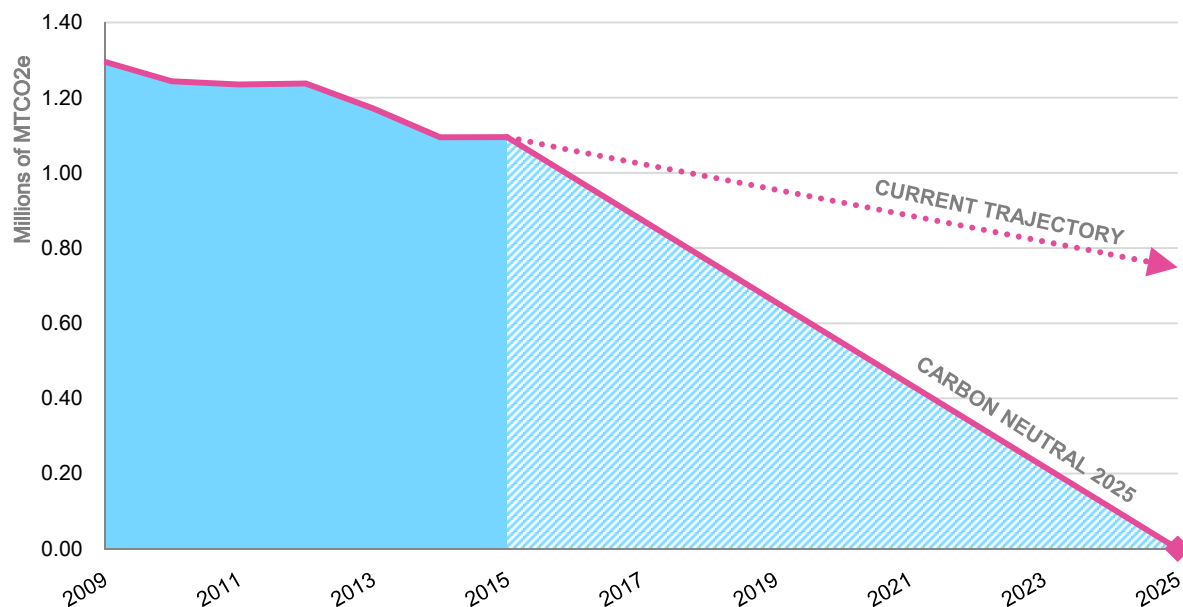


## EXECUTIVE SUMMARY

Global climate disruption poses serious and urgent environmental, social and economic challenges. The countries of the world will need to make massive changes across their energy and transportation systems in order to eliminate the emission of carbon dioxide and other greenhouse gases that are accumulating in the atmosphere and causing atmospheric temperatures to rise. These changes will require numerous innovative, scalable solutions in energy efficiency, power generation, industrial applications, transportation and more. Universities, with their threefold mission of education, research and public service, are ideally suited to contribute to developing these solutions. The University of California, with its vast intellectual resources on 10 campuses, five medical centers and three national laboratories, is uniquely positioned to play a leading role in this critically important endeavor.

In 2007, all 10 UC chancellors signed the American College and University Presidents' Climate Commitment, pledging to decarbonize their campuses by 2050. When UC President Janet Napolitano launched UC's Carbon Neutrality Initiative in 2013, the target date was moved to 2025. This bolder goal is both an opportunity and a challenge. It has galvanized many faculty, students and staff around an issue of enormous societal importance, driving new multicampus, multidisciplinary research and collaboration and enriching the curriculum. By focusing on what we must do to decarbonize, the UC system becomes a large set of living laboratories, each an active learning environment exploring solutions that have the potential to advance carbon neutrality worldwide.

### ***UC Scope 1 and 2 Greenhouse Gas Emissions: Current Emissions and Trajectory Necessary to Reach Carbon Neutrality by 2025***



*This graph illustrates UC's current rate of progress toward eliminating carbon from our operations. We are on track for 2040. The question is how to gain sufficient momentum to achieve carbon neutrality by 2025.*

The 2025 goal has also driven significant progress toward reducing carbon through efficient and innovative campus operations. Systemwide, UC's greenhouse gas emissions are now three percent below 2000 emissions levels, even with considerable growth in student enrollment and new building square footage. A combination of energy efficiency incentive programs, renewable energy procurement strategies, aggressive green building standards and other measures have set the university on a steady trajectory toward the elimination of carbon — by 2040. (See graph on page I.) The Carbon Neutrality Initiative calls us to accelerate our progress by implementing further operational and budgetary strategies to move us to carbon neutrality in just eight years.

