UCLA Luskin School *of* Public Affairs

Luskin Center

FOR INNOVATION

IMPACT *in* 2017

From the Director

J.R. DeShazo,
professor and director of UCLA Luskin Center for Innovation

Despite the federal government rolling back environmental health protections, California continues to roll out clean technologies and ramp up its environmental policies. The UCLA Luskin Center for Innovation is proud to inform the design and implementation of these policies.

During one of the biggest legislative debates of 2017 — over the future of California's carbon Cap-and-Trade Program — legislators looked to the Center for analysis of employment supported by revenue from that program.

Other leaders have called upon the Center to help ensure benefits for vulnerable Californians. We are helping the state develop a drinking water rate assistance program for low-income Californians. We are also informing the expansion of a pilot program that financially incentivizes low-income Californians to retire their old, polluting vehicles and use transit or replace with cleaner, more efficient cars. Most recently, we began serving as evaluator of the new Transformative Climate Communities Program, working with the awarded disadvantaged communities to track their progress.

Finally, we are collaborating with UCLA engineers and scientists who cleared a major hurdle in in the global quest to develop a cost-effective and beneficial use for carbon dioxide emissions. Their innovation is a process that captures waste carbon dioxide from power plants and other industrial facilities and uses it to produce CO_2NCRETE™, a sustainable alternative to traditional concrete.

We seek to strengthen connections between technology innovators, policymakers, and community leaders to support progress for the health of people and the planet.

As we approach the Center's decennial anniversary next year, we seek to strengthen connections between technology innovators, policymakers and community leaders to support progress for the health of people and the planet. We invite you to join us on this journey.

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Cover image: *A fluorescent pigmented pebble path that glows after dark from* SMART Parks: A Toolkit *(http://innovation.luskin.ucla.edu/sites/default/files/ParksWeb020218.pdf). Courtesy: Studio Roosegaarde.*

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Climate Funds Fuel Growth

Researchers assess employment benefits from California Climate Investments

One of the largest debates in Sacramento during 2017 was about the future of California's Cap-and-Trade Program — the nation's first economy-wide cap on greenhouse gas (GHG) emissions and an auction system for the purchase of carbon allowances. Auction revenues are deposited into the Greenhouse Gas Reduction Fund and then appropriated as California Climate Investments to programs and projects that reduce GHGs while providing local economic and environmental health benefits in communities across the state. Recently, state legislators wanted to know more about these economic benefits before deciding whether to extend Cap-and-Trade beyond 2020. A Luskin Center for Innovation study helped shed light on this topic.

Researchers modeled the employment benefits from California Climate Investments, focusing on the $2.2 billion appropriated between 2013 and 2016 that went to 29 programs aimed at reducing GHGs. This includes investments in high-speed rail, local public transit systems, clean vehicles, transit-oriented affordable housing, energy efficiency measures and solar power for low-income households, urban greening in disadvantaged communities, and ecosystem restoration. Many of these programs also induce consumers, businesses, and government entities to contribute matching funds, which we also analyzed. The largest example of induced co-investment is the $3 billion in federal funding for the High-Speed Rail Project, which would not be available without the state's match in Cap-and-Trade Program auction proceeds.

Our analysis reveals that the $2.2 billion in California Climate Investment appropriations supports an estimated 19,700 jobs in the state. The $6.4 billion in induced co-investment supports an additional 55,900 jobs in California. The jobs supported by California Climate Investments are diverse, cutting across many different industries and economic sectors, with the construction industry most impacted.

Return on Investment

Estimated number of jobs in California supported by California Climate Investments from 2013 to 2016

♦Photo: iStock/zhaokianjang

J.R. DeShazo, *director*

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A Milestone for Carbon Upcycling

UCLA lab turns waste CO_2 into a sustainable building material

Researchers at UCLA have cleared a major hurdle in the quest to develop a cost-effective and beneficial use for the carbon dioxide (CO_2) emissions contributing to global climate change. In UCLA's Laboratory for the Chemistry of Construction Materials, researchers successfully tested their invention: an innovative manufacturing process that captures waste CO_2 and embeds it in CO_2NCRETE™, a functional replacement for traditional concrete. The process is designed to be scalable and easily integrated into power plants.

If CO_2NCRETE™ were to displace 50 percent of traditional concrete used worldwide, it could prevent 0.5 billion to 1 billion tons of CO_2 from being released into the atmosphere annually, according to the researchers. This is significant because the production of ordinary portland cement — the primary binding agent used in concrete today — accounts for nearly 9 percent of the emissions fueling climate change.

It's not just environmentalists who are excited about the prospects of the technology beyond the laboratory phase. The process promises a low-cost, scalable pathway for CO_2 utilization and management, and has thus caught the attention of investors interested in the upcoming commercialization stage. Other technologies that capture CO_2 from power plants involve a significant cost for capture (enrichment) or treatment per ton of CO_2. But UCLA's process uses CO_2 borne in flue gas as is, and thus eliminates the need for expensive pre- or post-treatment.

The UCLA team is led by Gaurav Sant, associate professor and Henry Samueli Fellow in Civil and Environmental Engineering and Materials Science and Engineering. Other key scientific contributions have been led by: Richard Kaner, distinguished professor in Chemistry and Biochemistry, and Materials Science and Engineering; Laurent Pilon, professor in Mechanical and Aerospace Engineering and Bioengineering; and Mathieu Bauchy, assistant professor in Civil and Environmental Engineering. J.R. DeShazo, director of the Luskin Center for Innovation, provides public policy and economic guidance for this research.

The team is a semifinalist in the NRG COSIA Carbon XPRIZE competition, moving a step closer to a share of the $20 million prize.

