UCLA Institute of the Environment and Sustainability

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UCLA: A Living Laboratory for Sustainability

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Since 1990 the University of California, Los Angeles has grown almost 40%, adding nearly eight million square feet to the campus footprint, the equivalent of over 4,000 houses. Over the last two decades UCLA research awards and grants have exploded from less than $300 million to over one billion dollars annually. One would expect with such remarkable growth to see a parallel increase in environmental impact and resource use. Yet over the same two decades the University's greenhouse gas (GHG) emissions are almost level - a reduction of 26% in GHG emissions per square foot - water use has decreased, and less waste is sent to landfill. Is it possible to grow in a way that is responsible and conserves resources for future generations? Is it possible to generate economic activity and at the same time protect the environment? UCLA is striving to demonstrate a resounding "yes" to these questions. The motto of the University of California is Fiat Lux- 'Let There Be Light.' Through the years that light has not only grown brighter, it has grown smarter and more efficient. While the State of California and the world is in serious economic crisis, the University is harnessing the energy and creativity of the people of California to generate innovative solutions.

GREEN BUILDINGS

As you enter the UCLA campus on Westwood Boulevard you pass the new UCLA Police Station, which last year won a green building award at the 40th Annual LA Business Council Architectural Awards. The Police Station was the

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third building on campus to achieve LEED (Leadership in Energy and Environmental Design) Certification from the U.S. Green Building Council. Green buildings use less energy and water and generate less waste than standard buildings. UCLA now requires all new construction and major renovations to achieve LEED Silver certification or higher. This policy is part of a comprehensive UC Sustainable Practices Policy, developed collaboratively by the 10 campuses of the UC system. In addition to green buildings, this policy covers clean energy, climate, waste, purchasing and food.

ENERGY COGENERATION

If you are in a hurry, you might mistake the large brick building behind the Police Station for an average administrative building. Some notice the steam rising from the building and wonder about its source, but few realize that it is a 44 megawatt natural gas power plant. The UCLA cogeneration plant, which came online in 1994, is twice as efficient as a normal power plant because it combines heat and power production, using waste heat from electricity generation to produce steam and chilled water for heating and cooling. The natural gas fueled plant produces less carbon dioxide than diesel or coal-burning plants, and about seven percent of the methane gas used in the plant is piped in from the Mountain Gate landfill located in the canyons above the Getty Center. Landfill gas ordinarily needs to be flared, which is environmentally destructive. Capturing the gas for use as a renewable energy source offsets the need for coal or other petroleum based fuels.

CLIMATE ACTION PLAN

Building a cogeneration plant and investing in generating cleaner energy on site was one of many forward thinking actions UCLA has taken over past decades. Along with early actions in energy efficiency, lighting, and transportation, the plant laid a foundation for UCLA to lead in sustainability, especially in addressing climate change. California State law AB32, as well as the University of California, set a target of reducing greenhouse gas emissions to 1990 levels by 2020. UCLA's comprehensive Climate Action Plan lays out a plan for the university to achieve that goal several years ahead of schedule. The plan was authored by members of the UCLA Sustainability Committee, founded in 2005 and made up of students, staff and faculty

that helps catalyze and prioritize sustainability initiatives on campus. The plan catalogues the steps the University has taken in the past and contains a detailed financial feasibility analysis for the initiatives the University will undertake in energy and transportation to reduce greenhouse gas emissions (GHG).

