hiring in social sciences, arts and humanities and business. These disciplines are mentioned given the observation (above) that a mere 0.12% of climate-related funding is in areas outside of physical science. These should be new FTEs not re-allocations of existing ones.

28. Steer research funds towards encouraging new-time investigators to begin climate crisis research projects. This could include providing seed funding for projects to get pilot data; or for graduate student fellowships to allow student to branch out past their advisors. This should be new funding rather than a re-direction of existing funds.

Health and Preparedness

We start by considering the overall operations of UCSD Health, and then cover mental health resources for UCSD faculty, staff and students.

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[60] https://undergrad.ucsd.edu/programs/dei.html
[61] https://www.sciencedirect.com/science/article/pii/S2214629619309119
[62] https://en.wikipedia.org/wiki/Climate_justice

UCSD Health

First, health care provision generates a lot of emissions. The health care sector's contribution to greenhouse gas emissions ranks it 13th in the world, making it nearly equivalent to that of the UK[63]. Second, the climate crisis will have huge effects on health. Both the Lancet[64] and the New England Journal of Medicine[65] have characterized the health consequences of climate change as the "biggest global health threat" of the 21st century. Sir Richard Feachem, DSc MD, director of UCSF's Global Health Group had this to say: *"There are only four scenarios that could actually kill hundreds of millions of people. Nuclear war, meteorites, and pandemics are all merely feasible. But climate change is already underway."*[66]

The health effects of climate disruption include increased injuries and premature deaths tied to extreme weather, expansion of respiratory distress related to the changing environment, growth in emergent infectious disease linked to changes in permafrost melt and food- and water-borne illness, and new threats to mental health associated with climate- anxiety. Because children, elderly and chronically ill patients from low-income communities are especially at risk, UCSD Health, more than other local health systems, will bear the brunt of this increased and more frequent disease.

To address its emissions, UCSD Health should accelerate its transition to a low-carbon economy. To deal with the consequences of the climate crisis, UCSD Health should reorient its teaching mission and work to improve community resilience, assure health equity, and improve access to care.

UCSD Health can implement decarbonization in the way we (A) operate our hospitals and deliver care, (B) educate our medical students, interns and residents and (C) prepare our staff and faculty.

A. Hospitals and Health Care Delivery.

UCSD Health has four sites for hospitals and health care delivery: (1) the Jacobs/Thornton Hospital complex on the La Jolla Campus, (2) the Rady Children's Hospital in Kearny Mesa, (3) the current Hillcrest Hospital in downtown San Diego and (4) numerous satellite outpatient care centers throughout San Diego and Imperial counties towards the Arizona border to the East, the Mexico border to the South and Riverside county to the North. Each site offers unique opportunities for decarbonization and preparedness, and UC Health leadership.

29. Measure the emissions of the existing UC Health Care Facilities. While UCSD Hillcrest and La Jolla have met the "healthier food challenge"[67] the health system needs to now commit to equivalent programs for (a) leadership engagement and organization-wide decarbonization via leaner energy and decreased emissions, (b) waste abatement and increased recycling, (c) safer chemicals in its materials and (d) leveraging purchasing power of sustainable products. Health Sciences should begin by appointing an academic Climate Change Coordinator.

30. Design the New Hillcrest Hospital to include Climate-Specialties such as Disaster Preparedness and Public Health Research. A new hospital and health care complex is envisioned for Hillcrest campus that could be designed as a living laboratory for clinical care, education and research in public health. With extant research, teaching and clinical expertise in acute care (trauma, burn, emergency medicine, infectious, respiratory disease and psychiatry), Hillcrest hospital is in a unique position for expanding research and education in disaster preparedness and public health. New construction could use the best possible low-emissions, zero-waste, and toxic-free methods, and incorporate public transportation to a maximum.

31. Expand Telemedicine to reduce transportation emissions. The delivery of health care is expensive but its true cost does not even include the emissions impact of travel. Telemedicine is an easy way to reduce emissions in healthcare provision. Telemedicine needs investment and its use by patients, staff and faculty needs to incentivized by exploiting travel UC Health remote care sites, promoting remote access to specialty care and developing compensation plans. Dramatic behavioral changes under the Coronavirus pandemic have accelerated telemedicine and shown to many that it

[63] https://noharm.org
[64] The Lancet Countdown is an international, multidisciplinary collaboration dedicated to monitoring the evolving health profile of climate change. https://doi.org/10.1016/S0140-6736(19)32596-6
[65] https://www.nejm.org/doi/full/10.1056/NEJMp1913916?query=TOC
[66] https://www.ucsf.edu/magazine/climate-crisis-health-crisis
[67] http://www.healthierhospitals.org/

can be effective.

B. Medical Students, Interns and Resident Education.
UCSD Health School of Medicine, Pharmacy and Public Health have a unique opportunity to reach tomorrow's health professionals.

32. Prioritize the climate crisis in all aspects of medical education. The Deans of each school should make health climate awareness and decarbonization a priority to all teaching efforts that is at par with their school's systematic efforts to ensure equity and diversity of faculty and students.

C. Faculty Training and Awareness.
UCSD Health School of Medicine, Pharmacy and Public Health staff faculty have a unique opportunity to increase their awareness as health professionals.

33. Recognize climate crisis work in the assessments and career advancement of clinical faculty. The Schools of Medicine, Pharmacy and Public Health should establish a Clinical Enrichment Program with specific funding and opportunities for faculty to both take CME courses that offer internship opportunities, campus projects and research opportunities related to the health consequences of climate and climate solutions.

Mental Health Care Provision for UC faculty, staff and students
In 2017, the American Psychological Association named the condition of "eco-anxiety" in relation to climate change[68]. UCSF recently convened a climate change and mental health task force[69] and eco-anxiety amongst UC members is already a real thing[70]. At UCSD, the Director of the Faculty and Staff Assistance Program is Crystal Green. Dr. Green's team of five counsellors serve more than 16,000 campus staff and faculty and their household members, as well as retirees, emeriti and Postdocs and International Scholars from all over UCSD. Clearly this level of counselling support for so many inadequate, and also the counsellors could benefit from training on eco-anxiety and climate grief.

EVC Simmons presented data[71] at a Representative Assembly meeting in December 2019 on the escalating mental health crisis amongst our students, and a general campus email from the Chancellor on January 9th 2020 affirmed UCSD's commitment to student-centered mental health resources.

34. Increase the number of mental health counselors in the Faculty and Staff Assistance Program and provide eco-anxiety training for them and for student mental health counsellors.

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[68] https://www.apa.org/news/press/releases/2017/03/mental-health-climate.pdf
[69] https://psych.ucsf.edu/climatechange
[70] https://sustainability.ucsf.edu/1.830
[71] http://senate.ucsd.edu/media/409820/compiled presentations.pdf