Carbon Upcycling team, from left: Mathieu Bauchy, Bu Wang, J.R. DeShazo, Gaurav Sant, Cheng-Wei Lin, Richard Kaner, Laurent Pilon, Louis Linden, Gabriel Falzone.

The Bigger Picture

Luskin Center's contributions to climate action planning, policy and investments

2010–'12

Assessed early steps toward climate action planning in Southern California, followed by a progress report that spurred additional local climate action.

2011

Reviewed methods required to implement California's regional transportation and land use planning policy to greenhouse gas emissions (SB 375).

2013

Supported President Obama's Climate Data Initiative with the L.A. Solar and Efficiency Report, which was recognized by the White House in 2014.

2014

Convened state leaders to develop a climate equity framework for implementing the Greenhouse Gas Reduction Fund (California Climate Investments)

2015

Developed a guide to Greenhouse Gas Reduction Fund Program designs, expenditures, and benefits for disadvantaged communities.

2016

Published a financial analysis of Cap-and-Trade's impact on households in disadvantaged communities.

2017

See accompanying articles for highlights.

2018 Major ongoing projects include:

Estimating the costs and benefits – including avoided GHG emissions, improvements in air quality, and associated mortality and morbidly avoidances – resulting from California's suite of climate policies and programs between 2006 and 2020.

Serving as an evaluation consultant for the state's Transformative Climate Communities Program, to support plans that examine over time the benefits associated with the first three projects funded by this ambitious new program in Fresno, Ontario, and Watts.

Clean Vehicle Planning

Release of new Atlas to accelerate adoption of electric vehicles

Across the nation, a central challenge has been empowering cities and counties to actively plan for growth in their local electric vehicle (EV) market. Such planning requires localities to assess where new EV charging stations are most needed. This includes identifying charging demand at workplaces, along roads, and in apartments and other multifamily dwellings, in addition to future need for fast charging by electric ride-share vehicles.

The Southern California Plug-in Electric Vehicle Readiness Atlas: 2017 Update is a tool that meets these needs by describing current and forecasted growth in local EV markets by charging sectors.

The Atlas forecasts continued growth in the EV market, with more than 700,000 PEVs expected to hit Southern California roads by the end of 2025. It provides planners with critical spatial information for meeting charging demand at a local level. It can also help utilities identify where infrastructure upgrades may be needed to accommodate additional electricity loads.

With support from the Southern California Association of Governments and the California Energy Commission, the 2017 Atlas is an update to the first such Atlas created by the Luskin Center in 2013.

Researchers and co-authors of the Atlas:

J.R. DeShazo

Sam Krumholz

Norman Wong

Jason Karpman

♦Photo: iStock/m-imagephotography

Informing Investments for EV Charging Stations

Westside Cities study targets multiunit dwellings

In America's cities, one of the greatest challenges to electric vehicle (EV) adoption is the difficulty of installing charging stations in existing apartments, condominiums, and other multiunit dwellings (MUDs). The Luskin Center for Innovation developed a system for identifying MUDs that could be targeted for outreach because they exhibit relatively high latent demand for plug-in electric vehicles (PEVs) and relatively low-cost installation of charging infrastructure.

Using the Westside Cities subregion of Los Angeles County as a case study, researchers looked at more than 250,000 MUD units and identified opportunities to enhance PEV adoption, especially in the more than 16,000 MUD units in disadvantaged communities within this subregion. This project was supported by the Southern California Association of Governments and the California Energy Commission.

♦Photo: iStock/anouchka

Research identifies workplaces to prioritize

The research team won an award from the UCLA Public Policy Department for their study. From left: James Di Filippo, Jiahui Zhang, Kelly Trumbull, Mahito Moriyama, and Toru Terai.

Policymakers would like to know where unmet need for EV charging at workplaces is greatest when they allocate educational resources and charging station rebates. Researchers at the Luskin Center have combined data on EV workplace charging in Los Angeles and the commuting patterns of plug-in hybrid vehicle drivers to identify areas of greatest unmet need for additional workplace charging.

Because such commuters drive hybrids with limited electric range, access to charging infrastructure at work would enable them to drive farther on electric power, reducing their reliance on gasoline. Researchers specifically identified which neighborhoods and parcels in the county could be prioritized for charging infrastructure investments based on the potential to increase miles traveled on electric power.

Much of the expected potential is concentrated in a handful of zones spread across the county, informing investment targets that could result in the greatest impact.

Helping Santa Monica strategically site EV charging stations

As part of the City of Santa Monica's ambitious goal of achieving carbon neutrality by 2050, it seeks to aggressively encourage adoption of PEVs capable of zero emissions. This effort requires strategic investments in PEV charging infrastructure in various subsectors such as multifamily, workplace, curbside, corridor, and publicly accessible charging. The Luskin Center worked with the city of Santa Monica to identify specific sites charging infrastructure would support the greatest number of PEV drivers. Siting recommendations were broken out according to the three main charging typologies where PEVs likely would be docked for extended periods: workplaces, commercial/retail establishments, and residences (single-family homes, apartments, and other multiunit dwellings). The Downtown Expo Line station area ranked particularly high across all three typologies.

Photo: City of Santa Monica

Clean Mobility for Low-Income Households

Gregory Pierce,
associate director of research

What works in vehicle retire and replace programs

A minority of cars produce the majority of pollution from passenger vehicles in California. Many of these older, dirtier cars are driven by low-income Californians who often live in rural areas with limited access to transit and struggle to pay for gasoline and vehicle maintenance. Helping these households retire their old cars and afford cleaner, more reliable and fuel-efficient vehicles can result in long-term savings for low-income households while improving air quality and helping the state meet its greenhouse gas-reduction goals.