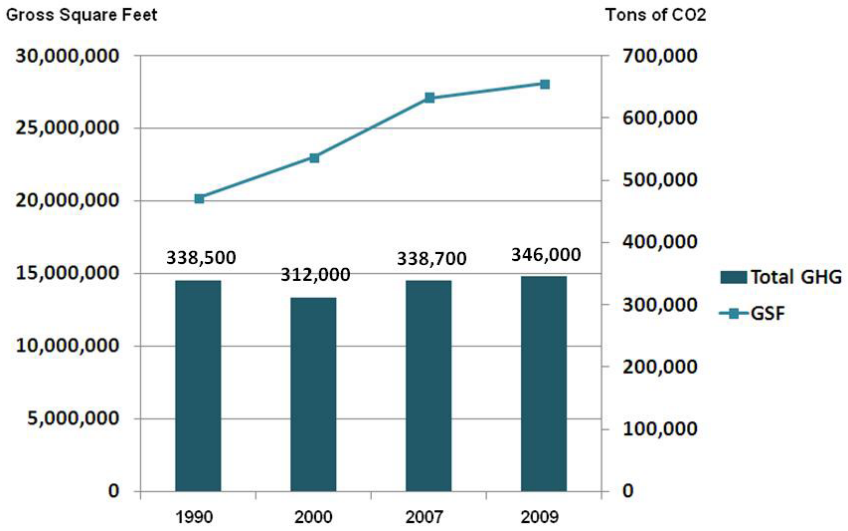

Fig. 1. UCLA Greenhouse Gas Emissions Compared to Growth, 1990-2009

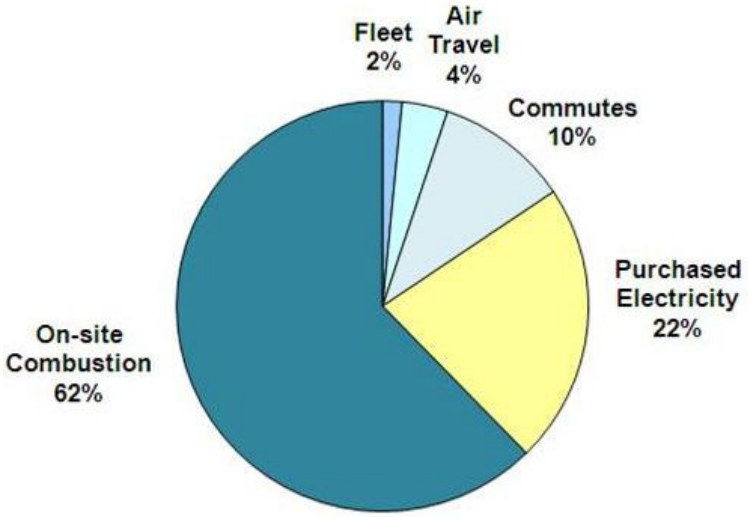

Fig. 2. Source of UCLA Greenhouse Gas Emissions, 2009

SUSTAINABLE TRANSPORTATION

In addition to energy use in buildings, UCLA's greenhouse gas emissions come from mobile sources like the campus fleet and commutes by students, staff and faculty. Sustainable

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transportation efforts at UCLA began before sustainability became a focus elsewhere. Due to its location within the Los Angeles Basin and the South Coast Air Quality Management District, the campus has long endured traffic congestion and focused on reducing emissions. In the 1990s, UCLA began a well developed transportation program that included vanpools, carpools and a campus shuttle. Now that suite of programs has expanded to include car-sharing through Zipcar, department bicycles, and bicycle loaner programs, as well as subsidized transit passes with five different transit agencies. Los Angeles is known as the land of the automobile, and this is reflected in the region's drive-alone rate, or percentage of people commuting alone by car. Approximately 75% of Angelenos commute in single occupant vehicles daily, impacting air pollution, traffic and greenhouse gas emissions for the region. Through UCLA's sustainable transportation programs, the campus has been able to lower the drive-alone rate for its staff to 53% and for students to 26%. To put it another way, almost half of staff and three quarters of students commute to UCLA by sustainable means such as transit, bicycle, carpool, vanpool or walking

Importantly, the initiatives outlined in UCLA's Climate Action Plan, in addition to addressing a critical environmental issue, also conserve university resources and result in significant cost reductions. The energy initiatives have an average payback period of less than five years, and some lighting initiatives pay back through cost savings in less than a year. By demonstrating it is possible to address GHG emissions through verifiable emissions reductions even in a challenging budget situation, UCLA is leading the way for the rest of California and the nation.

MULTIDISCIPLINARY RESEARCH

UCLA is also setting an example as a living laboratory for climate and sustainability research. Undergraduate and graduate students engage with staff and faculty to pilot new technologies and policies on the university campus. With over 25 research centers focused on climate and sustainability, UCLA is charting the future of our planet and creating the technology and leaders of tomorrow that will guide us through to a more sustainable world. Complex global problems can only be addressed by understanding systems and seeing the connections.

