



ISSUE #3 / SPRING 2016
DESIGNS FOR A NEW CALIFORNIA
IN PARTNERSHIP WITH
UCLA LUSKIN SCHOOL OF PUBLIC AFFAIRS

**MOVING TOWARD A
SELF-SUSTAINING CALIFORNIA**
PART 1: ENERGY

EDITOR'S NOTE

BLUEPRINT

A magazine of research, policy, Los Angeles and California

THIS MARKS THE FIRST OF TWO CONNECTED ISSUES OF BLUEPRINT, both devoted to the existential challenge of this generation: how to reorient society so that humanity no longer uses more than the Earth produces and so that temperatures may level off or someday decline. In this issue, we confront that challenge in the area of electricity — from power plants to cars. In our next, we will turn to a dimension of particular interest to California: water.

Climate change is often addressed as a technological challenge, and it is that. More efficient batteries are allowing electric cars to improve range and may offer ways to balance out electricity usage; refinements of wind and solar energy are allowing vast growth in the capacity of those systems to generate power. At UCLA, Professor Rajit Gadh, with support from the U.S. Department of Energy, leads an ambitious effort to reimagine the modern electrical grid, including its interaction with electric vehicles. His work and some of the other pioneering projects around California are featured in this issue's information-rich map.

But there are political and behavioral dimensions to this challenge as well. What policies will best encourage consumers to save energy or to invest in renewables? How might tax incentives broaden the appeal of electric vehicles without simply making it a little easier for millionaires to buy Teslas? How can policymakers press for greater heating and cooling efficiency in buildings — from shopping malls to private homes — without first understanding where power is being used well and where it's being wasted?

Those are the questions that underscore much of the research featured in this issue of Blueprint — issues not so much about the science of climate

change as about the ability of humans to respond and the effectiveness of government in trying to encourage that response.

In addition, we offer close looks at two of the most important public officials in this field, whose work individually and together has produced groundbreaking progress in California. Gov. Jerry Brown and Mary Nichols, who chairs the California Air Resources Board, have been at the forefront of environmental protection, especially in the field of air pollution, since Brown first appointed Nichols to that board in 1975. Theirs is an overlapping story of two visionary and controversial figures.

They were fighting pollution back when it was seen as avant garde, even kooky, to tout such ideas as solar energy. Gov. Brown reflects on those years — when he was sometimes teased as “Governor Moonbeam” — in this issue's Table Talk. And Nichols, who was named one of the 100 Most Influential People in the World by Time magazine in 2013 (Brown made it the following year), is the subject of our latest Profile.

The nature and complexity of climate change has generated an explosion of research, and we recognize that we've only begun to scratch the surface with the articles here. UCLA's Grand Challenge, for one, is attempting to marshal resources from around the campus in order to help Los Angeles become energy and water self-sufficient in the coming decades, and important work is being done around the world in these and related fields. We'll take another bite at these problems with Part 2; for now, however, we're happy to present some of the cutting-edge work being done on one of the gravest challenges facing the modern world.

Thank you for your interest in Blueprint and the issues we're covering.



JIM NEWTON

Editor in chief

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CAN BE FOUND AT
BLUEPRINT.UCLA.EDU

LANDSCAPE

A JOURNALIST REFLECTS

FIRST PERSON

When I was appointed city editor of the Los Angeles Times in 1998, I reached out for advice to one of the smartest people I knew, Warren Christopher, former U.S. secretary of state and Los Angeles civic leader without equal. Christopher, who died in 2011, had one word of advice. "Crusade," he said.

I also remember what Bill Thomas, the then-editor of the Los Angeles Times, told me when he hired me 28 years earlier. "Explain," he said; explain what's really happening.

Crusade and explain. That's the job of reporters covering government and policy and the politics shaping them. It's always been a challenging task, but today's fractured media scene makes it even more so. Journalists in Los Angeles face a contracting landscape and, because of that, extraordinary challenges to keep the spotlight on our public institutions — challenges that, if not met, could have grave implications for how policy is made, how government functions and how the public is served.

Covering government, politics and policy has never been easy in Los Angeles. In New York, Chicago, San Francisco and other big cities, power is centered in City Hall, often split between a powerful mayor and a legislative body. Los Angeles County, by contrast, has 88 cities and powerful regional agencies in charge of water, transportation, pollution control and other vital services. Power is diffuse, accountability difficult to determine. I've reported on sheriff's deputies pushing around low-income black tenants in the Antelope Valley, affluent Malibu residents fighting beach access, the 1992 Los Angeles riot, and public school troubles in Los Angeles and Compton. What they had in common was that each involved myriad government agencies and many consumers

of government services. And I was supposed to root out the problems, find out who or what was to blame for them, report why and how they happened and how people were affected — crusade and explain.

Over the last decade, the Times' staff has been cut by more than half, leaving those who remain concerned about the paper's ability to expose corruption and bad policies — stories like the Times' coverage of corruption by top leader of the city of Bell. Those articles won the 2011 Pulitzer Prize for Public Service. But these problems and concerns are not unique to the Times. The Daily News, once a formidable presence at City Hall, is now seriously diminished, a shell of its former self. The Orange County Register once had a full-time reporter covering Los Angeles government and briefly experimented with a Los Angeles edition; those are long gone. The L.A. Weekly once had the great Harold Meyerson on the government beat; he departed years ago. The San Diego Union-Tribune, once a regional player, now has largely retreated to its home turf.

Here's the simple truth: Fewer reporters with less competition is not a formula for holding government accountable.

But there's nothing more tiresome than an aging scold, especially a journalist ranting about how things were different in the good old days. So I put in a phone call to Davan Maharaj, the editor — and recently named publisher as well — of the largest of this region's news organizations. Maharaj has the considerable responsibility of putting out a paper under a Chicago management that fires editors and publishers with the frequency of National Football League owners dumping coaches.

I asked Maharaj if the reduction in staff had diminished the Times' ability to crusade against civic and corporate evils and to explain the complex policy issues that affect Angelenos. "I would say a resounding 'no' because we have no doubt the largest metro staff in the country," he said. "We have about 100 people covering California. That doesn't count people on the business staff."



PAINTING BY NANCY BOYARSKY

Maharaj cited the Southern California Gas Co. methane leak near homes in Porter Ranch as an example of how the paper is throwing resources at big stories. As he noted, the paper also showed grit covering the San Bernardino killings (in fact, the Times recently won a Pulitzer Prize for those stories) and devoted staff and space to the defective scopes that caused death and serious illness at UCLA's Ronald Reagan Medical Center and other hospitals.

I asked him how he sees the Times' role in the civic life of the region.

"The Times has to be the place that provides the best accountability journalism," he said. "That is why we are expanding our coverage of power and influence in Sacramento." He said John Myers, the new Times Sacramento bureau chief, had told him of the precipitous decline of reporters in the Capitol press corps. "Far fewer reporters cover influence groups and state agencies, and we are hiring reporters to shine a light on the lobbyists and the agencies that are not covered at all," Maharaj said.

Finally, I asked how he kept up morale in a national media environment of buyouts and departures.

"It's a tough one," he said. "But you try to tell reporters they work for one of the best institutions in the country.... Despite what is going on with the business, we as journalists in Los Angeles can still change the world and have an impact in our community."

It was honest of Maharaj to admit that it was tough to keep up staff morale. And I was encouraged to hear about hiring more reporters, although he didn't say how many or how accomplished they might be.

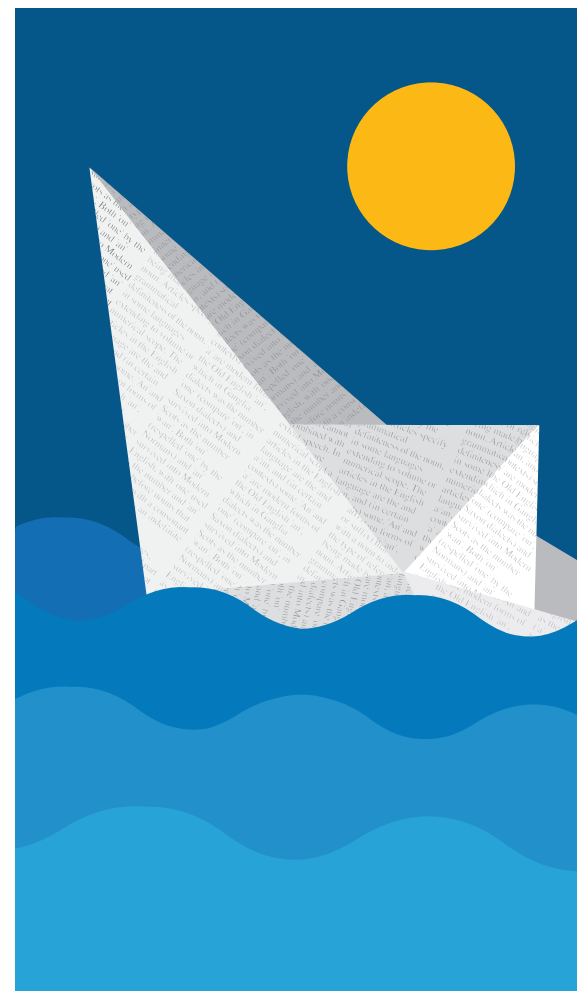
Crusading and explaining takes experienced reporters and editors with deep relationships and knowledge of their subject matter. I don't think the LAPD Rampart scandal investigation, led by Scott Glover and Matt Lait a decade and a half ago, would have been so successful without the help of other reporters and editors who had an extensive knowledge of the LAPD. The Times has good coverage of the department now, but with shifting priorities and fewer people, will it be enough to keep the spotlight on the police? And though other sources may fill some gaps — ProPublica is producing smart investigative work across the country, and KPCC has been adding reporters on local beats — thoughtful coverage of Los Angeles public policy requires deep pockets, experience and staying power, a tall order for today's news organizations.

When Lait and Glover turned up the first signs of the Rampart scandal, I thought of Warren Christopher's mandate to crusade. Christopher, among his many accomplishments, headed the Independent Commission on the Los Angeles Police Department — the Christopher Commission — after the 1991 police beating of Rodney King. I had covered commission hearings and accompanied Christopher as he campaigned through Los Angeles for the reform charter amendments that were approved by the voters. Those amendments, and the Times' coverage of police brutality and the riots, started the LAPD on the road to reform.

It took me a long time to win Christopher's trust — and the trust of many other Angelenos, rich and poor, famous and infamous, big shots or good people known only on their street or neighborhood, all of them my sources. My bosses gave me the time and the freedom to do that, to spend a few days, a few weeks or longer to pursue stories that the paper felt should be told.

Communities benefit when a vibrant press is watching over the formation of public policy and those who make it.

—Bill Boyarsky





THE NEW NEW SHARING ECONOMY

Four floors above San Francisco's 18th Street, in an office not much larger than a walk-in closet, the so-called "sharing economy" is getting a reboot. Three desks are wedged into the space, one occupied by Joshua Danielson, the co-founder of what economists, sociologists and lawyers are beginning to call a "platform cooperative." You've likely heard of Uber and Task Rabbit. Imagine a Task Rabbit where each rabbit owns an equal share of the company. Danielson's creation, called Loconomics, is a freelancer-owned cooperative marketplace for services, minus bidding and venture capital-backed middlemen. It soon will be accessible from your smartphone.

"This is a business and legal structure where no one is trying to exploit each other and there's no extraction," said Danielson, tall, clean-shaven and boyish. His tone and fixed gaze are devoid of web entrepreneur hucksterism. "We're not a marketplace that is taking profits and giving them to external parties. It's shared within that same community, still allowing [members] their independence." Loconomics initially will focus on six service areas: psychotherapy, massage therapy, house cleaning, dog walking, elder care and childcare. Danielson hopes there will be natural cross-pollination — that the clients of each of these "verticals" will overlap and mesh into a sustainable economic community.

Loconomics is an app still in beta — a phrase that tumbles from the lips of developers in every pour-over coffee emporium in the city. But Danielson wants to do

something nobody else has: Wed the convenience and fluidity of smartphone technology with the ethos of a worker-owned co-op. Set against loud public dialogue about how the tech industry is yet again reshaping San Francisco and widening its wealth gap by raising its cost of living beyond the reach of many workers, Danielson's app holds promise as a way to start balancing the economic scales. It might reclaim the sharing economy from what San Francisco author and public intellectual Rebecca Solnit calls the "sharecropping economy."

Displayed upright on a file cabinet flanking Danielson's desk is the classic 1976 Grateful Dead album "Steal Your Face," with its iconic red, white and blue skull struck through with a lightning bolt. It was recorded live at a dearly departed San Francisco venue, the Winterland Ballroom. "Not mine," Danielson said. The album belongs to a person to whom he sublets a workstation in this room, so small that the wall behind Danielson's desk is scuffed black by the swivel of his chair. To keep costs down, he sublets a second workstation as well. Bootstrapping, indeed.

