

A photograph of a wind farm with many white wind turbines in a dry, hilly landscape under a clear blue sky. The turbines are shown from various angles, some with motion blur on their blades.

UCS

Catalyst

Volume 16, Spring 2017

**Clean Energy
Momentum**

Ranking State Progress

**UCS Supporters
Get Creative**

Self-Driving Cars

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The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems. Joining with citizens across the country, we combine technical analysis and effective advocacy to create innovative, practical solutions for a healthy, safe, and sustainable future.

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[FIRST PRINCIPLES]

Facing Down the Wrecking Ball



By Ken Kimmell



The wrecking ball that is the Trump presidency is taking aim at so many important victories we have achieved together. Just recently, the Trump administration has taken initial steps to weaken or repeal fuel efficiency standards for cars as well as the Clean Power Plan—the nation's first-ever limits on carbon dioxide emissions from power plants. And what the administration can't kill with rollbacks, it is trying to eviscerate with severe and misguided budget cuts to key science-based agencies including the Environmental Protection Agency, National Oceanic and Atmospheric Administration, and Department of Energy.

But a resistance is forming, far and wide, from the “fact-based” community—those of us who insist that evidence and science undergird our policies across the board, not only on climate change but also on immigration, health care, reproductive rights, nutrition, and many other issues. That community showed up in droves at the Women’s March the day after the inauguration and at the airports when the president’s Muslim ban was announced. And now, as we go to press, that community is readying to come together again in hundreds of events on April 22 for the March for Science and on April 29 at the People’s Climate March in Washington, DC. I am proud that the Union of Concerned Scientists is partnering with both of these events and that so many of our staff members and supporters will be in attendance.

I joined the 2014 climate march in New York City, and I saw firsthand how that march helped galvanize public support that paved the way for the international agreement on climate change reached a year later in Paris. The gains from that very agreement are now threatened and, for that reason and many others, we must join together to march again; we must form a giant human barrier in the path of the wrecking ball to stop it before lasting damage is done. And then we need to sustain that energy to continue our resistance, standing up for facts, evidence, and the science-based safeguards we all depend on. [\(C\)](#)

Ken Kimmell is president of UCS.



WHAT OUR MEMBERS ARE SAYING

Here's a sampling of recent feedback from the UCS Facebook page (www.facebook.com/unionofconcernedscientists)

IN RESPONSE TO PROPOSED CUTS TO THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

f Hugh Weymouth:
Defunding NOAA is like putting a blindfold on and earplugs in when you've got a tornado coming.

f Robert Headley:
Cutting NOAA's budget will affect its ability to predict dangerous weather. What an incredibly stupid place to cut funding.

f Patrick Lane:
I was in the Navy for six years. We relied heavily on weather forecasts for our day-to-day work as well as jobs where the weather could pose a serious threat to our safety. This is heinous! Weather affects millions of people's lives all across the US and the world.

IN RESPONSE TO OUR NEW SECURE PORTAL FOR REPORTING ATTACKS ON SCIENCE (SEE P. 5)

f Mark Gall:
This is a sad time when scientists are threatened with their jobs—all for telling the truth.

f Bill Schmidt:
Good for the Union of Concerned Scientists for providing this information.

IN RESPONSE TO PROPOSALS TO WEAKEN FUEL ECONOMY STANDARDS—AND OUR CALL TO ACTION

f Dan Cohan:
Thank you UCS! It is extremely beneficial for the public to become fully aware of the anti-science, anti-environmental, and anti-climate change actions from Scott Pruitt and the Trump administration.

f Joan Schaefer Richmond:
If they think we are going to buy cars from companies that aren't working toward reasonable air quality standards, then they are going to be shocked, SHOCKED, I say, at their sales numbers.

f Rebecca LeBlanc:
Just sent my LTE [letter to the editor]—this was a great idea! Thanks for making it so easy to do!