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A glance at the map of UCLA and one might think that it is a traditional university with scholars working diligently but separately in their departmental silos. Chemistry here. Sociology there. Management over there. But a closer look tells a different story. The faculty, students and staff of UCLA are collaborating across disciplines and departments to address sustainability and other pressing global issues, creating a vibrant learning community.

One example of this multi-disciplinary approach is the graduate training program known as "Clean Energy for Green Industry." Faculty from Engineering, Chemistry and Biochemistry, Management, the California Nanosystems Institute and the Institute of the Environment and Sustainability (IoES), are leading this program. Funded by the National Science Foundation, this training program is producing the next generation of experts in energy storage, energy production and energy conservation. In another example, professors from Environmental Health Sciences, Atmospheric and Oceanic Sciences, and Urban Planning have collaborated to identify urban areas in the Los Angeles region that are most at risk for high levels of air pollutant exposure.

New connections are even reaching across the arts and sciences. The Center for Intercultural Performance has partnered with the IoES to create a truly remarkable program coming in Fall 2011. The "Water is Rising" tour will feature 36 performing artists from the nations of Kiribati, Tokelau and Tuvalu which will be among the first places on Earth to be submerged by rising sea levels as global climate change continues to affect our planet. This national tour, created here at UCLA, brings a crucial human cultural element to the discourse about the future effects of climate change.

Across Westwood Boulevard from the Cogeneration Plant, in the Court of Sciences, stands La Kretz Hall, UCLA's first LEED certified building and home to the interdisciplinary Institute of the Environment and Sustainability. The IoES houses seven research centers and helps coordinate research between the many other centers across campus that address issues of environment and sustainability. The IoES is home to the Environmental Science degree program, one of the fastest growing undergraduate majors on campus. Graduate students from departments as diverse as Medicine, Engineering, Management and Policy come together in the Institute's award-winning Leaders in Sustainability graduate certificate program to work on projects together and learn principles that they can use to transform their fields. The IoES also coordinates an innovative set of student-led undergraduate courses called the Education for Sustainable Living Program (ESLP). In the ESLP Action Research Team course, students form research teams and work with faculty and staff stakeholders to tackle issues of campus sustainability including energy

efficiency, transportation, waste stream management, sustainable food practices, curriculum development and more.

WASTE MANAGEMENT

UCLA, along with other UC campuses is targeting 75% waste diversion by 2012, and "zero waste" by 2020.

In 2010 one of the ESLP Action Research Teams worked with staff to redesign the campuswide recycling program into a more streamlined and efficient two bin system. UCLA is sometimes known as "the City in the Village." With a daily population of around 60,000, the campus population is larger than many small cities in California. Managing the complex waste stream in a place like UCLA is no small task. UCLA, along with other UC campuses is targeting 75% waste diversion by 2012, and "zero waste" by 2020.

The current diversion rate for the campus is 60%, meaning less than half of the waste generated at UCLA goes to landfill. The campus recycles almost every material imaginable, from bottles and cans, to computers and DVDs. All of the green waste on campus is recycled and often used as mulch. UCLA is introducing biodegradable utensils in campus food courts, recycling materials from construction projects, and composting food waste from the dining halls. The campus is also piloting a composting program in the residence hall rooms. A number of reuse and donation programs run on campus including the Office of Residential Life's "Clothes Out" program, which assists students in selling and donating unwanted items at the end of the year. The "Dollar Saver" program helps departments exchange unwanted used laboratory and office equipment.

SUSTAINABLE FOOD PRACTICES

Up the hill in the dining halls, another ESLP Action Research Team, "Waste Watchers," has tracked food waste and made recommendations about how to reduce the amount of food students throw away each meal. As you step into the dining halls you notice signs about organic ingredients in the salad

Students are a driving force for change - they are stepping up and taking responsibility themselves for advancing sustainability on campus.

bar, herbs grown on campus, and cage-free eggs, as well as information about saving water, energy and food waste through tray-free dining. The newest section of the UC Sustainable Practices Policy, Sustainable Foodservices Practices, requires that twenty percent of all food purchases meet one or more of a variety of sustainable food criteria, such as organic or fair-trade, by 2020. The Sustainability Manager for UCLA Housing and Hospitality Services chairs the UCLA Sustainability Food Taskforce, working with staff from the Medical Center, ASUCLA and the Faculty Center to make the policy into a reality.