"The real story here is a shift of power," Danielson said when we first spoke over the phone. He decided early on to resist the temptation of venture capital funding and built Loconomics with personal lines of credit and a little help from Sallie Mae. He pulled back to minimum payments on the student loans he incurred in an MBA program. He leaned on pro bono lawyers and tapped into the resources of the Sustainable Economies Law Center. He taught himself the basics of web design and worked with a developer in Spain who built the Loconomics code from scratch. "Sure, I'm in debt and mildly delusional," he said, dryly. "And I still have nothing to brag about until this thing is out in the world — tangible."

Christopher Tellez, a Reiki and healing arts practitioner with a master's degree in social work from Columbia University, who works in the same building, bounds into the room fresh from a session with a client. Tellez and Danielson met several years ago when Tellez was offering affordable pop-up clinics at an LGBT center. Danielson, seeing that Tellez had rich community organizing experience and a deep commitment to equity and social justice, invited him to join his board of directors.

"This is awesome," Tellez remembered saying when Danielson first pitched his idea for Loconomics. "We get to be part of creating something bigger, and I'm putting money into something that is going to come back to me."

Tellez and Danielson are anxious to see Loconomics released, beginning in the Bay Area. They hope interest will grow in other cities as users sign up. Given their limited resources, scaling up will be cautious and incremental. "Things take time," Tellez said, "and when you don't have tons of funders, and you don't have a gigantic staff, it takes a lot longer."

"We've made it this far, to where it's not worth taking investment from anybody," Danielson said. "That's the key to keeping the ownership amongst all the service professionals. It's by not giving in."

The Loconomics app will contain tools for service providers that they might otherwise have to cobble together on their own: scheduling software, financial performance tracking, client management, customizable web profiles, even access to insurance through the Freelancers Union. Danielson is betting that these resources will be incentive enough to join and pay the monthly dues of \$30. For the consumer — the user trying to find a house cleaner or a massage therapist — the worker-owned aspect of the platform will likely be little more than an added bonus, Danielson said. The convenience of the technology is important.

"San Francisco has a long history of social justice-minded folks, and I don't think that that's going to leave," Tellez said, as he peered out the window over the rooftops of the rapidly changing Mission District. "I think there's a lot of people that are socially conscious and that want to make decisions based on..."

"Where their money is going," Danielson said, finishing Tellez's thought.

"Yeah," said Tellez. "They want to feel like they're doing something positive."

— Zachary Slobig

KEEPING STUDENTS IN SCHOOL

A Jordan High School senior takes her seat in a small circle of chairs. The restorative justice room, fluorescent-lit and filled with desks, could pass for an old-school detention room. Instead, it is where specially trained counselors and teachers use talking circles and group therapy-like discussions to coax misbehaving students into confronting their problems and to help them out of their stew of anger and defiance.

The young woman is here because of a faceoff with another student that almost escalated into a brawl. She sits expressionless, hands folded across her chest, a whippet-thin figure who has bounced around several high schools but has managed to thrive at Jordan. A counselor, a dean and a restorative justice leader sit with her. They all want to see her graduate. A red plastic flower has been anointed the talking piece. Several times, she refuses her turn and passes the flower on. When she finally speaks, she recounts how the other student, also a girl, approached her, nose to nose.

"She put her stuff down, and I put my stuff down, and I said, 'What's up?'" Each girl was trailed by a throng of other students ready to join in.

"Well, it's good it didn't escalate into a fight," Sergio Luquin, the leader, offers. "Who do you think was harmed here?" He gives her the plastic rose.

She slides back into silence and passes it along.

Not long ago this student might have been suspended. But in 2013, the Los Angeles Unified School District became the first in California to end suspensions for willful defiance, a wide-ranging category of misbehavior that can mean mouthing off, disobeying a teacher or becoming disruptive in class. National and local research showed that schools were disproportionately suspending black and Latino males, and that the suspensions were putting students at a higher risk for falling behind, dropping out and ultimately getting into trouble with the law. Other school systems around the country have followed suit, and California passed a law in 2014 limiting

willful-defiance suspensions. During the 2011-12 academic year, L.A. Unified suspended 18,888 students. In 2013-14, it suspended 8,864.

The LAUSD replaced suspensions with restorative justice — conflict resolution, problem solving and making amends through counseling and group dialogue in talking circles. But mastering the technique takes time, training and funding. Teachers and administrators at many schools have yet to receive the preparation they need. That leaves them still struggling to deal with unruly students.

Two schools trained in restorative justice are Jordan High and Florence Griffith Joyner Elementary School, both in Watts. They draw their students from African American and Latino communities coping with poverty and crime. While they are part of the LAUSD, the schools are run by the non-profit Partnership for Los Angeles Schools, which funded the restorative justice training.

During the 2010-11 school year at Joyner, 138 students were suspended. This academic year, as of early February, only two had been suspended. The drop is the result of increasing expectations for behavior and showing students that they are valued, said principal Akida Kissane-Long: "Every child in this school is known by at least two adults (on the staff)."

In Raquel Williams' fifth-grade class, the weekly talking circle is not about dissecting discipline problems. It is more like group therapy. Under her patient questioning, students go around the circle eagerly naming their favorite animals and, later, what they dislike about their neighborhoods. Gunfire and lack of parking come up several times.

High school students are a tougher challenge. But in the current academic year at Jordan, only five students have been suspended — less than 1% of the student body. That is down from 11% from last year. In the 2010-11 school year, 35% of black students at Jordan were suspended. This school year, 2% of black students were suspended.

Back in Jordan's restorative justice room, counselor Luquin has a question for the senior: Could she have done something differently when she was provoked?

"Walk away," she says, reluctantly.

"That's good," says Carlton Washington, dean of students.

But the young woman is unconvinced. "When people come up to me with a group of friends ready to fight, that makes me mad."

Washington looks at her calmly. "In the rest of your life, people are going to want to fight you."

She won't let on whether she has grasped his point. But at the end of the circle, she agrees to come back and talk again.

— **Carla Hall**





PHOTO BY DAVID SPRAGUE

A LIFETIME IN SEARCH OF CLEAN AIR

Relentless Mary Nichols

IT WAS A SURPRISE.

Few people have done more to combat air pollution than Mary Nichols, but here she was, at breakfast in a coffee shop on Larchmont Boulevard, saying that California has more pressing problems than climate change.

Nichols, 71, quick to smile but quietly forceful, is a fierce fighter for the environment. A professor in residence at the UCLA School of Law, she is chair of the California Air Resources Board — for the second time. Forty-five years ago, fresh out of Yale Law School, she filed the first lawsuit under the Clean Air Act. Since then, she has reduced diesel emissions, taken steps to repair the ozone layer, decreased acid rain, curtailed particulates in the atmosphere and, most recently, overseen

sweeping changes to cut greenhouse gases and slow global warming. She drives an electric car.

So it came as a bit of a shock to hear her say: “Fixing the budget may be more important for the moment.” She paused over a soft-boiled egg. “Housing, education — these are serious problems. There’s a need to address them.”

But then Mary Nichols pointed out an important difference. Education, housing, the state budget are, one would hope, short-term troubles. On the other hand, climate change, although it can seem remote and incremental, is “an existential issue for the world.”

California, she said, should never relinquish its leadership in charting the course against it, because climate change has implications for mankind.

WRITTEN BY
JIM NEWTON

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Last spring, Nichols delivered a commencement speech at Harvey Mudd College in Claremont. President Maria Klawe introduced her by passing along gratitude from an alumnus, who recalled that in his days as a student he could rarely see Mount Baldy, and who thanked Nichols for getting rid of the smog that hid it.

Rarely flustered, Nichols seemed taken aback to be given credit for the view, but she accepted the compliment and shared it. Credit, she told the graduating class, belonged not just to her but also to “a few thousand other people.” Because of a combined effort, she said, “We can see Mount Baldy on most days from this campus. The Air Resources Board, back in the 1970s, had to fight to get to that point. We thought we knew what could be done. ...But the lobbyists and the lawyers...told us it couldn't be done.”

Tenacity is one of Mary Nichols' defining characteristics, particularly on behalf of important causes. As a student in Ithaca, N.Y., during the 1960s, she demonstrated for peace. With a group from Cornell, she went

a strong environmentalist (see the Q&A in this issue). He and Nichols hit it off. They shared — and still do — an unusual blend of philosophical curiosity and a pragmatic approach to politics. Brown offered her a spot on the Air Resources Board, and she accepted.

She focused squarely on smog. Under her leadership — and with support from Brown, who elevated her to chairman a few years later — the ARB demanded improvements in pollution control for automobiles, which the Clean Air Act allowed specifically for California. Car companies balked. General Motors and later Ford famously complained that if Nichols and her agency had their way and companies were required to install catalytic converters, it would bankrupt manufacturers. Nichols did not back down; both Ford and GM, it bears noting, are still in business.

Nichols dove ever more deeply into the complexities and politics of air quality. In 1993, President Clinton put her in charge of the Office of Air and Radiation at the Environmental Protection Agency in Washington.

“CLIMATE CHANGE IS AN EXISTENTIAL ISSUE FOR THE WORLD.”

to Tennessee to register voters. During law school at Yale, she visited California and saw firsthand that the environment was in danger.

“We got to Los Angeles in the late afternoon,” she told the L.A. Times. “I remember descending into the basin, driving west toward Sunset Boulevard and being astonished by the peculiar color of the air. It was a kind of flaming orange — not a natural color but a peculiar Day-Glo, chemical kind of orange.” When she moved to L.A. in 1971 with her husband, she joined the Center for Law in the Public Interest to lead its battle against air pollution.

She sued California under the Clean Air Act to force the administration of then-Gov. Ronald Reagan to meet the EPA's anti-pollution requirements. Nichols won, but she discovered the frustrations of using litigation to compel improvement. She encountered foot-dragging by both industry and government. Reagan was unwilling to force faster progress.

But Mary Nichols did not give up.

In 1974, she met with Jerry Brown, 36 at the time, who had picked his way through a crowded field and been elected to the office that Reagan had won from Brown's father eight years earlier. Young Gov. Brown was

The chief threat then was acid rain. Congressman Henry Waxman and others secured a set of amendments to the Clean Air Act in 1990 that allowed EPA to develop a cap-and-trade program. Nichols and her colleagues refined and implemented the program. She also confronted ozone depletion and a growing awareness of the dangers of particulates in the air.

Those were important achievements, but not the crowning moments of Nichols' career, which has otherwise been rooted in California. “I had a great staff and a fearless boss, Carol Browner,” Nichols said of her time in Washington. “But I found the federal government mired in bureaucratic intrigue...And I missed California.”

She returned in 1997. Two years later, Gov. Gray Davis appointed her Secretary of Natural Resources. And under Gov. Arnold Schwarzenegger, she reclaimed her old post at the ARB, now renamed the California Air Resources Board. At first, Nichols regarded Schwarzenegger, a Republican, with some wariness, but they found common ground, and their collaboration serves as a reminder that air pollution and climate change are issues that should bridge partisan politics.

Announcing her appointment, Schwarzenegger —

who signed AB 32, California's landmark climate change legislation — said of Nichols: "There is no one more qualified, more committed and more able to lead our efforts on climate change and air quality than Mary Nichols."

In 2013, *Time* magazine named her one of the 100 most influential people in the world.

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Nichols is the rare political figure who has championed a difficult, complex and staggeringly significant cause without succumbing to bitterness or wallowing in the polarization that cripples so much good intention in Sacramento and Washington. She is relentlessly positive, but hardly naïve; she recognizes that there are forces arrayed against her.

There are two main lines of opposition to the efforts that she has advanced against climate change. The first is mounted by deniers, who refuse to accept scientific evidence that the world is growing warmer and that greenhouse gases are to blame. "I don't relish being at the head of a wedge issue," Nichols said about poll numbers suggesting that a significant segment of the American electorate, not to mention many of the Republican Party's leading political figures, question the science. Still, she sees hope in data since the Paris Summit showing a shift toward acceptance. She and Brown attended the summit, where California's leadership was acknowledged by many, including Mary Robinson, the UN Special Envoy on Climate Change.

The second source of opposition seems more rational, but Nichols finds it in some ways more vexing. It comes from those who acknowledge the fact of global warming but argue that the sacrifice needed to respond is too harmful to California's economy. In other words, climate change is real, but California should do less to fight it because the effort risks the state's economic health to do a favor for the world.

Former Gov. Pete Wilson is among those who sounds that alarm. During a recent panel discussion at a Los Angeles Town Hall, Wilson said that California has gone too far in combating climate change because the state's efforts, in addition to its other environmental regulations, make it less competitive with Nevada, Oregon and other neighbors in the drive to lure businesses and jobs.

That argument infuriates Nichols. "To say we're losing ground to Oregon or Nevada is just not true," she said, her voicing rising in irritation. Indeed, study after study has searched for evidence that California's climate change program is harming its economy and found nothing to support that notion. To the contrary, two recent economic forecasts — one from the Los

Angeles County Economic Development Corp. and one from UCLA's Anderson School — predict that California will outpace the nation in job growth over the next five years, environmental regulations notwithstanding.