The Luskin Center for Innovation assessed the first year of the Enhanced Fleet Modernization Program (EFMP) Plus-Up pilot, a new state program that seeks to increase access for low- to moderate-income households to vehicle retirement and replacement incentives. The program offers two options: retirement-only or retire and replace. The former provides $4,500 to lower-income drivers to retire their polluting vehicles and use transit. The latter provides up to $9,500 to lower-income drivers who scrap old vehicles and buy less or zero-polluting ones.

The study outlines how two air districts piloted EFMP Plus-Up: San Joaquin Valley Air Pollution Control District and South Coast Air Quality Management District. The study found that, despite differences in how the districts

Photo: Shutterstock/ESB Professional

implemented program requirements, both successfully allotted a comparable number of clean vehicles to eligible participants, for a combined total of 773 vehicle acquisitions. Households that took advantage of the program were overwhelmingly in the lowest income bracket of program eligibility and lived in a zip code that contained a disadvantaged community.

The report presents lessons learned on program administration, outreach, processing applications, and more that air districts across the state can use as the program expands. Underscoring the need for this expansion, the study's primary finding was that the demand for clean, advanced technology vehicle incentives among low- and moderate-income households in California's disadvantaged communities is likely to be high for the foreseeable future.

The California Air Resources Board — which administers the EFMP Plus-Up at the state level — commissioned this study.

The Bigger Picture

Luskin Center's contributions to the evolution of the electric vehicle market

2010 Published a report identifying the potential for a robust electric vehicle (EV) market in L.A.

2011 Hosted the World EV Cities & Ecosystems Conference.

2012 Contributed to legislation on plug-in electric vehicle (PEV) charging stations.

2013 Published the Southern California PEV Readiness Plan and Atlas.

2014 Collaborated with Southern California Edison to develop a transportation electrification curriculum to support evolving workforce needs.

2015 Produced research that informed redesign of California's Clean Vehicle Rebate Program to better target low- and moderate-income Californians. Also informed legislative conversation on carpool lane access for clean vehicles.

2016 Published studies that support PEV charging at workplaces and multiunit dwellings.

2017 See accompanying articles for highlights.

2018 Proposed projects include:

- Understanding differences in growth across the California EV charging station market.
- Identifying the charging demand of electric ride-share vehicles.
- Estimating the health benefits and comparative cost-effectiveness of California's largest grassroots, transportation-focused environmental justice initiative.
- Hosting the EV Opportunity Forum.

The Next Frontier for Solar

Affordable housing holds opportunities for solar expansion and utility bill reductions for residents as employment grows

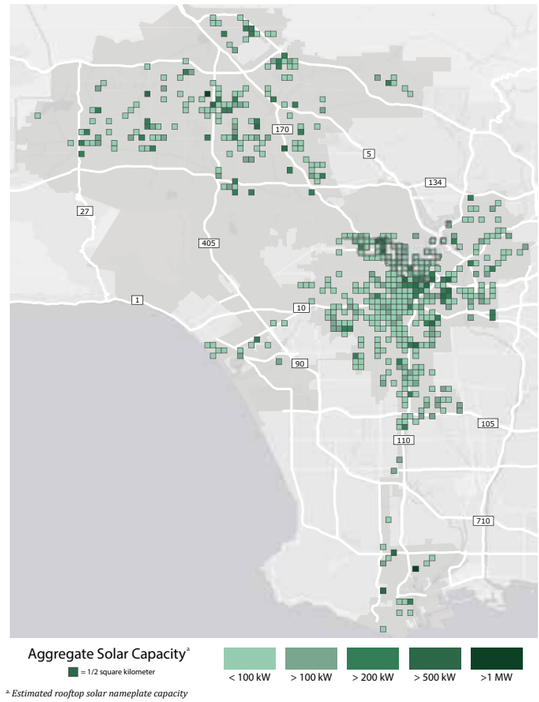
Los Angeles County is a national leader in the adoption of residential solar. Yet the homes of low-income households account for less than one percent of residential solar capacity across the county, according to new research by the Luskin Center for Innovation and the nonprofit organization GRID Alternatives. This may change.

The study found that cities in the county could soon unlock millions of dollars annually in state incentives for residential solar on affordable housing.

In 2018, California will launch a program targeted at putting solar panels on the roofs of affordable housing developments. With $1 billion in funding over 10 years, the Solar on Multifamily Affordable Housing program could reduce current disparities in the distribution of residential solar systems. Along with smaller programs such as the Low-Income Weatherization Program available in disadvantaged communities across the state, the affordable housing program will encourage the installation of solar systems that help affordable housing residents reduce their utility bills.

But there is a catch. Residents of affordable housing and other multifamily dwellings can take advantage of state solar incentive programs only if their utility offers a virtual net metering policy. Virtual net metering is a billing mechanism that allows multiple parties to share the financial benefits of a single solar power system. Southern California Edison offers virtual net metering, but municipally owned utilities in Los Angeles, Burbank, and Glendale don't.

Researchers calculated the potential of 115 MW of rooftop solar power throughout Los Angeles County on the more than 1,100 affordable housing properties that would qualify for a solar rebate. Researchers also estimated the benefits of realizing this solar potential on affordable housing, including 1,800 jobs that would be supported.