Students don't leave sustainability behind when they clear their plates. Student life on campus is tinged with green throughout, from the Team Green program of students educating peers to residence hall energy competitions and even a sustainability themed residence hall floor. As part of a behavioral study to investigate how real-time feedback about energy use affects people's consumption patterns, students receive real-time data about their energy consumption. IoES professors are collaborating with UCLA Housing and Hospitality Services, economics and engineering graduate students, and even an ESLP Action Research Team. The study, funded by the California Air Resources Board, will demonstrate how best to structure feedback and incentive systems to induce long-term behavioral reductions in energy use.

SUSTAINABLE BUSINESS EDUCATION

Down the hill from the residence halls, at the UCLA Anderson School of Management, there is change afoot. The new generation of business leaders is called by some "Generation And" because they recognize that is possible to do well in business and have a positive social and environmental impact, "doing well while doing good." Reflecting the national trend, the UCLA Anderson Chapter of Net Impact, an international organization of MBA's and professionals using business as a tool for having a positive impact in society, has grown almost exponentially in recent years, from a handful of students to one of the largest Anderson student organizations at nearly 200 students. The School now offers courses in renewable energy and social entrepreneurship, as well as other sustainability topics. These are just some of the over 350 courses related to sustainability that are offered at UCLA. UCLA Anderson also participates in the UCLA Leaders in Sustainability graduate certificate housed at the IoES.

The UCLA Anderson School of Management is truly practicing what they teach and has established a committee of faculty, staff and students focused on sustainability at the business school: The Anderson Green Commission. In 2009 they organized a case competition focused on sustainability at Anderson,

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where teams of MBA students competed with ideas for how to reduce resource use at the school. The winning ideas were implemented by Anderson's Operations group and included efficient hand dryers and a carpool program. The Anderson School is a pilot for the Departmental Energy Conservation program, as part of the University's restructuring efforts, and will pilot the campus Green Office Certification Program, educating staff and addressing individual resource consumption.

HABITAT RESTORATION

Behind the Anderson School runs Stone Canyon Creek which is undergoing restoration. Santa Monica Baykeeper, a local non-profit organization with expertise in habitat restoration and community action, has teamed up with the IoES and UCLA Facilities Management to restore a section of the creek's native ecosystem. Hundreds of volunteers from UCLA and the community have worked more than 3,000 hours on the project. Elementary school students from the University Lab School have been learning about water quality at the creek site and students at the Environmental Charter High School in Lawndale grew native plants in their nursery and helped plant them on site. The area is used for hands-on learning by students in biology, ecology, environmental science, engineering, geography and landscape design courses, just to name a few.

REGIONAL COLLABORATION

Across the Sculpture Garden from UCLA Anderson is the recently named UCLA Luskin School of Public Affairs, home to the problem-solving disciplines of public policy, urban planning and social welfare. At centers like the Lewis Center for Regional Policy Analysis, the Center for Civil Society, and the Luskin Center for Innovation, faculty and students are finding solutions to the regions toughest problems. The Luskin Center's proposal for an effective feed-in-tariff policy for solar energy in Los Angeles has been adopted as a

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legislative priority for the city. Next door at the Law School's Emmett Center on Climate Change and the Environment, law students and faculty are working on issues relating to international, national and local climate change law and policy.

While policies are being analyzed and crafted, across the university in the Office of the Vice Chancellor for Research, are leaders of Clean Tech Los Angeles, an initiative to connect technology with business and make Los Angeles the global capital of clean technology. The initiative harnesses the resources of groups like LA's Department of Water and Power, the Community Redevelopment Agency, the Chamber of Commerce, and scientific research heavyweights UCLA, USC and CalTech to turn the city into a center of green technology, green jobs and green manufacturing.

Another region-wide organization that is designed to encourage greater coordination and cooperation at the local and regional levels is the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC). Housed at UCLA's IoES but governed by its membership, this network brings together leadership from government, the business community, academia, labor, and environmental and community groups. The purpose of LARC is to build a regional climate action plan by sharing information, fostering partnerships, and developing system-wide strategies to address climate change, stimulate region-wide economic growth and create sustainable communities.