Using data from the Bureau of Labor Statistics, a study by Lee McPheters at Arizona State University found that in 2015, California ranked sixth among all states last year in employment growth, adding more than 16 million jobs, for a growth rate of 3%. Texas, on the other hand, which has pursued an opposite strategy on climate change from California — low regulation and little environmental protection — ranked 14th in job growth.

"People keep looking for the effect of AB 32 on our economy," Nichols said, "but they can't find it."

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What has happened so far in the battle against air pollution and climate change pales in comparison to what comes next.

Testifying before a California Senate committee in 2014, Nichols spelled out greenhouse-gas reduction goals in transportation, water, building construction and retrofitting, agriculture and energy generation. Nothing less than a comprehensive, market-based revolution, she said, is required to reorient California and the rest of the world toward sustainability.

To some, that is too much to comprehend. They simply give up, convinced that humanity has waited too long to rise to this occasion, that politics are too daunting, that technology can't catch up fast enough.

Not Nichols. She continues to demand that society examine its history and prepare for its future. Industrialization "worked very well for 100 years," she said. "Now it's not working so well." The next 20 years — "an eyeblink in history," as she describes it — will decide whether and how humanity meets this challenge.

"We're all in this together," Nichols said.

As for her role in this long and existential struggle, no one has described it better than Waxman. Awarding her an environmental prize in 2014, he captured the singularity of this determined woman, one who is feared and admired, calm and resolute; one whose life has been shaped by the conviction that all people are entitled to breathe clean air.

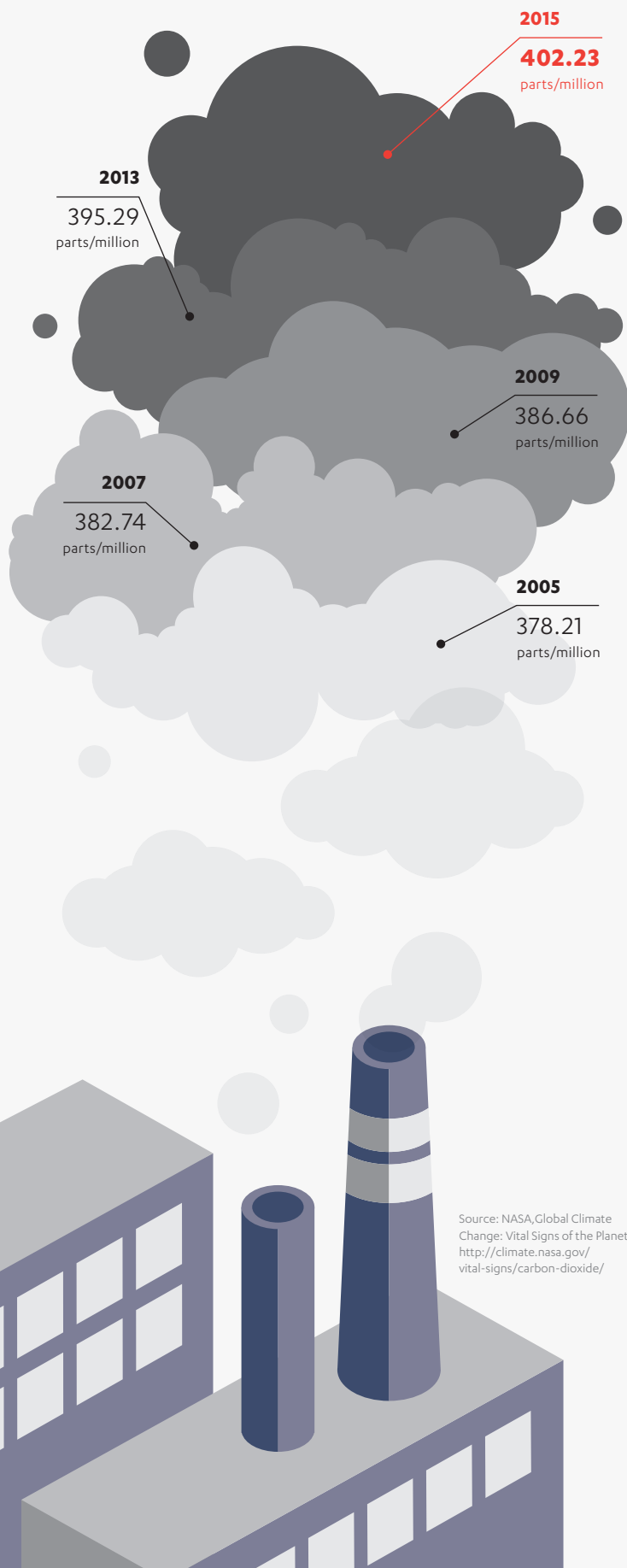
"Mary Nichols has pursued a cleaner and healthier environment with tremendous intellect, energy, vision, confidence, tenacity and compassion," Waxman said. "And she has done it with passion and joy... She reminds us all that government can bring people healthier and better lives."

The proof: Mount Baldy, once invisible from Claremont, now is there for all to see. ▀

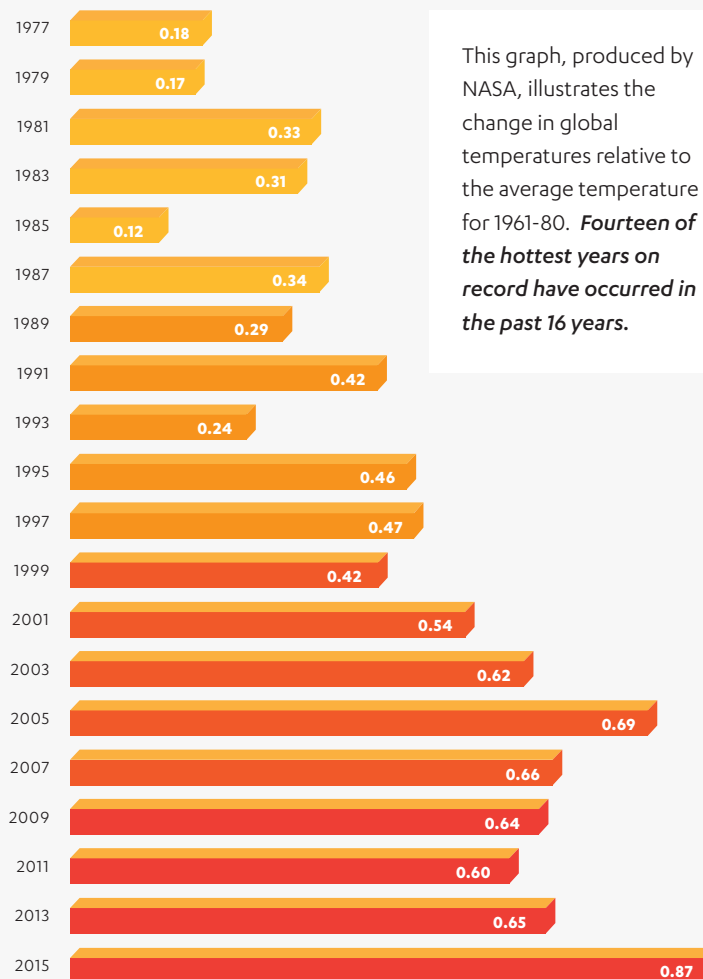
THE REALITY: THE PLANET WARMS

As carbon dioxide increases, global temperatures and climate-related problems are soaring.

The Cause: Carbon Dioxide Increases

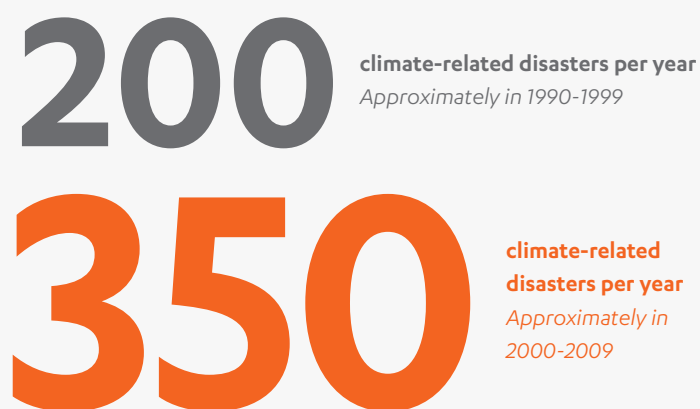


The Effect: Global Temperatures Rise



Source: NASA report: Global Climate Change: Vital Signs of the Planet (climate.nasa.gov)

Climate-Related Disasters Increase



Source: NASA report: Global Climate Change: Vital Signs of the Planet (climate.nasa.gov)

THE REACTION: THE WORLD RESPONDS

As last year's Paris Summit demonstrated, nations are recognizing the threats posed by climate change and are responding. California has played a leading role.

The Top Three

Leading Countries in Renewable Energy



Source: Renewables 2015: Global Status Report (published by REN21)

Geothermal
Energy created by harnessing the Earth's internal heat

Hydro
Energy created by moving water

Solar PV
Solar panels used to generate electricity

Wind
Wind used to generate electricity

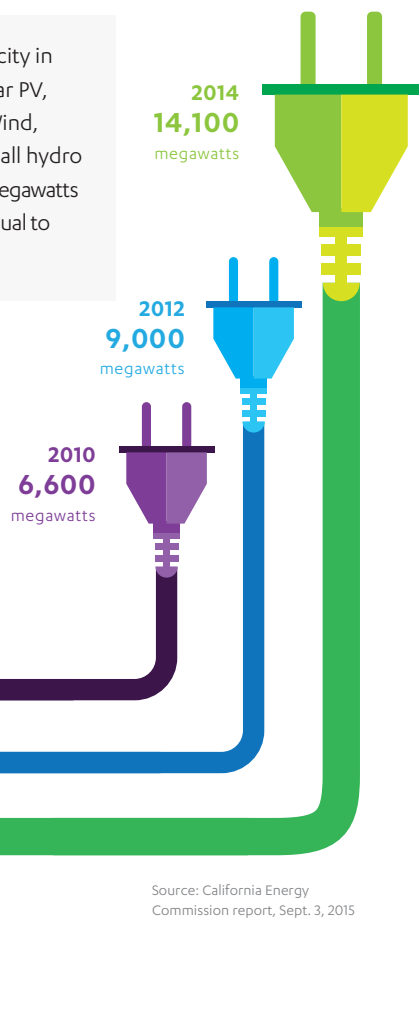
Biodiesel
Diesel fuel made from biodegradable materials

1st in the world 2nd in the world 3rd in the world



Growing Capacity

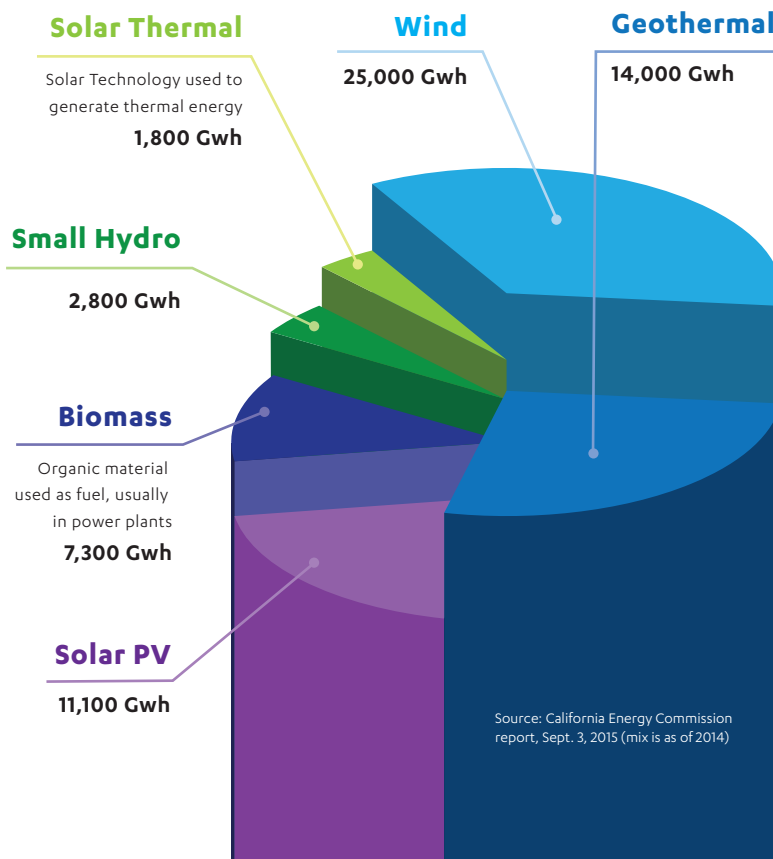
Combined capacity in California of Solar PV, Solar thermal, Wind, Geothermal, Small hydro and Biomass in megawatts (unit of power equal to 1 million watts).