Left: Residents of a LINC Housing property in Lancaster, California, help to install a solar system. **Photo: GRID Alternatives**

Affordable housing solar capacity per half-kilometer in the city of Los Angeles. **Map: James Di Filippo/Luskin Center for Innovation**

A Movement Toward Choice

Julien Gattaciecca, *project manager*

Kelly Trumbull, *researcher and assistant project manager*

Alternative utility options for electricity customers expected to grow in 2018

Los Angeles County is set to launch its own electricity provider in 2018, giving customers another option besides Southern California Edison. Called Los Angeles Community Choice Energy (LACCE), the county's venture is part of a wave across California of new community choice aggregators (CCAs). CCAs enable cities or counties to make decisions about what kinds of energy resources and local clean energy programs in which to invest. California communities recently established nine CCAs, with more than 12 municipalities actively exploring one.

Multiple CCA models have arisen out of this rapid growth. Now cities such as Santa Monica have multiple CCA options when trying to decide how best to meet ambitious clean energy targets and environmental goals. The city commissioned the Luskin Center to assess the strengths and potential challenges of the following three CCA options to inform Santa Monica's decision whether to form or join a CCA. The report's findings could also be useful to other cities with a similar set of options.

» LACCE, a soon-to-launch CCA with member cities across Los Angeles County. This regional CCA could also provide Santa Monica with the greatest economies of scale, which would well position the city to meet its ambitious renewable energy and other environmental goals while avoiding long-term risks.

» South Bay Clean Power (SBCP), a CCA designed for a group of cities in the South Bay and Westside subregion. SBCP is more a set of recommendations than an operationally ready option at this time. SBCP's business plan includes innovative, sophisticated strategies for a next generation CCA, which others outside of SBCP could adopt.

» A single-city CCA through the services of California Choice Energy Authority (CCEA), which pools services for multiple single-city CCAs. The business model for CCEA allows for member cities to have a significant autonomy to pursue and meet renewable energy and other goals. However, it would also involve an initial financial and staff commitment.

Relying in part on UCLA's research findings, the Santa Monica City Council recently voted to join LACCE.

Photo: iStock/franckreporter

The Bigger Picture

Luskin Center's contributions to the clean energy market

2010-'11 Collaborated with the Los Angeles Business Council on five reports that informed the design of a solar incentive for L.A., the largest feed-in tariff program in the nation.

2011 Published the Los Angeles Rooftop Solar Atlas, which helped cities and electric utilities throughout L.A. County understand their local solar rooftop potential.

2012-'13 Supported implementation of the California Clean Energy Jobs Act (Proposition 39).

2013 Influenced energy resiliency planning at the ports of Los Angeles and Long Beach.

2014 The White House recognized our Los Angeles Solar and Efficiency Report (LASER) as part of President Obama's Climate Data Initiative.

2015 Released guide to designing a community solar program.

2016 Received $2 million-plus grant from the California Energy Commission to test how best to communicate with households to help reduce their energy use and costs during peak times.

2017 See accompanying articles for highlights.

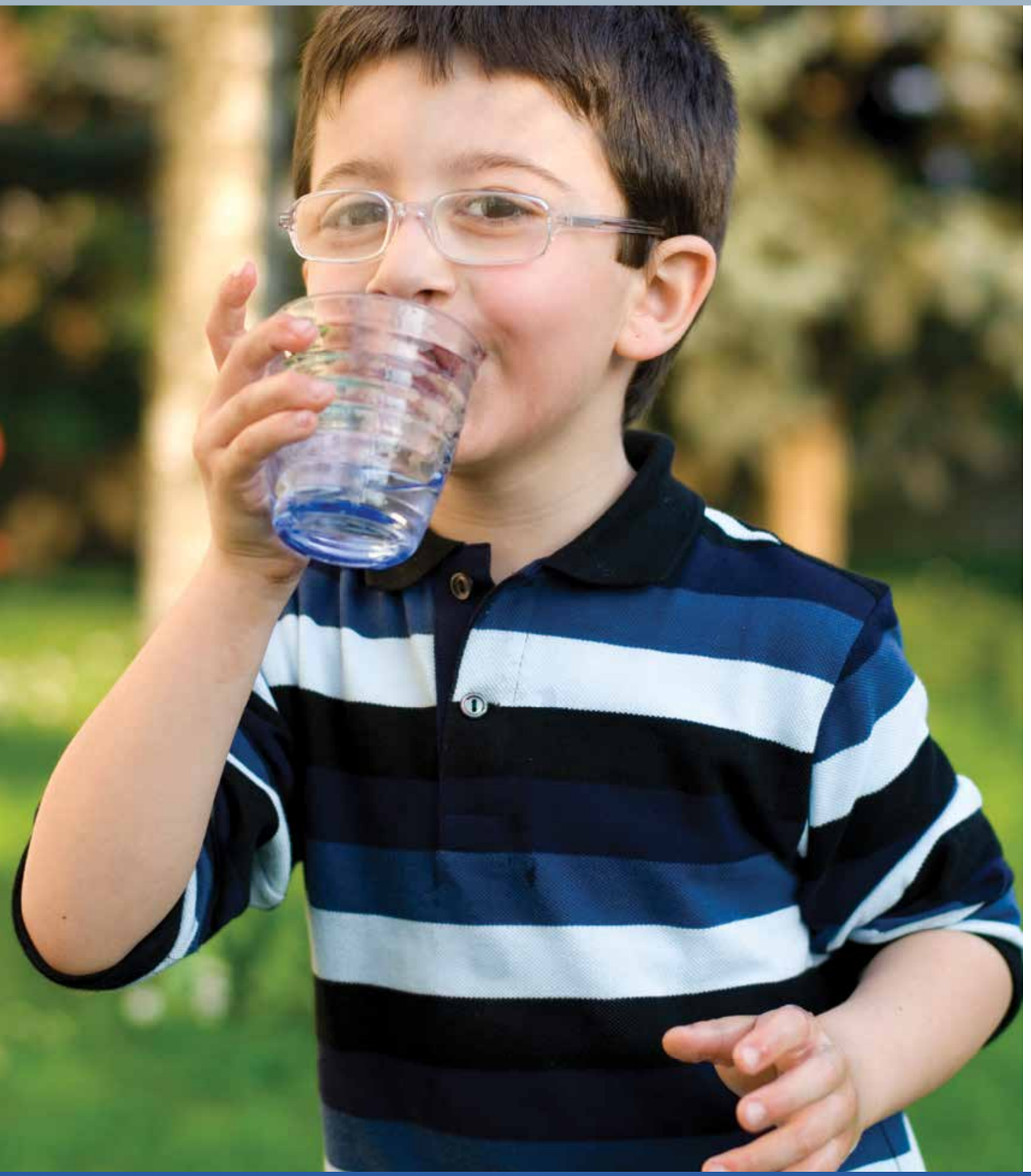
2018 Current projects include:

» Continuing to test — with thousands of volunteers — which demand response messages encourage energy conservation.

» Assessing how decentralization of energy procurement due to community choice aggregators (CCAs) in California could affect the grid and how CCAs are well-positioned to actively minimize the impacts.

» Assessing reductions in criteria pollutant emissions due to California's climate measures within the energy sector.

Photo: UCLA Luskin School of Public Affairs



Ensuring a Right to Water

Researchers are designing an affordability program for low-income Californians

Gregory Pierce,
associate director of research

California is the only state in the nation to legally recognize a Human Right to Water, per Assembly Bill (AB) 685 that become law in 2012. Water affordability is a necessary component to ensuring this right for all Californians. Accordingly, California legislators and Governor Jerry Brown approved AB 401 in 2015, which calls for the establishment of a statewide Low-Income Water Rate Assistance Program and authorizes the California State Water Resources Control Board to conduct a study to develop implementable program design options.

The Water Board commissioned Luskin Center for Innovation researchers to conduct this AB 401 study, the results of which will be delivered to the California legislature in 2018. The researchers — Gregory Pierce, Nicholas Chow, and J.R. DeShazo, along with several graduate students — used data on rising water rates and stagnating incomes in California to demonstrate the need for household-level water rate assistance across the state. Researchers also modeled a range of feasible affordability program scenarios and detailed multiple options for financing and administering a statewide program.

State financial assistance is important because researchers estimate that if left to their own resources, only a little more than 20 percent of water systems would be able to operate their own affordability programs.

The work with the Water Board in designing this program has entailed presenting initial research results in two rounds of public meetings across the state, holding focused stakeholder meetings and answering questions, and soliciting input about the program from residents and organizations across California. In the coming year we will continue to work toward the goal of ensuring affordable drinking water for all Californians.

Steep Rise in Water Rates

Increase in average monthly cost statewide for California residential customers, assuming monthly use of 11,220 gallons.

Source: Raftelis-AWWA California Water Rate Data, 2007-2015
Graphic by Christian Zarate/UCLA Luskin Center for Innovation

Photo: iStock/SeanShot

Addressing water challenges in mobile home parks in California

Although California officially recognizes the right to safe, clean, affordable, and accessible water for all citizens, there is much work to be done to fully realize this right, according to research conducted by researchers at the Luskin Center for Innovation and the Center for Neighborhood Knowledge.

In a study published by the journal *Environmental Justice*, co-authors Gregory Pierce and Silvia González assessed drinking water access and quality in mobile home parks, a significant but often-overlooked segment of the California population.

The study found that mobile home parks are:

» likely to incur more health-related water violations than other systems;

» four times more likely than the general population to experience a significant service shutoff (more than 24 hours); and

» 40 percent more likely to rely on groundwater, a known risk for reliability and quality.

In addition, mobile home parks are often served by small community water systems, a characteristic well documented to diminish access.

"This demonstrates that any deficiencies in water service in parks are indeed problems for which the public sector maintains oversight and authority to rectify," the researchers wrote.

The research provides useful information for policymakers who want to ensure that all Californians have access to clean, safe, and affordable water.

Photo: iStock/Eileen Groome

Fighting Drought With Stormwater

Researchers use campuses as a living laboratory

Kelsey Jessup,
project manager

Water-scarce urban areas in California miss out on billions of gallons of fresh water each year as rain washes into storm drains and out to sea. A nearly $2 million grant-funded project seeks to transform University of California (UC) campuses into living laboratories that show how urban stormwater can safely augment water supplies and minimize flood risk. Through coordinated research, modeling, and engagement with university officials and regulatory agencies, the research team will develop the science, engineering, and policy innovations needed to usher in a new era of treating stormwater as a resource rather than a liability.

Senior researcher Gregory Pierce and project manager Kelsey Jessup are part of the research team comprised of faculty, staff, and students from all five southern UC campuses that received the grant from UC's Multi-campus Research Programs and Initiatives. Their role on the larger team is to examine how universities compare to cities in terms of governance and financial capacity to invest in green infrastructure, and how to overcome barriers in capacity to enhance stormwater capture more broadly in the region.