UCLA Extension's new Global Sustainability Certificate Program provides training and education for professionals interested in integrating sustainability into their careers or pursuing careers in the field. The program encompasses the fields of architecture, design, business, education, landscape architecture, law, marketing, public policy, real estate, science, technology and urban planning. The program focuses on major elements that impact the environment on a daily basis and hundreds of professionals from industries as diverse as medicine, aerospace engineering, real estate and entertainment are taking courses in the program and collaborating with each other.

FUTURE TECHNOLOGY

Not only are we shaping regional policy development and encouraging sustainable business opportunities, we are also modeling the future of climate impacts in our region and inventing the technology of the clean energy future. Atmospheric and Oceanic Sciences researchers are estimating renewable energy resources (especially wind) on an hourly basis at a scale of 2-3 kilometers which captures well the topography of Southern California. These efforts, looking

historically and under future climate change scenarios, are already helping city and regional planners to think in new ways about how to best take advantage of our region's physical assets and create new sources of clean energy.

In Engineering, our researchers have genetically modified a cyanobacterium to consume carbon dioxide, the leading compound contributing to global climate change, and produce a potential alternative liquid fuel, isobutanol. Other pioneering research includes a low-cost solution for solar, polymer based solar cells, as well as revolutionary nano-structuring technology for synthesizing water desalination membranes – a demonstration of which will be installed at the UCLA cogeneration plant to recycle water.

WATER CONSERVATION

The cogeneration water recycling demonstration project is part of a comprehensive approach to water conservation that includes water recycling, high efficiency fixtures, and smart climatologically based irrigation. New projects are under evaluation by the UCLA Water Taskforce, a group that includes staff and administration from Plumbing, Energy Services, Capital Programs, and the Medical Center, as well as faculty from the Engineering Department. The taskforce is one of the targeted working groups of the UCLA Sustainability Committee.

So far, UCLA's water conservation efforts have reduced annual water use by over 70 million gallons. As you exit the campus entrance on Hilgard Avenue at Wyton Drive, beneath the UCLA sign you see a water efficient demonstration garden. The new landscaping features a range of low-water-using plants and a new drip irrigation system. UCLA undergraduate students from the ESLP Action Research Teams worked with staff from Facilities Management, Housing and Hospitality Services, and professionals from the UCLA Extension Landscape Architecture program to design and install the project.

Funding for these types of small projects, as well as larger ones, is now available to UCLA students, staff and faculty through The Green Initiative Fund (TGIF). In 2008, a group of dedicated undergraduate students led a campaign to start TGIF, and the referendum passed with over 75% of the vote. This fund assess a $4 fee per quarter per student to support

sustainability initiatives on campus. The fund generates over $200,000 a year and demonstrates how students are a driving force for change – they are stepping up and taking responsibility themselves for advancing sustainability on campus.

HEALTH AND MEDICAL ENTERPRISE

Sustainability is inextricably linked with human health. Fundamentally it is about sustaining human life and human civilization. Globally we face many challenges including water crises, food shortages, disease, poverty, and many of these are worsened by climate change. In addition to housing pioneering academic and professional degree programs, the School of Public Health regularly hosts forums, lectures and events to encourage the discussion of sustainability in health issues. On a local level, Public Health researchers have utilized GIS mapping to assess public exposure to pesticides, air pollution and other health threats. Over in Dentistry, researchers have received attention for achievements in greening their research laboratory with the help of ESLP students.

As a major part of the UCLA community, the UCLA Health System also strives to minimize its waste output while contributing towards other communities as well. The Health System donates linen, old lab coats and expired but reusable medical supplies to training physicians and to clinics in Haiti and Armenia. Torn linen, non-invasive medical equipment and all clinically-used alcohol and formaldehyde are recycled. The "Save Blue, Go Green" program reduces non-hazardous waste from operating rooms. At the other end of the spectrum, the system's Services Department actively promotes healthy lifestyle choices to the UCLA community through various measures, including their Green Apple program, which labels healthy food selections, and an online forum for nutrition questions. The UCLA Health System is a member of Practice Greenhealth, a national organization focused on sustainability in hospitals.