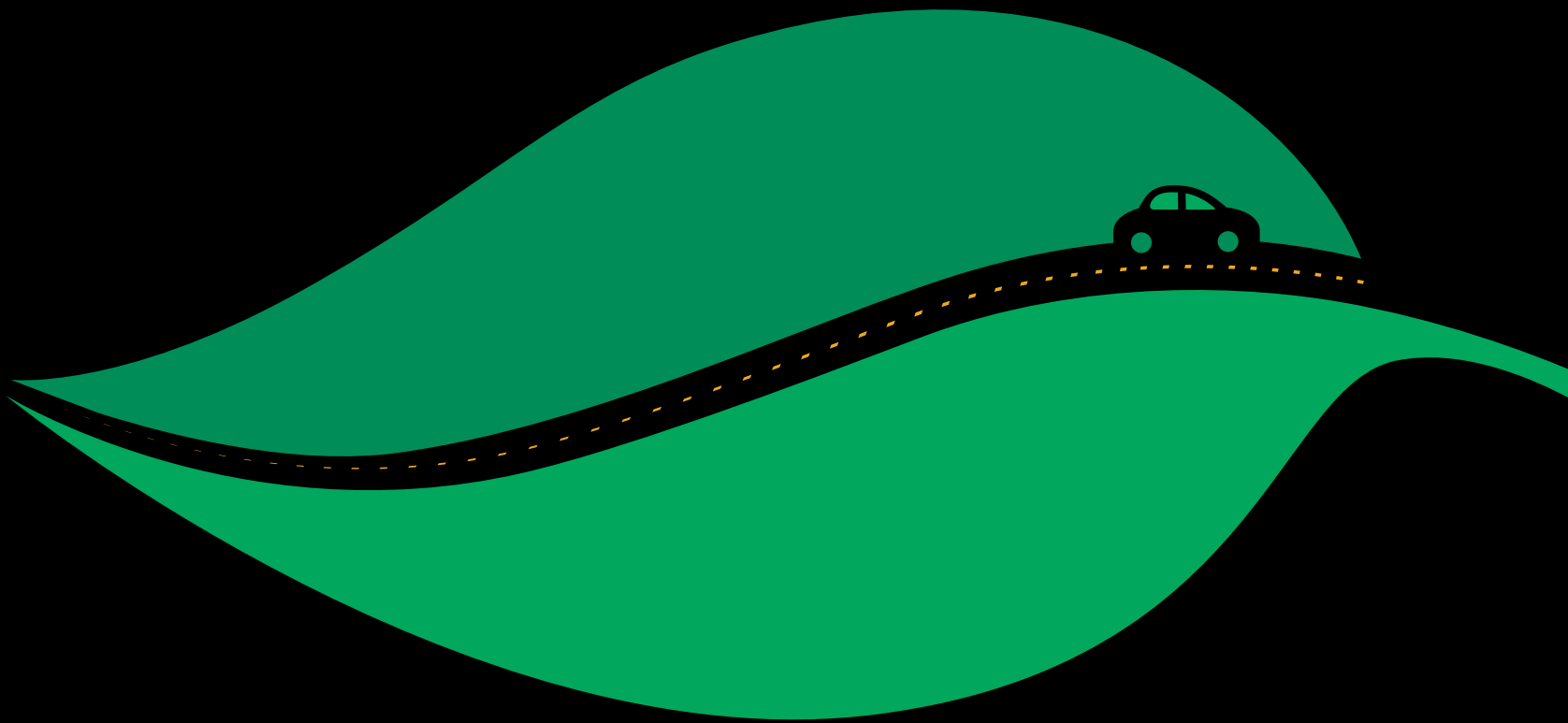
Source: California Energy Commission report, Sept. 3, 2015

Renewable Energy Mix in California

62,000 Gigawatt (1 billion watts) hours
Energy Mix Total as of 2014



Source: California Energy Commission report, Sept. 3, 2015 (mix is as of 2014)



WHICH POLICIES WORK?

WRITTEN BY
LISA FUNG

EDUCATING POLICYMAKERS TO ENCOURAGE CONSERVATION

J.R. DESHAZO GREW UP IN RURAL VIRGINIA, the oldest of seven children in a blue-collar household warmed by firewood. Now he devotes his research and intelligence to weaning Americans off fossil fuels — first by examining behavior and then by scrutinizing policy.

His mission starts with consumers, but aims really at policymakers. That's because, though some of the challenges of climate change are technical, others are political. If society is going to recognize and adapt to a warming planet, it will require thoughtful policies to encourage those adaptations. That's where DeShazo comes in.

In his role as director of the Luskin Center for Innovation, DeShazo, a UCLA professor of public policy and urban planning, leads research in renewable energy — power that is generated from natural resources (such as solar, wind, geothermal or water) and is naturally replenished. For DeShazo, that is both an environmental and a social challenge: Ensuring that low-income households have access to energy-conscious options is a personal goal, an outgrowth of his upbringing.

"I am very empathetic to low- and moderate-income family households in this country and other countries who are struggling just to live on a day-to-day basis," he said. "It makes me work extra hard on projects that are related to low-income Californians. They are affected more by most of these policies because more of their income goes toward energy and water, as a percentage. So that's a real consequence."

After high school in Virginia, DeShazo went on to study economics and history at the College of William and Mary, where he graduated with honors before winning a Rhodes scholarship. He received his master's degree in economics at St. Antony's College at Oxford and then completed a Ph.D. at Harvard.

The 49-year-old father of two drives a plug-in electric vehicle and has installed solar panels on his house. "Yes, my 16-year-old is driving an electric vehicle, and the 4-year-old got to watch the solar panels go on the rooftop — and he was very excited about that," DeShazo said with a laugh. His wife, Mary Evans, is an environmental economist who teaches at Claremont McKenna College.

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A key part of DeShazo's work involves analyzing the behavior of consumers and utilities, then finding ways to help them meet their individual goals, whether it's saving money, reducing greenhouse gas emissions, or both. He has been called upon to advise and assess the policies of the U.S. Environmental Protection Agency, the United Nations, the California Air Resources Board, the Los Angeles City Council and numerous other agencies.

"We help utilities and utility regulators think about how to design programs to incentivize or to bring more clean power into the air," he said. "And we help consumers think about the choices they make by investing in energy efficiency."

There's a wealth of energy alternatives on the market today: Electric vehicles, solar rooftop panels and xeriscaping are just a few of the available clean technologies. The trick is to get consumers to consider and ultimately change their consumption habits and to get providers to come up with more options.

The most basic challenge is learning how to talk to consumers about energy. DeShazo has found that American households respond differently to messages on energy savings. For example, he said, "Conservatives really don't like to be told what to do by government policymakers." In those cases, it's best to appeal to their desire to save money, and their desire for the country to be more energy independent. For lower-income households, he says, emphasizing cost savings is most effective.

When education is coupled with rebates or subsidies, all sides see rewards. "The great thing about that strategy is that it produces a social benefit and an environmental benefit." But, DeShazo says, lawmakers must ensure incentives go to the people who need them the most.

The classic complaint, he says, is that subsidies are going to rich people. "Why do you want to give a Tesla owner a \$5,000 rebate?" Is it really going to make a difference if they're buying an \$80,000 car to give them a \$5,000 reduction, compared to a household that might be considering the purchase of a \$12,000 car?"

The same is true of solar rooftop panels, which can run at least \$15,000 to \$20,000 for a typical house. That purchase, even after rebates and credits, may not pay for itself for 10 years. So right now it's easier for a higher-income household to make the investment and wait for the return, which could come in the form of direct energy savings, rebates on electric bills or the possibility of selling power back to the utilities, DeShazo says.

Much of DeShazo's recent work at Luskin has focused on plug-in electric vehicles, an emerging market that has become a top-10 priority for many states.

In March 2015, for instance, DeShazo and several other researchers published a state-by-state analysis of attempts to encourage the development of plug-in vehicles, from creating tax rebates to enlarging the electric charging infrastructure to make the vehicles more usable. The report, "State of the States' Plug-in Electric Vehicle Policies," was co-authored by DeShazo, CC Song, Michael Sin and Thomas Gariffo. Its findings are helping to guide California and others in pursuit of a new vehicle mix for American highways.

As of December 2015, sales of plug-in vehicles in the United States topped 400,000, with 170,580 sold in California, according to the California Plug-in Electric Vehicle Collaborative. The public-private consortium is made up of 48 partners, ranging from global automakers and utilities to Gov. Jerry Brown's office. Their common goal is to expand the plug-in vehicle market.

"California accounts for about 45% of national EV sales," said Josh Boone, deputy executive director of the consortium. "We are not only the national leader for plug-in electric sales, we're also the global leader."

Worldwide, more than 1 million EVs have been sold, according to a recent survey by HybridCars.com, which tracks plug-in vehicle sales. Plug-in vehicles fall into two basic categories: battery-electric vehicles and plug-in hybrid electric vehicles. Because battery-electric vehicles have no internal combustion engine and are fully powered by an electric motor, they are considered zero-emission vehicles, while hybrid cars are zero emission only when in electric mode.

California has a long history of strong air-quality regulations and hefty consumer incentives for adopting energy alternatives. Energy policy has been motivated largely by the state's commitment to dealing with pollution and climate change. To that end, Gov. Brown issued an executive order in 2012, setting a goal of 1.5 million zero-emission vehicles in California by 2025. Nationwide, President Barack Obama has made a push for 1 million plug-in electric vehicles on the road.

There's still a long way to go.

In December, Mary Nichols, chair of the California Air Resources Board, told the Los Angeles Times, "We're not currently on a path that will lead us to the 1.5 million." David Clegern, a spokesman for the board, said the state has undertaken a number of measures to speed the growth of the zero-emission vehicle market, which

**"WE HELP UTILITIES
AND UTILITY
REGULATORS THINK
ABOUT HOW TO
DESIGN PROGRAMS
TO INCENTIVIZE OR
TO BRING MORE
CLEAN POWER INTO
THE AIR."**



J.R. DESHAZO (LEFT) AND GAURAV SANT, A PROFESSOR OF CIVIL AND ENVIRONMENTAL ENGINEERING, PRESENT A NEW BUILDING MATERIAL THEY HAVE CREATED FROM CARBON.

include investing in more charging stations and steeply increasing annual vehicle delivery requirements for automakers, which would require that 15 percent of new cars for sale in California by 2025 be zero-emission vehicles. Some companies are developing electric cars precisely so that they can have access to markets in California and Oregon, which also has imposed mileage requirements.

As more people are encouraged to buy plug-in cars, automakers will likely boost production and offerings to feed the growing market. That's why DeShazo's consumer-focused research is key. "It's going to be easier if you see a neighbor try it out," DeShazo said. "You learn from them when you talk. It's a kind of peer-to-peer education. That process takes time."

Sales have increased, in part, through such enticements as rebates, access to preferred parking spots and carpool lanes and other initiatives. "We hear from our automaker members and from the driving community that incentives are one of the key factors in pushing folks to purchasing or leasing an EV," Boone said.

However, financial incentives are not meant to be permanent; they are designed to help jump-start new technologies. The good news is that research shows that early adopters have additional motivations. "Most of them are doing it for environmental reasons or they want to try new technologies," DeShazo said. "People like whatever is new."

Though electric cars have been around in some form since the late 1800s, the first mass-market, mass-produced hybrid vehicles have become available only in recent years. Early mass-market electric vehicles were introduced in the 1990s, but the benchmark year came in 2010, when the fully electric Nissan Leaf and Chevrolet Volt were introduced, marking the "second launch" of plug-in electric vehicles. Today there are about 30 electric or hybrid options available to consumers.

But it's still considered a nascent market. "They're viewed as a little bit risky — we're still learning how to use them. People ask, 'Are they going to work for me in my household in my situation?'" DeShazo said. "So you tend to only want to get one if you have an extra vehicle you can fall back on."

Typically with new technologies, the more affluent have been among the early adopters, and the electric vehicle is no different. Research has found, unsurprisingly, that lower-income households don't tend to buy new cars; they tend to buy used cars. Only recently have rebates been made available

for buyers of used cars. "One of the things we're looking at is how do you match these rebates with financing arrangements that the [government] might want to provide a guarantee on," DeShazo said. "Even if there is a higher-than-average default rate, it might be a better way to use public funds."