Below: A bioswale capturing stormwater on the UCLA campus. Photo: Cully Nordby

Nicholas Chow,
water engineering project manager

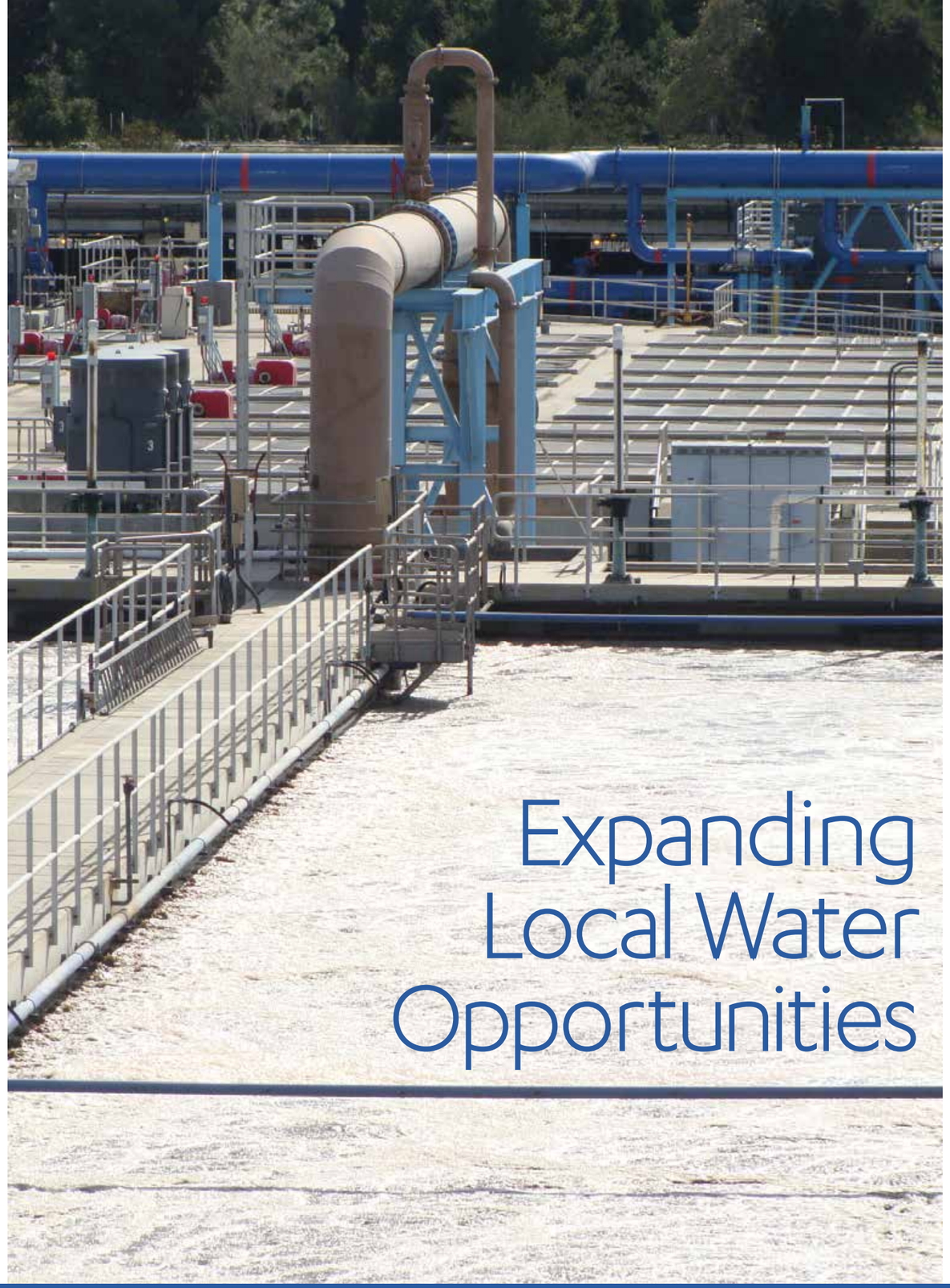
An urban water market for Los Angeles County

UCLA has an ambitious goal for Los Angeles County: 100 percent locally sourced water by 2050 while enhancing ecosystems and public health. Currently, the vast majority of the region's water is piped in from hundreds of miles away. With a grant from the UCLA Sustainable LA Grand Challenge, the Luskin Center for Innovation is exploring a strategy to help the 215 community water systems across the county collaborate to make the best use of local water for their own system, and for the region.

The 215 systems in Los Angeles County vary greatly in their local water resources, including their access to groundwater and aquifer storage, stormwater capture, water reuse, and complementary infrastructure. These differences will become more profound as the region reduces its reliance on imported water. Some systems will have abundant, lower-cost local water that far exceeds consumption levels. Other systems will face a scarcity of local water, and at much higher cost. This will create incentives for systems with abundant local water to develop storage capacity cost effectively. In addition, it will create incentives for systems with scarce local water to purchase it from their neighbors, leading to a more integrated, regional water management strategy.

Researchers Nicholas Chow, Brad Franklin, and J.R. DeShazo are helping to lay the foundation for such an integrated water market. They expect that there could be significant cost and water supply benefits in achieving greater local water reliance through bilateral trading versus having each system unilaterally develop its own strategies. The researchers are also studying where additional infrastructure investments will be needed, as well as the institutional architecture necessary to support and regulate such a system. The Luskin Center will release the full study in the second half of 2018.

Right: The Tillman Water Reclamation Plant in Los Angeles. **Photo: National Water Research Institute**



Expanding Local Water Opportunities

Exploring the water-energy connections of the future

In the face of Southern California's expected climate variability and drought conditions, the production of recycled water will increase quickly for industrial, agricultural, commercial, and eventually even residential uses. What will this transition mean for water users? Who will produce the recycled water? And what energy challenges associated with expanded recycled water production lie ahead?