The 2025 goal highlights the challenges that UC — and by extension other large organizations — will face in order to remove carbon from their everyday operations. Many financial and management barriers stand in the way, including funding constraints, competing priorities, and limits on debt capacity, as well as a lack of awareness and engagement on the part of most faculty, students, administrative leaders and staff. In addition, the university's coexisting models of centralized and decentralized decision-making may test our ability to move quickly to such an ambitious goal.

To provide oversight, research and recommendations for the Carbon Neutrality Initiative, President Napolitano has convened experts from across the university, including faculty, students, administrative leaders and operations staff, with expertise in energy and sustainability, environmental law, climate science, social science, budget and finance, facilities construction and operations, administrative services, capital planning and communication. The primary oversight group is the Global Climate Leadership Council (GCLC), formed in 2014. The GCLC subsequently established an Applied Research Working Group that, in early 2016, formed the Task Force on Carbon Neutrality Financing and Management to study the barriers impeding progress toward the goal and to recommend potential solutions. At the same time, a generous grant from the TomKat Charitable Trust made it possible to establish the UC-TomKat Carbon Neutrality Project, which is researching ways to eliminate campus reliance on natural gas and ways to foster broad-based attitudinal and behavioral change in support of carbon neutrality. Finally, a recently formed Carbon Abatement Technical Group is investigating the role that carbon offsets

## Why 2025? And how much will it cost?

Concerns about the 2025 deadline largely stem from uncertainty about the costs, and these questions generated extensive debate during the course of our work.

Many stakeholders have asked that the deadline be reexamined. (See Appendix IV). However, our Task Force largely followed its directive from President Napolitano and set aside the “why 2025?” question to focus on “what’s next?”

Because we did not take a prescriptive approach to strategies for achieving carbon neutrality — each UC campus is in the process of choosing its own optimal path forward — we did not specify firm costs. Instead, we have recommended funding, financing and energy procurement strategies that can make implementation affordable and cost-effective.

We are sensitive to concerns about the overall cost of meeting the systemwide 2025 goal. We believe that the appropriate course of action is to move aggressively to implement cost-effective measures to reduce emissions, consistent with our recommendations, and to work toward meeting the 2025 goal. We anticipate that these next steps can be done without negatively impacting our budgets, but believe that our leaders should continue to evaluate the campus-specific financial implications to ensure that costs remain manageable.

might play in the Carbon Neutrality Initiative.

With this set of activities in place, our Task Force focused on the fiscal and administrative challenges we must overcome to achieve carbon neutrality by 2025. Determining how to decarbonize UC's seven central heating and cooling plants is among UC's toughest challenges and the TomKat natural gas group will make recommendations for how to do so. We anticipate, however, that eliminating direct carbon emissions from the heating and cooling plants cannot occur by 2025 given the large capital costs required to do so. As a result, the Carbon Abatement Technical Group will make recommendations about how to use offsets as a transition measure. The goal is to prioritize off-campus actions that have broad support because they are consistent with our educational mission and provide other co-benefits. All of these recommendations will need buy-in from the university's many stakeholders, which is the focus of the TomKat communications group.

Since mid-2016, our task force has been meeting and reaching out to the university community in order to understand what campuses need and how they approach the operational, fiscal, organizational and technological issues related to the Carbon Neutrality Initiative. The "Overcoming Barriers to Carbon Neutrality" report is the result of our efforts.

One of our Task Force's principal findings is that many campus leaders across the system have not fully embraced the Carbon Neutrality Initiative, especially its 2025 deadline (See Appendix IV). Perspectives vary widely among campus stakeholders as to the initiative's merit and priority. Moreover, each of UC's 10 campuses and five medical centers has its own culture, infrastructure, energy mix, competing priorities, budgetary constraints, and local climatic and topographic features that make a centralized, one-size-fits-all approach both impossible and undesirable. This has led us to a key conclusion: ***The successful transition to carbon neutrality hinges on securing broad support for the initiative among senior administrators, staff, faculty and our students. Additionally, the way in which carbon neutrality measures are implemented must respect campus autonomy in charting their own progress toward carbon neutrality while providing campuses with the leadership, tools and authority to accomplish the goal.***

## Recommendations

Our Task Force focused its efforts in five broad areas that pertain to campuses and medical centers: funding and financing, energy efficiency and conservation, new buildings, communication and change management, and energy supplies. A sixth area addresses barriers specific to medical centers. We engaged campus-based subject matter experts, administrators, faculty and students through interviews, surveys and workshops. In addition, we shared preliminary findings and recommendations broadly to ensure that our recommendations reflect the university community's perspectives.