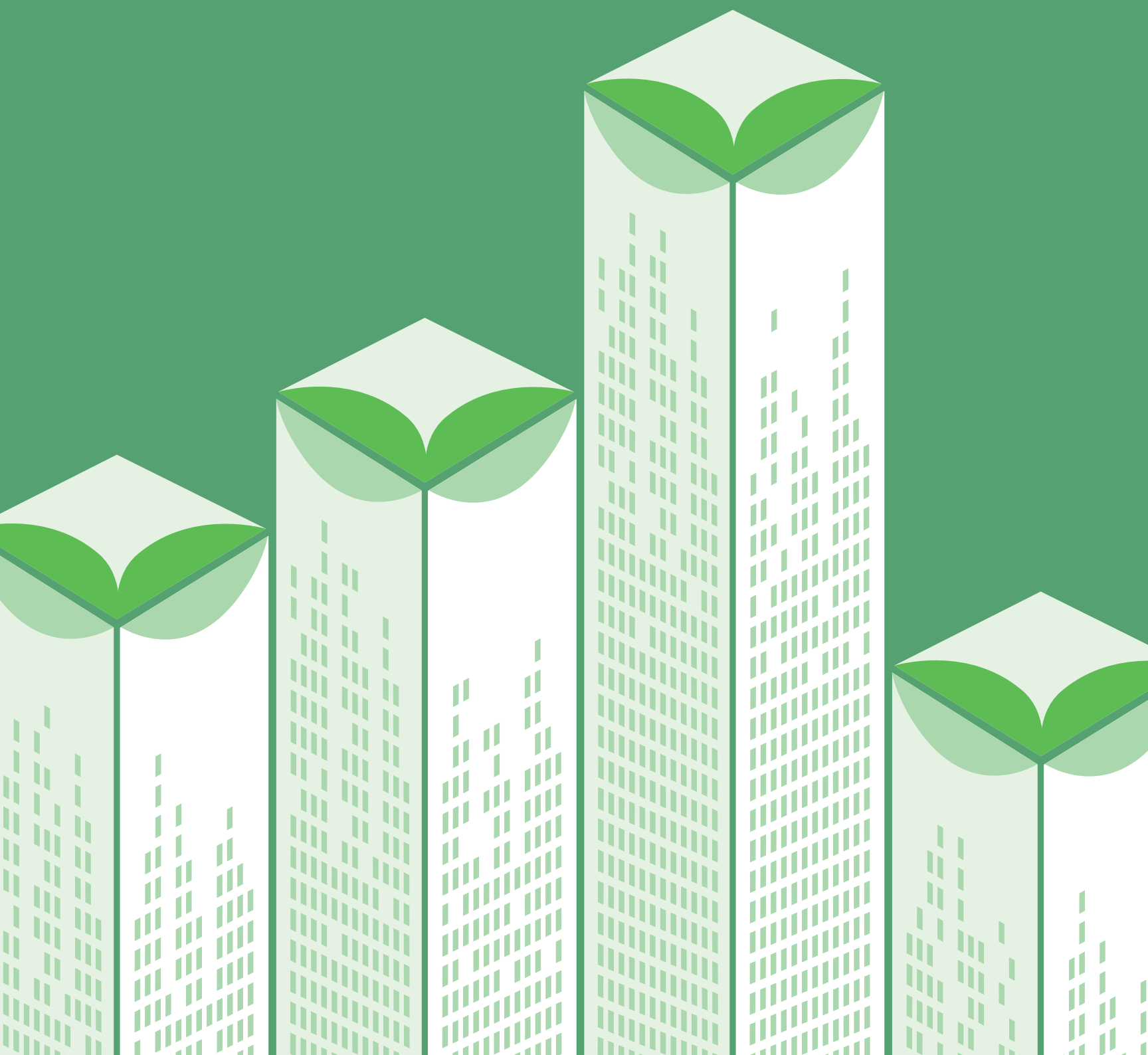
Technological advancements are creating more price points for consumers. Electric cars include range in price from the \$26,000 Chevrolet Spark or the Smart EV but also the \$85,000 Tesla Model S 85D. Rebates and incentives bring down the price.

"It's an exciting time," Boone, of the California Plug-In Electric Vehicle Consortium, said. "The next generation of electric vehicles includes more affordable, longer-range plug-in hybrids and longer-range all-battery electric vehicles."

At the Consumer Electronics Show in January, Chevrolet unveiled its 2017 Bolt EV, an electric car with a 200-mile range on a single charge, significantly increasing the current average range of 40 to 80 miles. The car is expected to cost about \$30,000 after a \$7,500 federal tax credit, making it more affordable for lower- and middle-income households.

As availability expands, so does the prospect of a modern transportation network decoupled from oil and gas. If it happens, it's likely to begin in California — and it will be a credit to DeShazo and his colleagues.

"It's exciting to do research on energy policy and climate change in California because we are a state that is willing to experiment, to adopt interesting policies," DeShazo said. "Some of the ideas are out there and crazy, and some of them are really innovative and on the forefront of what the rest of the world is going to be doing. And we get to look at those and evaluate all of that. That's exciting." ▀



WRITTEN BY

MOLLY SELVIN

SHOP FOR A FORD EXPLORER OR A HONDA FIT, and you'll find a sticker in the window disclosing the vehicle's fuel efficiency. But if you want to buy or rent a building, you likely will have no idea how much it will cost to heat or cool. Officials with the city and county of Los Angeles want to change that and soon may join several other American jurisdictions in requiring building owners to report on the energy efficiency of their structures. An ambitious new data set built at UCLA is helping to guide that effort.

The Los Angeles County Energy Atlas project, a first-of-its-kind interactive website, enables policymakers and the public to sort energy consumption and emissions within the county by building size, vintage, construction materials, neighborhood and other metrics. The Atlas focuses on electricity and natural gas use. Among its surprising conclusions: Buildings are responsible for 40% of the county's greenhouse gas emissions, more than from motor vehicles in a region known for its reliance on the automobile.

"I wanted to open up a whole set of questions about where we put our energy conservation and dollars," said UCLA professor Stephanie Pincetl, who led the four-year project and is continuing to build on it. Information such as that contained in the Atlas will be critical to efforts in California and elsewhere targeted at improving the energy efficiency of existing buildings and curbing greenhouse gas emissions.

POWER USERS:

IDENTIFYING WHERE ENERGY IS USED AND WASTED

Pincetl and her team published the Energy Atlas last September, as city officials were wrapping up nearly a year of public stakeholder meetings, laying the groundwork for an ordinance that would require owners of commercial buildings and large multi-unit apartments to report their buildings' energy use.

"We had a great turnout and a lot of support," recalled Hilary Firestone, a senior project manager in the Los Angeles Office of Sustainability, which helped lead the process. Between 200 and 300 people attended these sessions, including representatives of building and apartment owners associations, labor leaders, realty corporations, engineering firms that focus on energy efficiency, and the Los Angeles Area Chamber of Commerce.

Last November, the Los Angeles City Council voted to direct the city attorney to draft an energy-use reporting ordinance with input from the Department of Building and Safety. Firestone hopes that the strong consensus that has coalesced behind the proposed measure, including groups that are often at odds, such as the Chamber of Commerce and labor unions, will result in quick passage.

"The great thing about the Energy Atlas," Firestone noted, "is that it's providing us with real data that can help inform policy and program decisions, for example, about which buildings need the most help and where we can get the most energy savings. This will allow us to make sure that our policy design will have the most impact."

If the proposed ordinance becomes law, Los Angeles would join a growing list of cities that require owners of commercial buildings, multifamily apartment units and manufacturing facilities to "benchmark" their energy use. Most of these ordinances apply to buildings of between 10,000 and 50,000 square feet, on the assumption that they are responsible for the largest share of energy use. Single-family homes are exempt.

**“THE IDEA
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OUT AS A
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**UCLA PROFESSOR
ANN CARLSON**

In 2009, New York City became the first American municipality to require building owners to report their energy use as well as to conduct periodic energy audits. The city compiles and releases this information each year in aggregate form, allowing individual owners to measure their buildings against citywide averages for energy use and efficiency.

These measures work as gentle prods toward greater efficiency. From 2010 through 2013, benchmarked buildings in New York City cut their energy use by an average of 5.7 percent, saving more than \$260 million, according to data from the

Institute for Market Transformation (IMT), a Washington, D.C.-based nonprofit that promotes energy efficiency in buildings. Several other cities, including San Francisco, Seattle, Kansas City, Minneapolis, Chicago, Philadelphia and Atlanta, have joined this effort, reporting similar energy savings, and new benchmarking proposals are now before lawmakers in Houston and Salt Lake City.

Most cities fine scofflaw owners, but Firestone notes “surprisingly high compliance” nationally with the benchmarking rules, higher than with many other building code requirements. For example, Chicago’s just-released Building Energy Benchmarking Report found that 92 percent of building owners complied with energy reporting requirements last year. That kind of response speaks to “the broad awareness and importance of these programs,” Firestone observed, and the fact that these measures are aimed at helping building owners to do better.

These rules don’t aim to “shame” building owners, noted Lisa Colicchio, director of corporate responsibility for CBRE. The international real estate company is also a member of the Building Owners and Managers Association of Greater Los Angeles; Colicchio works with BOMA’s sustainability committee, which supports the ordinance proposal.

“If you don’t measure, you can’t manage it,” she said. “That’s what we tell clients.”

Even the Valley Industry and Commerce Association (VICA), an advocacy group representing some San Fernando Valley business owners, which has generally opposed new regulations, is taking a wait-and-see approach on the proposed L.A. ordinance, according to VICA president Stuart Waldman.

Key to the apparent broad support for benchmarking here is the fact that many of Los Angeles’ larger buildings are owned or operated by national corporations with properties in cities where similar ordinances are in place. “They know that the market rewards well-run, energy-efficient buildings with higher rents, higher sale prices and higher occupancy rates,” said Cliff Majersik, IMT’s executive director.

The Los Angeles benchmarking proposal responds to Mayor Eric Garcetti’s ongoing effort to create a more environmentally friendly city and to California’s greenhouse gas reduction goals (some of which are being developed as part of UCLA’s Grand Challenge program, featured elsewhere in this issue). Last year Garcetti’s office released Los Angeles’ first comprehensive sustainability plan with goals for transportation, air quality and job creation.

A pair of new state laws should facilitate those goals. Assembly Bill 802, passed in September and signed by Gov. Jerry Brown, creates statewide benchmarking guidelines that complement existing city ordinances and make it easier for large-building owners to access data on energy usage from utilities. Senate Bill 350, part of the same package, commits the state to increasing the energy efficiency in buildings by 50 percent by 2030 and requires utilities to draw 50 percent of their power from renewable energy by the same deadline.

UCLA’s Pincetl said the Energy Atlas would allow government officials and building owners to comply with these new initiatives and encourage homeowners to cut their energy use.

“SB 350 cannot be really well implemented without this kind of data,” she added. “You have to know where you are going to invest to get the biggest savings in energy use over time.”

For instance, the Atlas found that the most inefficient buildings aren’t the oldest but rather structures from the 1970s. Pincetl attributes this discovery, which she called surprising, in part to the county’s rapid suburbanization during that period and intense competition among construction companies. Builders put up houses and offices quickly, she said, and often used cheaper, less energy-efficient materials — drywall instead of the lath and plaster found in older structures.

Energy use in Los Angeles County also varies considerably by community as well as by income. Malibu residents are the heaviest per-capita users, while those who live in Avalon on Catalina Island use the least. Homes in many low-income neighborhoods are less efficient per square foot than in wealthier communities. But higher-income neighborhoods as a whole consume three times more energy than poorer communities.

These findings suggest strategies for encouraging building owners to save more energy by making changes to their properties. For example, financial subsidies could incentivize low-income residents to weatherize older homes. Wealthier residents in larger homes, who are often large water users, might respond to utility rates that tie usage to a home’s square footage. Commercial building owners might respond best to a package of utility rebates and financing for energy upgrades.

But Pincetl stressed, “We’re not policy makers. Our job is to open up the realm of inequality and think about energy policy in a more data-driven manner.”

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The Atlas emerged from Pincetl’s frustration with the absence of such data and from her long involvement in environmental research. At UCLA she directs the California Center for Sustainable Communities, whose mission is to produce “actionable science that improves the sustainability of urban systems.”

The Center is one of several campus institutes, involving more than 100 UCLA faculty members, taking part in UCLA’s Grand Challenge to achieve energy and water sustainability in Los Angeles County by 2050. (The push for sustainability is one of two challenges issued by Chancellor Gene Block in 2012; the other marshals campus researchers to better understand, prevent and treat depression.)

“The idea of the Grand Challenge is to hold Los Angeles out as a model city,” noted Ann Carlson, the Shirley Shapiro Professor of Environmental Law at UCLA. “Understanding everything we can about energy use within our borders is incredibly important, and the Atlas is a foundational element in that effort,” she said. Carlson co-directs the Emmett Institute on Climate Change and the Environment, whose mission is to develop and promote tools for environmental policy makers.

Work on the Energy Atlas began in 2011. The UCLA research team acquired address-level energy consumption data from 2006 to 2010 from the major utilities in Los Angeles County. They matched this electricity and natural gas usage information with assessor records and census data, linking address-level energy consumption to building characteristics. Analysis of these 500 million records produced a map of how much energy is used where in the county. (Five cities — Azusa, Cerritos, the City of Industry, Pasadena and Vernon — are not included because researchers were unable to obtain data from the smaller utilities that serve those communities.)