The California Energy Commission, in concert with the U.S. Department of Energy and the U.S.-China Clean Energy Research Center, has awarded the Luskin Center for Innovation part of a $1.1 million grant to study the energy intensity of recycled water production. Preliminary results for Los Angeles County demonstrate that there will be significant statewide energy savings if recycled water were to see wide adoption. Results from this study will be presented at the 2018 WateReuse Conference and will be published in mid-2018.

Researchers are also assessing the viability of using water infrastructure as a tool for responding to fluctuations in energy availability throughout the day. Sometimes the grid receives excess energy supply from hydropower and solar panels, while at other times demand for energy exceeds supply on the grid. The Luskin Center is exploring how to put the water system to work efficiently using that excess power.

The results of this study will inform water and energy planners in making decisions to increase Los Angeles' local and regional water reliance by using water to its fullest potential.

Maximizing Benefits of Parks

SMART Parks Toolkit highlights technologies that make parks more user-friendly and sustainable

The burgeoning world of smart technology includes everything from televisions to thermostats. Now you can add neighborhood parks to the "smart" category. The Luskin Center for Innovation has released "SMART Parks: A Toolkit" to highlight how technology can enhance the efficiency of, and community access to, public spaces.

What makes a park smart? It's one that uses technology to achieve "equitable access, enhanced health, safety, resilience, water and energy efficiency, and effective operations and maintenance," according to the researchers.

The toolkit is intended for park managers, designers, advocates, and anyone who wishes to learn how technology can be incorporated into parks. The guide is organized by pertinent chapters — landscape, irrigation, stormwater management, hardscape, urban furniture, lighting, and digital landscapes — and includes a wide range of example technologies and their benefits, including:

» Interactive play sets that increase park accessibility for children with physical and mental disabilities by providing adjustable language, game, and noise settings.

» Path pavements designed to be comfortable for older adults and enhance safety.

» Energy-generating exercise equipment that charges cellphones while users exercise.

» Irrigation controllers that conserve water by optimizing watering patterns in each park.

» Soils that improve groundwater infiltration and remove pollutants from stormwater runoff.

» Self-healing concrete that reduces park maintenance and replacement needs.

The toolkit also includes guidance on how to navigate the challenges associated with the process of updating existing parks and creating new smart parks, such as staff training and cost constraints, and provides an overview of potential funding strategies.

Anastasia Loukaitou-Sideris, *professor of urban planning, assistant dean at UCLA Luskin School of Public Affairs and lead researcher on the project*

Kelsey Jessup, *project manager*

Sutu ball wall, left, is an interactive play structure that can promote increased activity, including by the disabled. Right, friction from user motion generates electricity for powering cell phones or other devices.
Photos: left, Yalp Interactive; right: The Great Outdoor Gym Co.

Assessing trailhead use in the Santa Monica Mountains

The L.A. region is home to the nation's largest urban national park, the Santa Monica Mountains National Recreation Area. Accessed by more than 33 million people annually, the park offers over 500 miles of trails for hiking, mountain biking, picnicking, wildlife viewing in a biodiversity hotspot, and more.

Yet the park lacks current information about visitors and their patterns, needs, and expectations. To address this gap, the National Park Service awarded the Luskin Center for Innovation a grant to conduct a visitor-use survey at the park. This study aims to learn from current visitors in order to meet the needs of a diverse population and to reflect this diversity in management and programming. The last visitor-use survey was done 15 years ago. Since then, the population of Los Angeles has grown significantly and the demographics of surrounding communities have changed.

Researchers will conduct the survey during the summer of 2018. The National Park Service will use the results as it makes decisions about resource allocations for the park. The Luskin Center will work closely with the National Park Service to determine successful ways to balance access to the Santa Monica Mountains for the public's recreational use with the protection of park resources.

A group of hikers on a trail in the Santa Monica Mountains National Recreation Area.

Photo: National Park Service

2017 Event Highlights

New Directions in Environmental Policy

Coming just days after the deadline for Governor Jerry Brown to sign legislation, this public event in October brought together state leaders to offer insights about recent landmark environmental policy decisions. **J.R. DeShazo** (left above), director of the Luskin Center for Innovation, moderated the panel featuring **Dean Florez** (second from left), former state senator and director of California Air Resources Board; **Henry Stern**, state senator from District 27; and **Janea Scott**, commissioner on the California Energy Commission.

Photo: Rich Schmidt Photography

The Future of ...

Air Monitoring in California

A diverse group of air monitoring experts articulated their goals, guiding principles, and purposes for California's system of monitoring networks by 2040. The event brought together environmental justice leaders, government agency representatives, and academics.

Humans as Sensors

Digital technology has turned humans into sensors that generate behavioral data on an unprecedented scale. Computer science leaders from across the country attended this conference in August to discuss promising sources of new data.

LUSKIN INNOVATOR SPEAKER SERIES

Making a Difference Where You Are

This public event in October featured stories of social innovation from the grassroots. **Nan Alexander Doyal** gave highlights from her new book, *Dig Where You Are*, about the potential in each of us to make a difference in the world by simply taking what we already know how to do and using it to make a meaningful change for the good.

What Makes a Great City?

Author, architect, and urban planner **Alexander Garvin** defines a great city as a dynamic, constantly changing place that residents and their leaders can reshape to satisfy their demands. In his January talk he also highlighted successful initiatives that other cities can learn from to become more dynamic and livable.

Chasing Water: Moving From Scarcity to Sustainability

Water scarcity is spreading and intensifying in many parts of the world, with dire consequences. In February, **Brian Richter,** a global leader in water science and conservation, explained why and how water plans must be informed by local culture, economics, and the varied needs of affected community members.