In April 2011, Practice Greenhealth awarded UCLA Ronald Reagan and Santa Monica Hospitals each a Partner for Change Award which recognizes health care facilities that have established environmental programs and continuously improve and expand upon these programs on the path to sustainability.

CONCLUSION

At UCLA, we are striving to practice what we teach. The examples outlined here are just a handful of the many extraordinary efforts ongoing at UCLA from innovative operations to ground-breaking educational programs to cutting-

edge research. It is the students we are educating today that will see us through to a more sustainable future. And although we have dozens of academic programs and over 350 courses that relate to the environment and sustainability, it is just as important that UCLA "walk the walk."

UCLA is embracing its responsibility, as a public institution, to be a leader in addressing sustainability. UCLA is not only demonstrating that this can be done in a financially feasible way, but we are engaging the region and the state to affect real change in how we live our lives. We are taking steps on campus to further integrate operations with our education and research mission by expanding academic programming, infusing sustainability into the curriculum, and supporting faculty research that stimulates new technologies and student involvement in finding sustainable solutions to global challenges.

We also recognize there are always opportunities to improve and grow. We are currently conducting a full campus-wide evaluation of sustainability using the Sustainability Tracking, Assessment & Rating System™. This system, developed by the Association for the Advancement of Sustainability in Higher Education, is a transparent, self-reporting framework for colleges and universities to gauge relative progress toward sustainability. We will use this system to aid our planning process and prioritize initiatives in the coming years. The UCLA sustainability process aims to be a catalyst for optimism in advancing sustainable solutions to global challenges and achieving stable human coexistence with the natural systems on which society depends.

FURTHER INFORMATION

UCLA Sustainability website

UCLA Climate Action Plan

Research Centers at UCLA focused on environment and sustainability

Academic Programs at UCLA focused on environment and sustainability

UCLA Extension Global Sustainability Certificate

ESLP Action Research Team Program

The Green Initiative Fund

AUTHOR BIOS

Nurit Katz, MBA, MPP

UCLA's first Sustainability Coordinator, Nurit Katz is working to foster partnerships among academic, research and operational departments and to further the goals and initiatives of the campus sustainability program. Before starting in this position she founded the UCLA Sustainable Resource Center to provide resources for the community on sustainability. She then served as President of the Graduate Students Association and assisted Dr. Charles Corbett in developing a new interdisciplinary graduate certificate program - Leaders in Sustainability. After graduation she helped launch the UCLA Center for Corporate Environmental Performance. She has worked on a variety of sustainability projects including a project for the City of Los Angeles that focused on transit-oriented development along the Expo Light Rail Line. Her essay on the topic was published in the UCLA Anderson Forecast's "Solutions for Our City." Nurit holds an MBA from the UCLA Anderson School of Management, a Masters in Public Policy from the UCLA Luskin School of Public Affairs and a BA in Environmental Education from Humboldt State University. Nurit was recently honored as one of 100 Inspirational Alumni for the 75th Anniversary of UCLA Anderson. She serves on the Executive Committee of the Luskin Center for Innovation and on the Board of Opportunity Green. In 2010 Nurit completed a full Ironman distance triathlon with Team in Training in support of the Leukemia Lymphoma Society.

J. Cully Nordby, Ph.D.

Dr. Cully Nordby is the Academic Director of the UCLA Institute of the Environment and Sustainability and is a behavioral ecologist in the Department of Ecology and Evolutionary Biology. She earned a B.S. in zoology from the University of Wisconsin, Madison and a Ph.D. in animal behavior and a graduate certificate in conservation biology from the University of Washington, Seattle. While doing postdoctoral research at UC Berkeley, she held a David H. Smith Conservation Research Fellowship through The Nature Conservancy. Her research focuses on the behavioral ecology and conservation biology of birds, with particular emphasis on understanding how native species respond behaviorally to exotic species invasions. She also teaches courses in environmental science and sustainability at UCLA. In 2007, Dr. Nordby was appointed chair of the UCLA Sustainability Committee. The mission of the committee is to create a culture of sustainability in which the entire UCLA community is aware of, engaged in, and committed to advancing sustainability through education, research, operations and community service.

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