**“IF YOU
DON’T
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CAN’T
MANAGE
IT.”**

**LISA COLICCHIO,
DIRECTOR OF CORPORATE
RESPONSIBILITY, CBRE**

The Atlas data is downloadable but privacy-protected; users can view neighborhood-level data but not the characteristics of individual properties.

The project cost \$500,000. Funders included the Southern California Regional Energy Network and the County of Los Angeles Office of Sustainability. A number of policymakers and energy experts and other local organizations also contributed funds as well as advice.

Pincetl, 63 and an urban planner by training, regards the Energy Atlas as a work in progress. Her team is now adding 2015 data on energy use and emissions, and has begun to look at the energy profiles of public schools. By focusing on Los Angeles County, the Atlas already includes a

third of California’s residents, and Pincetl hopes eventually to expand the project to cover the entire state.

In the meantime, Carlson believes that reaching the ambitious sustainability goal UCLA set for the county will involve behavioral as well as technological change. The drought, for example, has caused Californians to significantly cut their water use. But maintaining those reductions will be hard, she said. The same holds true for energy use and conservation.

“It’s easy to say turn off the lights, but most people don’t notice if their electricity bill is smaller,” she noted. However, as energy prices rise, people might become more sensitive to the relationship between use and cost.

Carlson also believes that sustained savings will result when building codes incorporate more energy efficiencies into building design — for example, lights that turn off when no one is in the room and thermostats that automatically adjust to changing room temperatures.

That’s where the Atlas comes in. Reform begins with data. ▀



**CHANGING
MINDS,**



CHANGING HABITS

WRITTEN BY
KATHLEEN KELLEHER

MAGALI DELMAS PICKS UP HER SMARTPHONE and touches the icon for her home thermostat. She is inside UCLA'S Institute of the Environment and Sustainability, where it is warm. But an icy wind is blowing outside, and she worries that her house might be too cold for her father, who is visiting from France. With a tap-tap, she changes the thermostat to a warmer setting.

Delmas is a native of France, where conservation is encouraged from childhood. She is ever mindful of energy use, and not just her own. An environmental economist, her latest research focuses on motivating changes in behavior to conserve electricity, using unique and effective nudges.

"Our stream of research explores how people are responding to any type of messaging and what drives change in terms of conservation," said Delmas, a management professor at both IoES and the Anderson School of Business. "It is very rare that people behave altruistically. So how do you make people aware of their impact, and how do you get them to care and act?"

Finding ways to persuade people to save electricity is an increasingly urgent quest. By law, Californians must double their energy efficiency by 2030. Scientists say 2015 was Earth's hottest year on record, mostly because of greenhouse gases. A quarter of all carbon dioxide emissions in the United States are caused by generating power for homes and businesses. Conserving with new technology and changing behavior could reduce carbon discharge by 123 metric tons per year — or about 20% of the dispersion attributed to household use.

Encouraging households to conserve power is difficult. Electricity is relatively cheap, about 4% of monthly expenses. "Keeping lights on all day and night probably won't cost you more than a few bucks a month," said Noah J. Goldstein, a professor at the Anderson School, whose primary research focuses on motivating behavioral change, and who responded to questions by email. "So people think, 'For only pennies a day, I don't even have to think about turning off the lights.' It is not that people don't respond to financial incentives; the problem is that financial incentives for engaging in environmentally friendly ways aren't typically big enough to sway people's behavior."

Raising electricity prices is difficult and not always politically feasible. Many utilities in the United States are subsidized, obscuring costs. "Not only is the environmental impact of electricity use invisible, meaning people don't really know what the impacts are," Delmas said, "but people don't really know how much electricity each appliance is using — and they don't really care."

To measure the value of informing consumers about harm to the environment and childhood health related to their energy use, researchers led by Delmas designed a study, published last year in Proceedings of the National Academy of Sciences, which analyzed the consumption of electricity by 118 graduate student households in UCLA apartments over eight months. The households received real-time, appliance-specific information about their energy use. The information was available around the clock on a website and summarized in weekly emails.

The experiment tested the effectiveness of different messages on energy conservation behavior with two groups. In the first, each household received information about its energy use paired with its negative impact on the environment and children's health. In the second group, each household received this information paired only with its monetary cost. Households in both groups were compared to the top 10% of their most efficient neighbors — and to a control group.

An example of an email showing environmental impact was: "Last week, you used 29% more electricity than your efficient neighbors. Over one year, you are adding 456 pounds of pollutants, which contribute to health impacts such as childhood asthma and cancer."

Residents who received messages about their energy consumption paired with corresponding pounds of pollutants and negative impacts on childhood health cut their energy use by 8.9%. If they were families with children, they reduced their energy use by 19%.

The study showed that frequent messaging about household electricity consumption linked to its generation of fine particulate air pollution and its damage to health changed daily decision-making. Participants said they turned off unnecessary lights and unused electronic devices. Messages about health and environment may have resonated because they were "morally sensitized consumers" who were disturbed by wasting energy and harming health, Delmas said. "People told us that they were surprised to learn about their impact on the environment and felt some kind of moral duty to reduce their consumption."

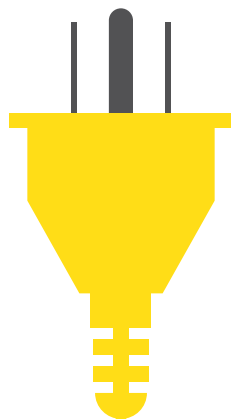
However, residents who received the monetary message did not change their electricity consumption. "People just learned that electricity is quite cheap," Delmas said. When the average users reduced consumption to levels of the most efficient users, they saved only about \$5 per month.

The experiment was repeated in faculty housing in New Delhi with the same results. "Air pollution is a major issue in India," Delmas said. "Those who responded to health and environment messages reduced their electricity consumption by 18%, as compared to a control group." Again, monetary messages had no effect. "This was a surprise to us," she said. "We were expecting Indian households to be more sensitive to the financial savings." This also contrasted starkly with what people had said in a survey before the experiment. They claimed that saving money would be their main reason for saving electricity, but they acted differently.

In a separate study, Delmas' team investigated the role of social pressure to reduce energy consumption. The team installed electricity meters in 66 standardized dormitory rooms. The meters ran for nine months. Consumption in each room was compared weekly to that of the average electricity user.

One group of students received their readings privately, by email. "We gave people the information in real time and detailed appliance-level use," Delmas said, "but it had no impact."

Another group of students received their readings both privately and publicly. Their information was displayed on posters next to elevators so



other students could see it. The posters marked above-average conservers with virtuous green dots and below-average conservers with red dots for wasters. “When the posters went up, it became serious,” one student said. Thermostats were lowered. “I turned off all the lights and wore a lot of sweaters,” another student said, “so I could get a green dot.”

The result was impressive: a 20% reduction in energy use.

“We used social pressure to motivate them to act,” Delmas said. “This was based purely on information, because students do not pay for electricity.”

Delmas said the reduction lasted for three months after the feedback ended.

Peer pressure works among members of like-minded groups who know what the others are doing. Driving a Prius or a Tesla is a conspicuous badge of green values, Delmas said, just as drought-tolerant front yards show who is making water-saving changes. But it is more difficult to make a public showing of virtue among consumers of electricity.

Some utilities use software offered by Opower, a Texas-based technology company, to create detailed, personalized home energy reports comparing an individual household’s usage to that of similar-sized households and offering tips on power reduction and goal-setting. Utilities that send such comparisons to their customers include Pacific Gas & Electric, Southern California Edison, Glendale Water & Power and San Diego Gas & Electric. Consumers compete for top spots on an Opower list sent out by Glendale Water & Power. “People will say, ‘I went outside to turn off my circuit breaker so that I would win,’” said Craig Kuennen, a marketing administrator for the city. “Some people ask us to recheck the numbers because they were not No. 1!”

Home energy reports have contributed to consumer reductions in energy use of up to 2.5%, said Matt Maurer, vice president of communications for Opower. The firm has based the design of its energy reports on studies conducted by researchers including Professor Goldstein at UCLA and Robert Cialdini, professor emeritus of psychology at Arizona State University, who is on the Opower advisory board. Using peer pressure created by the reports, Glendale has reduced power consumption by 4% during times of peak demand, usually heat waves, Kuennen said. The savings totals 248,000 kilowatt hours of electricity annually, he said. This means that each household saves about 2 kilowatt hours per heat wave by turning air conditioners down or off, closing drapes, and turning off lights and TV sets. Kuennen said the changes endure after the heat waves end.

Using peer pressure can backfire. This happens, said P. Wesley Schultz, a psychology professor at California State University San Marcos, when low-energy consumers become aware of the norm (sometimes called the magnetic middle)

and increase their electricity use to meet the average. The effect can be eased, Schultz and his colleagues found, merely by adding happy faces to above-average conservation numbers on home energy reports and sad faces to below-average numbers. “The basic smiley face message is quite a strong, universal one,” Schultz said. “It is feedback from your group saying, ‘We like what you are doing.’”

“What’s interesting is that most people think they are motivated by financial incentives and not at all by social norms,” Goldstein said. “And yet, my colleagues and I have found that just the opposite is true in terms of what actually motivates people to conserve energy.”

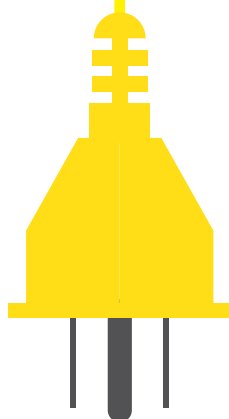
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One advantage of messaging to motivate behavioral change is that it does not matter whether people understand what is influencing them to act. By coming up with a new way to frame information about electricity use — making it personal by citing pounds of pollutants and damage to children’s health — the Delmas team created messaging that caused people to care and act. Using the information to exert social pressure made it doubly effective.

Until now, policymakers have focused on cost savings to motivate reductions in electricity use, Schultz said, because that is what people think is their own greatest concern. But because cost savings and penalties for not saving are so small, research shows that financial incentives simply do not work. Goldstein said it would be different if electricity prices were increased by, say, 4,000% — not a likely scenario. Meanwhile, consumers can be coaxed to care enough about negative environmental and health impacts to cut their use of power. With carefully worded messages, technological advances such as smart meters and computerized generation of highly detailed, real-time energy reports, researchers hope that policymakers, utilities and environmental activists can make the consequences of wasting electricity so clear that reducing consumption becomes the only choice. ▸

“IT IS VERY RARE THAT PEOPLE BEHAVE ALTRUISTICALLY. SO, HOW DO YOU MAKE PEOPLE AWARE OF THEIR IMPACT, AND HOW DO YOU GET THEM TO CARE AND ACT?”

PROFESSOR MAGALI DELMAS





Schatz Energy Research Center

The Schatz Energy Research Center at Humboldt State University is creating clean and renewable power technology, particularly hydrogen energy systems. Mankind, its researchers say, must evolve “from the energy hunter-gatherers we are now to the energy farmers we must become.”

Sources: California Energy Commission; Trident Winds; Wheelabrator Technologies; US Bureau of Land Management; San Luis Obispo Tribune; Calpine Corp.; Intel Corp.; UCLA; Humboldt State University; Caltech; UC Solar; Abengoa Solar.



Wheelabrator Shasta Energy Co.

The Wheelabrator Shasta Energy Co. in Shasta County processes as much as 1,250 tons of forest residue and waste from wood mills daily. It produces up to 58 megawatts of electricity, which it sells to a local utility. Wheelabrator generates enough power to supply 66,000 homes and businesses.



Geysers Geothermal Field

The Geysers geothermal field extends across 45 square miles of Lake and Sonoma counties. Eighteen plants produce enough electricity for 725,000 homes. This is the largest geothermal power plant complex in the world. Its first exploratory geothermal well was drilled in 1920, and its first power plant was built in 1960.



Advanced Solar Technologies Institute

The Advanced Solar Technologies Institute at UC Merced combines efforts by researchers at nine UC campuses to develop power in ways that include harnessing energy from nano-materials and the ultraviolet part of the solar spectrum. The institute also studies enhanced batteries and thermal energy storage.



Intel Corp.



Intel Corp. in Santa Clara County has installed 58 wind micro-turbines, 6 to 7 feet tall and weighing about 30 pounds apiece, on the roof of its headquarters. The mini-wind farm generates enough electricity to supply its conference center. Intel is at the top of the EPA's latest ranking of green power users.

SUSTAINABLE CALIFORNIA

RESEARCH BY
NONA YATES

California leads the nation in generating electricity from renewable resources. It gets about one quarter of its power that way. Legislation signed by Gov. Jerry Brown requires the state to double this percentage by 2030. Most of the energy comes from sun and wind. Other sources include biological waste, geothermal steam and running water. Crucial to reaching the 2030 goal is research, especially into energy storage.