Conservation for Cities

It's time to think differently about cities and nature. Author and nationally regarded scientist **Robert McDonald** offers a framework for strengthening the bonds between cities and nature through innovative infrastructure. In November, he and a panel of L.A. leaders shared stories of how to better connect our cities with the benefits of nature.

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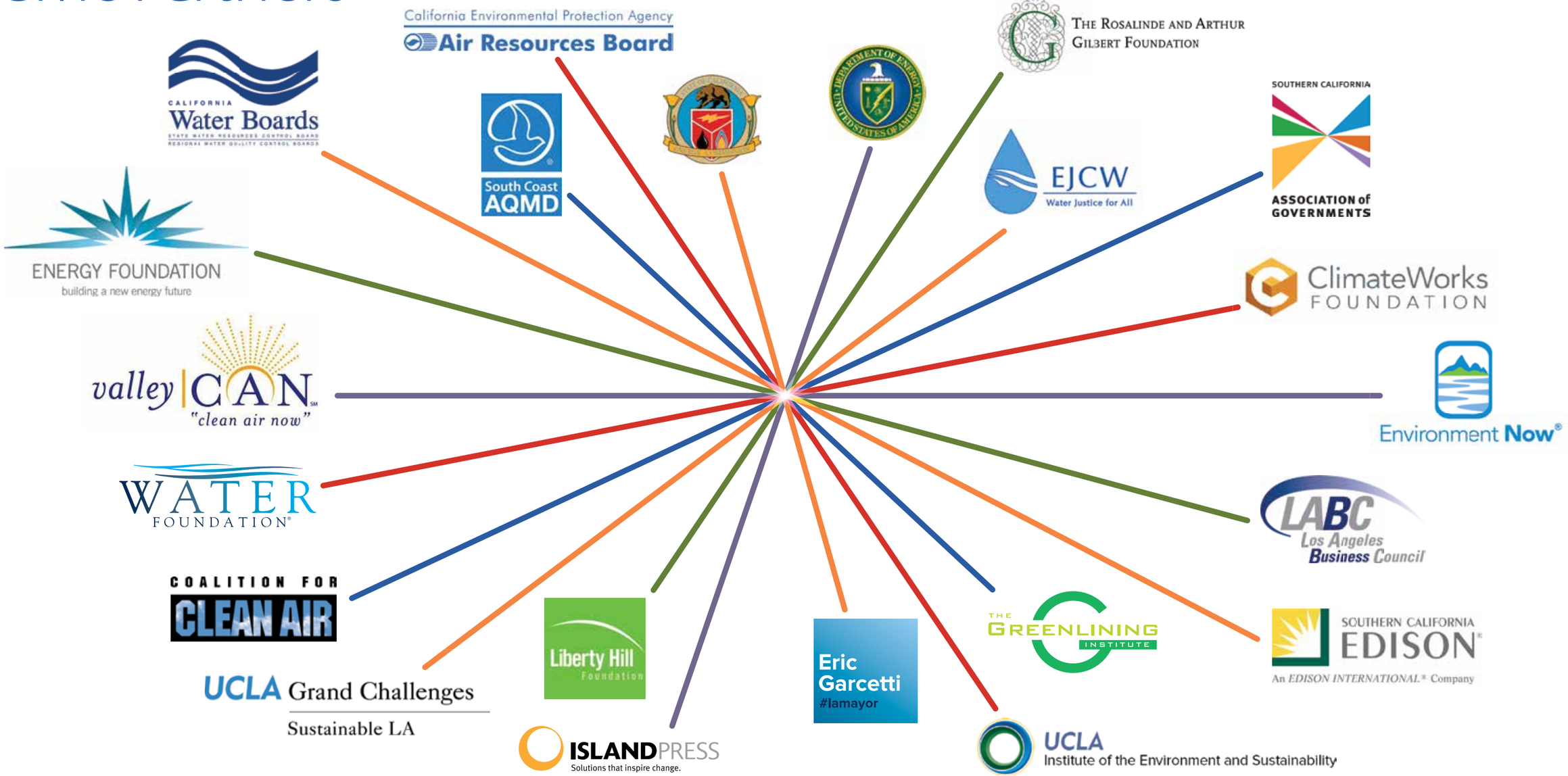
Jill Sourial, *director of urban conservation, The Nature Conservancy*

Civic Partners (a partial list)



Faculty Collaborators

Richard Ambrose, *Env. Health Sciences; Institute of the Environment and Sustainability*

Evelyn Blumenberg, *Urban Planning*

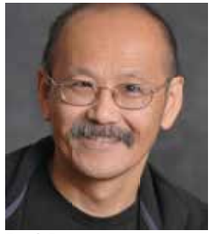
Richard Carson, *Economics, UCSD*

Darin Christensen, *Public Policy*

Mark Gold, *associate vice chancellor*

Richard Kaner, *Chemistry and BioChemistry*

Anastasia Loukaitou-Sideris, *Urban Planning*



Paul Ong, *Urban Planning*

Laurent Pilon, *Mechanical and Aerospace Engineering*

Michael Ross, *Political Science*

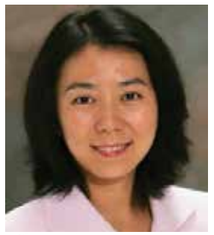
Gaurav Sant, *Civil and Environmental Engineering; Materials Science and Engineering*

Tamara Sheldon, *Economics, University of South Carolina*

Zachary Steinert-Threlkeld, *Public Policy*

Ertugrul Taciroglu, *Civil and Environmental Engineering*

John Villasenor, *Electrical Engineering and Public Policy*



Yifang Zhu, *Environmental Health Sciences*

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