We have not attempted to provide a definitive path to carbon neutrality by 2025. Instead, we present a set of strategies that can be implemented based on the unique needs of each location. We built in flexibility for campuses to determine how to implement the recommendations based on campus-specific feasibility. We recommend centralized approaches only where they offer significant economies of scale or will be necessary to achieve meaningful carbon reductions.

We believe that each campus will need to implement a mix of strategies in each of the areas we have identified:

- **Funding and financing.** Accounting for the cost of carbon and integrating carbon management with utility budgets.
- **Energy efficiency and conservation.** Investing in deeper energy efficiency and developing and paying for qualified staff to operate finely tuned building systems.

- **New buildings.** Designing new buildings to carbon-neutral standards.
- **Communication and change management.** Engaging faculty, students and staff in the commitment to achieving carbon neutrality.
- **Energy supplies.** Procuring as much renewable energy as possible.
- **Medical centers.** Addressing the barriers unique to hospitals, including regulatory requirements and the primacy of patient care and safety.

Out of 28 recommendations, we highlight eight in this summary. These eight address the most challenging barriers and will involve the most significant organizational and financial changes. Implementing them will contribute the most to accelerating progress and putting the university in a position to achieve carbon neutrality by 2025. The remaining recommendations are critical best practices, already in place on some campuses, that need to be widely adopted in support of both operational excellence and carbon neutrality.

## Funding and Financing

Funding concerns cut across all carbon reduction strategies. Even programs that pay for themselves, such as energy efficiency retrofits, often struggle for funding because they require large up-front investments, and typical budgeting practices mask long-term savings. Campuses are already employing multiple mechanisms to fund energy efficiency projects, procure green energy and reduce costs of carbon abatement. But they need to invest much more, and funding is a formidable barrier. These two recommendations are designed to improve the way that funding for carbon abatement activities is approached:

- **FF1. Integrate purchased utilities and carbon management functions as a stand-alone financial unit.** This recommendation is designed to make revenue streams and cost savings from energy efficiency and other carbon reduction measures available for additional energy efficiency and carbon reduction efforts. It will enable campuses to directly leverage energy-saving activities that have early-stage operational paybacks to support activities that are more expensive. It will help campuses prioritize funding for carbon reduction actions. The UC-TomKat Carbon Neutrality Project provides a detailed technical analysis in support of this recommendation.
- **FF2. Implement internal carbon charges.** We recommend first establishing a standardized, systemwide shadow price for carbon to account for the financial and regulatory risks associated with greenhouse gas emissions. This will help campuses prioritize funding for actions that reduce carbon emissions without charging an actual carbon fee. Once the shadow price has been operationalized, we recommend that campuses and medical centers self-assess and implement an internal charge based on actual campus carbon emissions and use the proceeds to fund further carbon reduction measures.

## Energy Efficiency and Conservation

Data from many completed energy retrofit projects demonstrate that entire campuses and medical center non-acute facilities could attain 50 percent or more improvement in energy efficiency through a comprehensive program of energy retrofits. Deep energy efficiency projects can also result in long-term cost savings, although upfront costs can be high and payback can be long. Furthermore, precision building energy systems must be maintained by highly qualified staff. These funding and staffing strategies are designed to help campuses access sufficient capital to invest in deep energy efficiency projects and develop appropriate staff to maintain them.

- **EE1. Develop a comprehensive funding plan for energy efficiency projects.** We recommend that the Office of the President integrate energy efficiency into systemwide financing considerations and work with campuses to help develop funding strategies for energy efficiency projects.

- **EE2. Improve staffing for energy efficiency programs.** A major impediment to successful implementation of energy efficiency projects across campuses is the low number of qualified project delivery and operations staff. Our experience shows that the cost for new staff is more than covered by energy cost savings. We recommend that campuses evaluate the staffing levels needed to scale up energy efficiency investments and increase staffing accordingly.