Rio Bravo Hydroelectric Plant

The Rio Bravo Hydroelectric Plant on the Kern River near Bakersfield generates 14 megawatts of power. Plants producing less than 30 megawatts generally are considered by the California Energy Commission to be sources of renewable energy, because their environmental impact, including disruption to waterways, is less.



Smart Grid Energy Research Center

The Smart Grid Energy Research Center at UCLA is developing better ways to store electricity, make networks more responsive and integrate renewable energy into grids, including power from smart devices and electric vehicles. An additional goal is to make systems more secure.



Abengoa Mojave Solar Project



Trident Winds

Trident Winds proposes to install 100 floating wind turbines off Morro Bay. The wind farm would stretch across 40,000 acres of ocean and generate electricity for 300,000 homes. Each turbine would be 636 feet tall, more than twice the height of the Statue of Liberty. Trident projects completion in 2025.



Joint Center for Artificial Photosynthesis

The Joint Center for Artificial Photosynthesis at Caltech has designed an artificial leaf that uses sunlight to split water molecules into oxygen and hydrogen. By processing two gallons of water, the leaf generates enough electricity to supply a Southern California household for a week.

The Abengoa Mojave Solar project in San Bernardino County uses an advanced parabolic trough technology to generate power. The 2,200 parabolic mirrors concentrate solar energy to drive a conventional steam turbine. One of the world's largest solar plants, it generates enough electricity to power nearly 100,000 homes.



GOVERNOR

F O R

JERRY BROWN'S LONG

E V E R

STRUGGLE FOR THE ENVIRONMENT

IT CAN SEEM THAT JERRY BROWN HAS ALWAYS BEEN GOVERNOR OF CALIFORNIA. First elected in 1974, he served two eventful terms — securing rights for farmworkers, balancing the state budget, navigating a tax revolt and the Medfly — before unsuccessfully running for the Senate in 1982. He left politics for a time. He traveled, worked with Mother Teresa, learned Spanish, and then returned. He served as mayor of Oakland for two terms, was elected attorney general and then, an astonishing 28 years after leaving the governorship, he regained it. He is now the longest-serving governor in the state's history, one of the youngest men ever to hold the office and the oldest, too.

Much has changed about Brown over the years. He's older, of course; he'll be over 80 by the time he wraps up his tenure. Once impulsive, he's now far steadier. But there are philosophical throughlines in his long, complicated career, and one of the strongest is his devotion to the environment, an issue that some critics once mocked him for. Looking back, he seems more prescient than fringe.

Brown and Blueprint editor-in-chief Jim Newton recently discussed the governor's long commitment to the environment and his plans for addressing it in his final term. As with any serious conversation with Brown, their exchange was marked by his bracing candor and curiosity. And, too, it contained the governor's reflections on Catholicism, marriage and politics. There is no person in American politics who thinks like Jerry Brown.

Blueprint: *Environmental issues have been very important to you for a very long time. What first captured your attention about this area?*

Jerry Brown: The idea that there is an environment that we're a part of and can't be separated from, and that this environment can be degraded, impaired and altered in a very negative way, more than aesthetically but actually having to do with the vitality of living things and the whole way living beings all function, that this could be affected by decisions.

That was a rather startling thought to me.... Before the notion of ecology and environment, there was the notion of resource conservation. That's a very different idea. That's a partial idea: Let's protect the forest; let's protect Yosemite.

BP: *And a lot of that was conservation for future use, right?*

JB: Conservation, yes, but not just conservation for future use — conservation as applying to a very particular and limited piece of land or river or mountain.

The environment is a different concept. Ecology is an encompassing idea. "Eco" comes from the Greek word *ekos*, "house."

BP: *I didn't know that.*

JB: Yes. So does the word *ekos* in the economy, but the economy is *ekonomos* and ecology is *ekologos*. So this notion of all encompassing — that we live on a thin layer of soil under a narrow layer of atmosphere — that's kind of a new

idea; to me it was.... And this tallied with my interest in religion or philosophy or the pursuit of meaning, which is certainly a big part of me. It was what led me to go into the Jesuits.

Here we're not talking about Catholicism or God but we are talking about something that has the characteristics of an absolute. There are a lot of things that are rather relative; you can take it or leave it. You know, do you want a hamburger or a turkey sandwich? Do you want a Chevrolet, or do you want a Ford?

There's a lot of our affluent modern life where the choices are somewhat trivial. And therefore they don't inspire the kind of gravity and depth of feeling that spiritual, theological or religious ideas did to me. But the environment does, because you can wreck it.

The idea [is] that there are certain rules that don't admit of compromise. So you have to get on the side of nature, on the side of ecology. Ecology doesn't do what we want. We want to go buy a turkey sandwich today: "I want that one. Yeah, and would you please grill it?" That's different than saying, "Well, we're going to dump X amount of CO₂ into the environment for Y number of years, and nothing's going to change."

BP: And hope that nothing happens?

JB: You know it's going to be a disaster. So that area of life had the kind of uncompromising gravity that made it worthy of attention and study and careful consideration. So that's why the environment interested me, because some of the certitudes of pre-Vatican II Catholicism fell away, and in their

place I saw ecological certitudes.

We may not know what each law is, but we do know there are laws and that they do not admit of exception. In fact, there is a passage that I came across a long time ago, and it was quoted by

Gregory Bateson in "Steps to an Ecology of Mind," but it's from St. Paul to the Galatians, I think. It says, "God is not mocked." And in Bateson's view, he understands that the environment is not mocked. So that right there, you're comparing God and the environment. God is not mocked. You don't go against God. You don't go against the environment without bringing the consequences....

When you're in politics, you see — at least it's my experience — there are so many issues and so many points of view that as a successful politician you don't get invested deeply in many of the fighting opinions that you have to deal with....

If you want to have an eight-hour day, that's fine. And the conservatives who said no, that took away the right to contract, which is the right of property, and the Constitution says you can't do that. Oliver Wendell Holmes took the idea that many of these things are just matters of debate and opinion in a free society. And the court should limit its validating one side or another, except when the Constitution requires.

So that is true of a lot of stuff. I can enjoy reading conservative journals, National Review and The Weekly Standard. I can enjoy reading The Nation. I can enjoy reading Counterpunch. But there are all these opinions, and a) you can't always prove them; b) you don't know what the full consequences are going forward; and c) the total context of our society in the world is such that there's always plenty of unknown that would allow people of good will to hold thoughts of diametrically opposed opinions. So therefore it is a little foolish to latch onto one side or the other.

But when it comes to the fundamentals, [it's not foolish], and science would fit into that, and the environment now is very much grounded in science.

BP: In that sense, it's different from other areas of disagreement — abortion or capital punishment, say?

JB: All those things you can make a good opinion, you can make an argument for. There are very good arguments on both sides. And by the way, it's very hard to live with no opinions. That is why it's better to live with not just facts — because the facts are themselves constructs — but [also with] interpretations that are well grounded, well founded.

BP: Back to your point that the environment won't be mocked, that you can't defy the environment...

JB: Well, to go against nature, to go against the nature of things.

BP: But how do we know what the environment wants? I mean, what if the Earth wants to be warmer?

JB: Yeah, that's fine for the Earth. But for human beings it won't do.

BP: It's our relationship to that environment?

JB: It's human beings. The Earth is going on. It's been 4.5 billion years.

BP: It's going to be OK.

JB: The Big Bang is fine. But we won't be fine.

BP: These are issues you've been talking about for 30, 40 years probably, and early on they attracted some skepticism — "Governor Moonbeam" and all that. Do you feel vindicated by the way that the public has come around in areas like solar energy or satellite technology that once seemed so exotic?

JB: I don't find "vindication" a particularly apt word.



JERRY BROWN WAS ELECTED IN 1974 AND RE-ELECTED IN 1978.

BP: *What's the right word for it?*

JB: Well, *vindicated* would be: I was accused, and now I've been vindicated. I don't see it that way. Look, "Moonbeam" is a Royko [Chicago columnist Mike Royko coined the term] thing.

BP: *I remember.*

JB: But I did talk about space, the space satellite. At the same time, I had some interest that Stewart Brand wrote an article in Co-Evolution Quarterly on space colonies. And I did say my goal as president would be to protect the Earth, explore the universe and serve the people. That was kind of the distillation of my thoughts.

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But I can throw out ideas, and for a leader it's not the same as being a professor or being a provocative journalist. Leaders, if they don't stick within certain rhetorical realms, risk being perceived as not serious or reliable or predictable. And so I think when they said Moonbeam, it caught on because it just wasn't the space satellite that I proposed, which would have been a very good idea. But it's just a general approach. It could have involved Linda Ronstadt. It would have involved — I don't know — other things. So it wasn't just, "I'm for solar energy."

BP: *Got it.*

JB: It was a kind of a gestalt that he [Royko] latched onto, or he invented. I do jump into things, and I'd have to say there's a little dilettante element in that critique, and I think that's reasonable. You know, I had Stewart Brand, we hired him just to bring people through the office. We had Ken Kesey give a talk....

That is different from, for example, George Deukmejian. He's a sober, serious man... who shows up and has his normal wife and house and is relatively durably placed and positioned within his conservative framework. So I was more a little bit episodic....

If the idea is that I didn't apply myself with the degree of diligence that

one could expect, I think that's a fair criticism. But it's true, maybe a little bit of sampling things. And I've been kind of — I get bored with things. And I got bored with different things.

It's interesting. That's why I was rather reluctant to get married. And I certainly didn't want someone who I was very much in love with and excited and then get bored a few months down the road and have kids and alimony and everything. But the funny thing is I've never been bored one day with my wife. Every day is exciting.

BP: *That's good.*

JB: It's a miracle. But it came a little late, very late to the party, too.

BP: *Better late than never.*

JB: I do find that there is something about ideas, and I do get very excited about ideas.

BP: *And that's really what I was driving at.*

JB: And so a lot of people — growing up, I can remember my sister Alice, she had a question once. I said, "Well, if it's a venial sin to steal a penny, what if you steal two pennies? When does it become a mortal sin?" And she said, "Do you stay up nights trying to think of these questions?"

I don't know why I do; I have questions. I had a lot of questions then; I have a lot of questions now. And that can be somewhat diversionary.

BP: *My point wasn't so much to zero in on the word "vindicated" — so I'll move away from that — as to ask about some of the ideas that went into that characterization.... But the other piece of that is the ideas upon which that critique was based. So advocacy of solar power, using satellite technology, colonizing space; those ideas seem much more —*

JB: The wellness commission.

BP: *The wellness commission. Those all seem much more contemporary today.*

JB: They are contemporary.

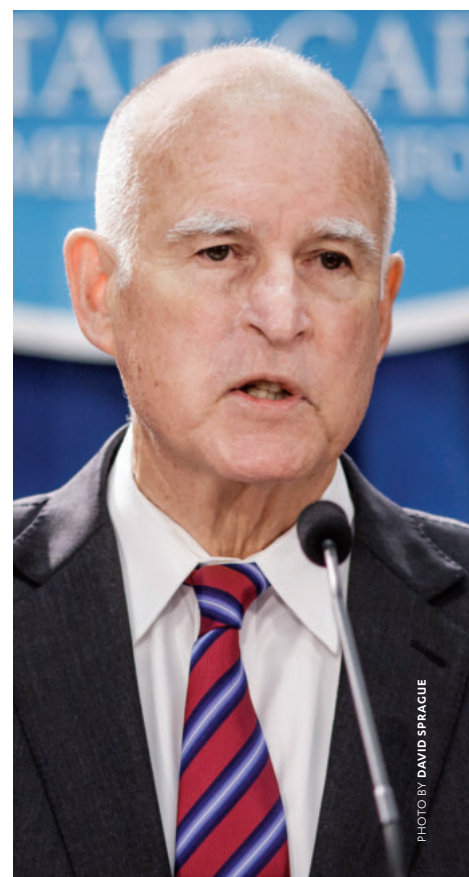


PHOTO BY DAVID SPRAGUE

BROWN, NOW 78, IS THE OLDEST PERSON EVER TO SERVE AS CALIFORNIA'S GOVERNOR.

BP: So forget whether that's vindication or not. Do you feel like some of the things you were talking about in the '70s, particularly as they relate to environmental consciousness, now have come to fruition, that they are now more generally accepted?

JB: I think I was on the right track. And I've stayed on that track. And therefore, both because these ideas tallied with reality, but also because I am perceived as consistent, that gives more gravity, whereas before it was a little more of the grasshopper jumping.

BP: Let me read to you from the speech you made at the Vatican recently. You said: "There are many challenges, but a fundamental challenge is our inability to imagine where we could end up if we don't take the measures that we have to. It's hard to imagine catastrophe; it's hard to imagine extinction." And yet, as you say, the possibility of extinction is real.

JB: It's very real.

BP: So my question is: How do you talk about extinction without sounding like a nut?

