University of California's Climate Demonstration Project for the World

Taking a Community of Half a Million to Carbon Neutrality Within 10 Years

It is now well established that human activities, primarily burning fossil fuels, are heating up Earth: 2015 is poised to go down as the hottest year on record. The world's temperature has now risen halfway towards 2°C, considered the "red line" of exceedingly disruptive climate change. Already at this halfway point, people are experiencing the impacts of climate disruption, including extreme heat waves and hurricanes that cost human lives, livelihoods and billions of dollars; air pollution that kills millions of people annually; more rapid spread of diseases; and increased droughts, floods and crop failures that have helped spark international conflicts and migration crises.

To avoid a future where these impacts reach unmanageable levels, the world must reduce greenhouse gas emissions dramatically and quickly—for CO_2, this means an average reduction globally of about 80 percent by 2050, transitioning to full carbon neutrality shortly thereafter. Such reductions have never been seen before, leading to a sense of futility for many people. What the world needs in order to embrace a "can-do" attitude are real-world demonstrations of how carbon neutrality can be achieved not only locally, but at larger scales within a short time frame.

The University of California is providing just such an example. Launched by UC President Janet Napolitano in 2013, the UC Carbon Neutrality Initiative set a goal for all 10 UC campuses to achieve zero-net greenhouse gas emissions for on-site combustion and electricity generation by 2025. Collectively, this means that more than half a million people will achieve carbon neutrality at their workplace within 10 years.

How the University of California Will Reach Carbon Neutrality

To accomplish the ambitious goal of becoming carbon neutral, the resources of all 10 UC campuses and three affiliated national laboratories have been mobilized, with the goal of exporting the lessons learned globally. This year, the Initiative sponsored a Carbon Neutrality Summit and developed the *Bending the Curve* report, an action plan with 10 scalable solutions that will limit global temperature rise to below 2°C through the end of the century (to be published as a book in spring 2016 by University of California Press).

> *"Reducing the human carbon footprint is a moral imperative"*
>
> - UC President Janet Napolitano

The Carbon Neutrality Initiative and its *Bending the Curve* report recommend the following:

- ***Promote the diffusion of existing renewable and energy efficient technologies*** to quickly reduce CO2 emissions and short-lived climate pollutants (methane, black carbon, HFCs and ozone). These steps already are underway at UC, which in 2014 announced the largest solar energy purchase by any U.S. higher education institution.

- ***Expand campus-based prototype solutions,*** such as UC Davis's anaerobic bio-digester (which turns campus organic waste into renewable power); UC Irvine's hydrogen-fuel cell powered bus (with zero tailpipe pollutant emissions); UC Berkeley's "smart" building (which reduces energy usage up to 30 percent by utilizing novel sensors and systems integration

technologies); and UC San Diego's [Energy Innovation Park](#) (which generates ~85 percent of its own electricity, produces 2.8 MW of electricity from bio-methane derived from San Diego City's waste water treatment plant, and employs the world's largest commercial fuel cell).

- ***Push cutting-edge research*** to enhance performance and decrease costs for existing technologies, and to introduce game-changing new technologies, such as the Nobel Prize-winning development of light-emitting diodes at UC Santa Barbara.

- ***Facilitate "leap-frogging" to clean energy production in developing countries.*** Examples include developing lower cost solar and wind generation together with microgrids and nanogrids that are uniquely suited to the needs of countries that lack established energy infrastructure.

- ***Work with policy makers*** to develop market instruments to enhance economic viability of clean energy technologies and phase out fossil fuel, an activity in which several UC faculty members are already engaged. Effective approaches include incentives to reward scaling up clean energy and terminating subsidies for emission-intensive pursuits.

- ***Develop communication strategies, dialogues and venues*** targeting diverse audiences in order to generate public awareness and enthusiasm for dealing with the climate problem on local, national, and global scales. Many system-wide and campus-based efforts already are underway, such as the UC-wide Cool Campus Challenge, UC Merced's Center for Climate Communication, UC San Francisco's programs on environmental health, UC Los Angeles' research on how people react when they understand the connection between tangible health impacts and energy use, UC Riverside's work on how religious leaders view climate change, and UC Santa Cruz's Science Communication Program.

Ten scalable solutions for holding climate change to 2^{O}

These 10 pragmatic solutions can be implemented immediately at local, regional and national scales. More detail on each solution can be found in University of California's *[Bending The Curve](#)* report

1. Bend the warming curve immediately by reducing short-lived climate pollutants and sustainably by replacing current fossil-fueled energy systems with carbon neutral technologies
2. Foster a global culture of climate action through coordinated public communication and education at local to global scales.
3. Deepen the global culture of climate collaboration by designing venues where stakeholders, community and religious leaders converge around concrete problems with researchers and scholars from all academic disciplines, with the overall goal of initiating collaborative actions to mitigate climate disruption.
4. Scale up subnational models of governance and collaboration around the world to embolden and energize national and international action.
5. Adopt market-based instruments to create efficient incentives for businesses and individuals to reduce CO2 emissions.
6. Narrowly target direct regulatory measures – such as rebates and efficiency and renewable energy portfolio standards- at high emission sectors not covered by market-based policies.
7. Promote immediate widespread use of mature technologies such as photovoltaics, wind turbines, battery and hydrogen fuel cell electric light-duty vehicles and more efficient end-use devices, especially in lighting, air conditioning, appliances and industrial processes.
8. Aggressively support and promote innovations to accelerate the complete electrification of energy and transportation systems and improve building efficiency.
9. Immediately make maximum use of available technologies combined with regulations to reduce methane emissions by 50 percent and black carbon emissions by 90 percent.
10. Regenerate damaged natural ecosystems and restore soil organic carbon to improve natural sinks for carbon (through afforestation, reducing deforestation and restoration of soil organic carbon). Implement food waste reduction programs and energy recovery systems to maximize utilization of food produced and recover energy from food that is not consumed.