## New Buildings

Even with the most efficient use of existing space, new buildings will be needed as the university continues to grow. These recommendations are designed to help embed carbon reduction practices into planning, design and construction processes so that new buildings do not increase campus carbon emissions. We recommend that these be firm systemwide policies once adopted. We defer to the Systemwide Sustainability Steering Committee for specific implementation details.

- **NB1. Prioritize net-zero carbon for new building projects and all-electric designs for new housing.** We recommend that the Sustainability Policy Steering Committee evaluate ways to update the university's building policies to support net-carbon-neutral and all-electric design proposals. To achieve carbon neutrality, all new buildings must be, at minimum, carbon neutral, inclusive of any offsets purchased. All-electric designs, coupled with renewable energy sources, will be essential for campuses to reach net-zero emissions. Student housing projects may provide an early case for net-zero carbon strategies but will need to take into account cost considerations. UC's Carbon Neutral Buildings study, which was developed in support of this recommendation, analyzes options for new buildings and provides a framework for project-specific decisions.
- **NB2. Strengthen energy performance standards and incentivize low-energy design.** We recommend that the Sustainability Policy Steering Committee strengthen UC-wide design standards for new construction to include more aggressive energy conservation and carbon reduction/elimination measures. Energy Use Intensity (EUI) targets for new medical center facilities will also help promote high-energy performance design and should be incorporated into the planning and design processes for upcoming building updates. Although many projects voluntarily exceed current policy requirements for energy efficiency and carbon reduction, higher energy performance standards will need to be enshrined as university policy to make them a consistent, nonnegotiable priority.
- **NB3. Base capital project design decisions on life cycle cost analysis (LCCA).** We recommend that the Sustainability Policy Steering Committee adopt a new policy (similar to the California mandate that state agencies use LCCA) so that major capital project design decisions are based on energy and carbon costs over the life of a project. LCCA considers the value of a project from construction through end-of-life and can include carbon footprinting, the cost of energy and energy system operations and at least a shadow price for carbon. LCCA enables designers and decision makers to see the long-range savings that result from an energy-focused design standard.

## Communication and Change Management

The Carbon Neutrality Initiative is an ambitious effort that presents unique communication challenges beyond the scope of our Task Force. For in-depth communication research and recommendations, we are relying on the TomKat Communications Strategy Working Group, whose faculty, students and practitioners from across the UC system are using audience research, system mapping, theory of change and other techniques to develop a new set of communication tools tailored to the UC Carbon Neutrality Initiative. Our recommendations lay the foundation for their strategies, with the following being of highest priority:

- **CM1. Position carbon neutrality as a campus and systemwide priority.** We recommend that the importance of the Carbon Neutrality Initiative and its connection to the UC mission be better communicated through targeted messaging that engages the regents, campus leadership, faculty, students and staff.

## Call to Action

The ambitious goal of achieving carbon neutrality by 2025 has catalyzed campuses to accelerate their efforts and make admirable progress in the areas of energy efficiency and carbon reduction. Having communicated with many, if not most, of those who will be responsible for making carbon neutrality a reality for the University of California, we are confident in the energy-saving technologies and methodologies currently available, in the UC faculty and scholars working to improve upon them, and in the operations personnel who implement them. Still, our task force has concluded that 2025 is a target for which the university is not fully prepared. Reliance on natural gas, competition for funding, limited financing options, carbon-blind budgeting and planning procedures, and, above all, absence of a universally shared vision of the high priority of carbon neutrality, make the Carbon Neutrality Initiative an enormously difficult undertaking.

Yet the recommendations in our report make good business sense even in the absence of a carbon-related objective. While the recommendations will reduce carbon, they also stand to improve the quality of campus operations and business processes. In keeping with UC's threefold mission, they leverage UC's ongoing applied research and provide our students with innumerable learning opportunities, while serving the global public by leading the way to a sustainable climate future. We therefore urge the Office of the President and all campuses and medical centers to begin exploring how to put them into practice immediately.

## For More Information

Contact Ann Carlson,  
Chair of the Carbon Neutrality Finance and Management Task Force  
[carlson@law.ucla.edu](mailto:carlson@law.ucla.edu)

or

David Phillips  
Associate Vice President for Energy and Sustainability  
UC Office of the President  
[david.phillips@ucop.edu](mailto:david.phillips@ucop.edu).

This report and related documents can be found online at <http://ucop.edu/carbon-neutrality-initiative/reports/>.