JB: It's very difficult. One of the ways you do it is you go with Nobel scientists. ...They're talking about the Doomsday Clock. That's talking about it. It's not me, it's people who have been talking since World War II. Oppenheimer was very concerned. Same thing with Einstein when he said, "Everything has changed but our thinking." So we have the ability to create extinction, but our thinking hasn't caught up with it.... We can't imagine the evil of extinction.

occurring or that human beings are responsible for it?

JB: People can't imagine it. We can't imagine it. Could the Muslims in Srebrenica imagine they would be rounded up and shot? They would have gotten the hell out of there. Couldn't imagine that.

Could the people in Hiroshima imagine that they were going to get an atomic bomb? People in Nagasaki?

But there it is. We don't imagine — or it's hard to imagine because it's something that threatens our particular attitude and way of life. And it's been branded by commentators, anti-climate change commentators, as leftist. Leftist, liberal, Obama.

In their view, it's bad people who are doing bad things, threatening the free enterprise, God-given, American, Western way. So it's almost like telling the Romans that no, it's time to become Christian and put away all your gods. It's very threatening. It's a paradigm change for these people.

So the authority figures — if you look at the Republicans — they've closed ranks. Maybe from the liberal point of view, some of it is political correctness: You can't deviate from that. You'll pay a high price if you do. If you have an open debate.

BP: It is a shame certainly for the responsible management of this issue that it becomes associated with one political party or one ideology. There is no liberal environment or conservative environment, right? I mean, it's ultimately not a political question.

JB: But it does take rules: Energy efficiency, tailpipe emissions or requiring

"IT'S HUMAN BEINGS. THE EARTH IS GOING ON. IT'S BEEN 4.5 BILLION YEARS..."

BP: And climate change is potentially as devastating?

JB: Climate change is slower. The trouble with climate change is that you can pass tipping points, and down the road it is going to be enormously difficult and expensive to change with all the embedded infrastructure. Enormously difficult. Even though today it's relatively trivial. To de-carbonize the economy, even though it's massive and would take trillions of dollars, it could be done. But it would take a real mobilization....

And there's an industry of denial, of manufactured skepticism, all for short-term gain, or because of an ideological fear of more regulation that will curb unfettered market behavior or individual consumption. So people don't want to believe there's an absolute out there called the environment, called the climate system. But we know there is. We didn't make the sun shine today. It was raining for a couple days. We didn't do that. So what made that? What made that is the whole atmospheric chemistry.

Now, can 7 or 9 billion people, can several billion cars and coal plants affect that? Most of the scientists say yes. And if they can, how are we going to un-affect it? See, that's the simple-minded thing. Up until 1850 you never had more than a billion people. And what did they do? Run around in their little clothes and with a little bit of gunpowder here and there.

Now we have massive technology. The human impact is multiplied, is unimaginably greater. But the human capacity for wisdom has not improved an iota. So there's the problem.

BP: What do you make of the fact that there is a significant chunk of the American people who do not believe either that climate change is

zero emissions — those are regulations. Regulations generally are bad. "Government is the problem," Ronald Reagan said, "not the answer." So if the government's the problem, then this climate change story is just a call for more government. More problem, not more solution.

BP: I was recently at an event with Gov. Pete Wilson, and he was making the point that he believes — and many people believe this, I think — that California's regulatory attitude with respect to the environment, climate change in particular, puts it at a relative disadvantage to places like Oregon or Nevada in terms of trying to bring new business in. Therefore economically this is hurtful to California. I assume you disagree.

JB: Well, that's a comment. Let's assume we're just two guys at the bar, and that's what you say. I say the opposite. What does that mean?

BP: [LAUGHING] Right.

JB: California's a \$2.2 trillion economy. You've got that, and you've got this, you've got Uber, you've got space missiles, you've got farmers, you've got marijuana growers. You've got the University of California, you've got the L.A. Times. This is a complex world.

Now, are you saying because of regulations that we're at a disadvantage to Oregon? First of all, Oregon is going to have certain advantages. Nevada has space; you do a lot of warehouses, and maybe Nevada has a tax advantage. But there are all sorts of positives and negatives that people calculate. Why doesn't Silicon Valley move to Reno? Or to Corvallis? It hasn't. Is it

growing? It's growing as rapidly as ever....

So that's a general statement. I think you have to ask: What rules do you want gone, which ones? But here's the point on climate change: If we do nothing, that's not going to help advance the ball.... What is the disadvantage? We've created — 2 million jobs have been created in California, and the percentage growth is greater than the nation's. Compare California in the last 10 years, our growth rate is higher.

So it has benefits, and it has burdens. But when he [Wilson] says that, it's because there are a lot of local rules. A lot of local rules. And yeah, these are problems. But OK, they're problems. I agree with you. But it's easier to build in Texas. It is. And maybe we could change that. But you know what? The trouble is the political climate, that's just kind of where we are. Very hard to — you can't change CEQA [the California Environmental Quality Act].

BP: Why not?

JB: The unions won't let you because they use it as a hammer to get project labor agreements. The environmentalists like it because it's the people's document that you have to disclose all the impacts. And, of course, the developers have a problem because "impact," boy, that's a big word. Everything's an impact. I pound on the table, that's an impact [POUNDING ON THE TABLE]. You know what I mean?

So there's a lot of stuff here: Stanford, there's [Hewlett] Packard, there's [Steve] Jobs. Why did Facebook come out here? There are a lot of bright

BP: A little Fiat.

JB: How many miles?

BP: It gets about 80, maybe 80 to 90 on a charge....

JB: It'll get better because we're in the early frontier. So it is technical, but it's also — what's the other word?

BP: Political.

JB: It's political. We have 26 states fighting Obama's clean coal, clean air regulations. Why? You need them. And a lot more. It's vital for their children, their grandchildren, at least.

We're looking at 2050. It's not that far away. 2050 is what, 35 years away? ... Thirty-five years ago I was governor of California. That's not very long. That's not very long at all. It's pretty scary. But the political is a problem. And why are they all locked in?

A lot of this stuff, the way we form opinions is only in part based on the evidence. A lot of it's who thinks what and who do we identify with. Identity is a big thing. Identity. Identity can be gay, the LGBT, that's how you identify with that. Black Lives Matter, La Raza, the conservative movement, the left. Those are all identity brands.

And people say, "What does it mean to be on the left?" And you check that out. "OK, that's what I think." What does it mean to be on the right? People read The National Review, or they read The Weekly Standard, and they feel comfortable. Those people don't read The Nation.

THE BIG BANG IS FINE. BUT WE WON'T BE FINE."

people. And by the way, Silicon Valley doesn't always have to expand. I'm sure there'll be limits. There's always a limit to every culture. Toynbee is somewhat discredited, but his whole idea of challenge and response: You have a challenge, and the response builds the civilization. But then somebody else comes along. So that can be true of California. We're not going to be the same state we were in 1860 or 1910 or 1940, before World War II and the Space Age. Stuff happens. There's historic momentum.

BP: As you look forward on the issue, particularly, of climate change, are the obstacles that you see toward getting to a successful place in terms of our relationship with the environment technological? Are they political? Are they philosophical?

JB: They're both.

BP: All of that?

JB: Well, they're technical because you need to get more efficient buildings, you need to get more efficient cars, you need to invent things. We need to invent biofuels. You need to invent lighter, more durable, more efficient batteries. If we can invent the right kind of battery, that would displace the normal car. Somebody just told me he thinks in five years or thereabouts the combustion engine will be obsolete.

BP: I just bought an electric car. I must tell you, I don't want for a combustion automobile at all.

JB: What kind of a car?

BP: Right. When they turn on the television, they watch Fox News, or they watch MSNBC. They identify.

JB: And I think generally people like to have their own place in the world reinforced.

BP: Which is all well and good, as you said earlier, when it's in areas where people of good will can honestly disagree. It's more problematic when it butts up against something absolute, when it butts up against —

JB: Right, but they don't consider that. First of all, do we really know? Do I understand [everything about] climate modeling? No. And it's very complex....

All I can say is when I talk to people, climate change fits with my point of view. So then it could be a little bit despairing that there is no objectivity and there's no way to agree. There's only a way to fight.... Generally, I never feel I fully understand things. So that's why I... have a tendency, an inclination to probe.

[Author Carl Schmitt] talks about how the political is all about the distinction of friends and enemies. And whatever he once was — he was in Germany and had a role under the Nazis for a couple years before he retired into a more privatized world — he writes thoughtfully about "friends and enemies."

It's not, "What are the facts?" [Instead, it's,] "Which side are you on? Which camp?" "Pete Wilson, what camp are you in?" "Tom Hayden, what camp are you in?" Or who's the head of the Sierra Club? Or whatever. They have camps. And then they fight. ▀

CLOSING NOTE:

Time's A-wasting



CLIMATE CHANGE IS REAL. The Earth is getting warmer, with profound implications. The cause is humanity. In order to sustain anything like our current way of life, humans must respond forcefully — as individuals and as part of a larger social and economic revolution.

Those are the sobering verdicts of this magazine's featured work. As Gov. Jerry Brown notes here, confronting the reality of climate change requires nothing less than contemplating the possibility of human extinction. And addressing this crisis is made even more complicated by its incrementalism. Because climate change is gradual and its most profound effects won't be upon us for some time, the temptation to delay, especially in the face of so many other pressing problems, is overwhelming.

How, then, should policymakers raise awareness of the issue and implement ideas for change? That is the fundamental question posed by the three pieces of research highlighted in this issue. Pricing seems one obvious solution: People waste less if it costs them more. The problem, as researchers Magali Delmas, Noah Goldstein and others have discovered, is that energy is so cheap for most Americans that even raising its price considerably may not much affect behavior. Instead, Delmas and others are experimenting with different cues — notes that compare a homeowner's energy usage to that of neighbors or reminders of how much a consumer is contributing to environmental degradation. Not exactly

shaming, but pointed comparisons that get more of a reaction than a few extra dollars on a monthly bill.

Similarly, J.R. DeShazo works closely with governments to assess ways to induce people at all income levels to switch to cleaner technologies, whether in their homes or the cars they drive. Some of that is monetary — tax rebates for electric cars to bring down their price, for instance — but it also involves thoughtful public investment. Free charging stations, to cite just one example, may be more important to some consumers than a low sticker price. DeShazo and his colleagues have compiled extensive research comparing those incentives and investments and offering guidance for officials contemplating what to do next.

And then there is the need, as is the case in almost all policy discussions, for clear and solid information. How can leaders reduce energy consumption without knowing who is using it and how it's being wasted? That was the idea behind the Los Angeles County Energy Atlas, an interactive website that charts energy use and supplies policymakers with information they need to target excess consumption and encourage conservation. The Atlas already is up and running, and researchers eventually hope to expand it to the entire state.

As Mary Nichols notes in our profile, the world's industrial model worked wonders for a while, but it's fast approaching the end of its utility. To thrive, perhaps even to survive, humanity needs to change course, and soon. The changes required to prevail over a warming planet become more difficult as time goes by; small changes now could avert severe ones later.

If our grandchildren are to live lives comparable to our own, those changes need to begin now, guided by the ideas expressed in these pages.

— **Jim Newton**



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SENIOR ADMINISTRATION

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EDITORIAL STAFF

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USER EXPERIENCE DESIGNER
Heather Henderson

OUTREACH COORDINATOR
Elizabeth Kivowitz Boatright-Simon

OFFICE MANAGER
Oriana Luquetta

CONTRIBUTORS

BILL BOYARSKY was a political reporter, columnist and editor at the Los Angeles Times for 30 years and now is a columnist for Truthdig, the Jewish Journal and LA Observed.
bwboyarsky@roadrunner.com

LISA FUNG is a Los Angeles-based writer and editor who has held senior editorial positions at the Los Angeles Times and The Wrap. This is her second article for Blueprint.
lisa.fung5@gmail.com

CARLA HALL is an editorial writer at the Los Angeles Times.
carla.hall@latimes.com

KATHLEEN KELLEHER is a Santa Monica-based writer who has written for the Los Angeles Times, the Orange County Register, Arroyo and other publications.
kathykelleher@verizon.net

MOLLY SELVIN was a staff writer for the Los Angeles Times for 18 years and is now a research fellow at Stanford University.
mselevin@stanford.edu

ZACHARY SLOBIG is an independent journalist and current Pulitzer Center Fellow based in San Francisco. His work has appeared in WIRED, NPR, the Los Angeles Times, Outside, GOOD and others.
zslobig@gmail.com

NONA YATES, a former research editor at the Los Angeles Times, heads the Yates Research Group in Marina del Rey. She can be reached at
nona@yatesresearchgroup.com

FEATURED RESEARCHERS

ANN CARLSON
carlson@law.ucla.edu

MAGALI DELMAS
delmas@ioes.ucla.edu

STEPHANIE PIN CETL
spincetl@ioes.ucla.edu

J.R. DESHAZO
deshazo@ucla.edu

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— **Jim Newton**

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SOMETHING TO SAY?

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