IN RESPONSE TO OUR LIVE PANEL DISCUSSION AT THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE CONFERENCE IN FEBRUARY

f Francisco Lacerda:
Tried to get in the room but it was completely full. Waiting outside to get in an additional room with webcast. Me and several hundred colleagues! The scientists' commitment to these important issues is quite reassuring!

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A new UCS analysis finds renewable energy momentum in many surprising places.

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Marching for Science and Climate Action



Supporters of science rally in front of the White House in March 2017, to protest the administration's attempts to weaken or eliminate important science-based policies. Alden Meyer, UCS director of strategy and policy, was one of several speakers at this event.

As we go to press on this issue of *Catalyst*, the Union of Concerned Scientists is preparing for a week of science activism bookended by the March for Science on April 22 and the People's Climate March on April 29—with many activities in between. We anticipate that both marches will help register the widespread public outrage at many Trump administration policies and showcase broad support for science and climate action. Among the scientific community, we have rarely seen the level of motivation and engagement as high as we have heading into this week of protest.

UCS is playing a role as a cosponsor of both events. The April 22 March for Science, which grew organically (snowballing from a discussion involving a few enthusiastic people on Reddit.com), is expected to be one of the largest demonstrations for science ever held, with a rally and teach-in on the National Mall in Washington, DC, as well as hundreds of satellite events across the country and

around the world. Among other things, the organizers are planning to shine a spotlight on the role science plays in all our lives and in shaping decisions and policies that affect us all.

The April 29 People's Climate March, similarly expected to draw huge diverse crowds calling for action on global warming, is being organized by the People's Climate Movement, the same group that organized the September 2014 march on the eve of that year's UN climate summit. That event drew some 400,000 people from every walk of life to the streets of New York City, demanding action to address the global climate crisis and helping to reboot the climate movement in this country.

Especially given the unprecedented efforts by the Trump administration to roll back key measures protecting our health and environment, UCS believes that visible public action—from marches and rallies to teach-ins and protests—can play an essential role in drawing public

attention to urgent issues, energizing participants, and helping to shape public opinion. That's why many UCS staff and members are planning to participate.

But we also know that, to be truly successful, these types of events must be followed by sustained action, including speaking out in all forms: communicating with elected officials by calling, writing, and visiting their offices; penning letters to the editor of your local newspaper; and engaging your friends, family, and neighbors. You can find a variety of tips and tools for doing just that at the UCS Action Center (www.ucssusa.org/action-center).

Whether or not you participated in these powerful demonstrations, we are grateful for your support and hope you will continue to make your voice heard. We need you standing with us as we keep up the pressure for climate action and in defending the role science plays in crafting policies that protect our health and safety.

UCS Builds a Secure Portal for Reporting Attacks on Science

Since 2003, UCS has actively worked to expose political interference in science and defend the integrity of science in policymaking. To fulfill this watchdog role, we depend on sources who have knowledge of what's happening within government—including federal government employees and their associates who often play a vital role by speaking out when they see suppression or distortion of science taking place.

Today, as science-based policy-making and public access to scientific information face the most overt threats in recent memory, those aware of abuses need a safe and secure way to report them. Toward this end, UCS has established several ways for whistleblowers to communicate with us.

One makes use of an encrypted email service called ProtonMail, developed by MIT and CERN scientists, that uses servers in Switzerland. Because ProtonMail does not require authen-

tication, message senders can remain anonymous as long as they avoid linking their ProtonMail account to a cell phone or email account when signing up for the service. Federal scientists or others with sensitive knowledge can send documents, datasets, or other information to UCS via ScientificIntegrity@protonmail.com.

By sharing information you may have about attempts to diminish or destroy agency scientific libraries or library content, to suppress or distort science in the policymaking process, or to prevent scientists from publishing their research, we can help bring public attention to these issues and fight back together. But we also urge whistleblowers to adequately protect themselves from repercussions or retribution.

For more advice on how to share firsthand knowledge you may have of political interference in science, visit www.ucsusa.org/secureshare.

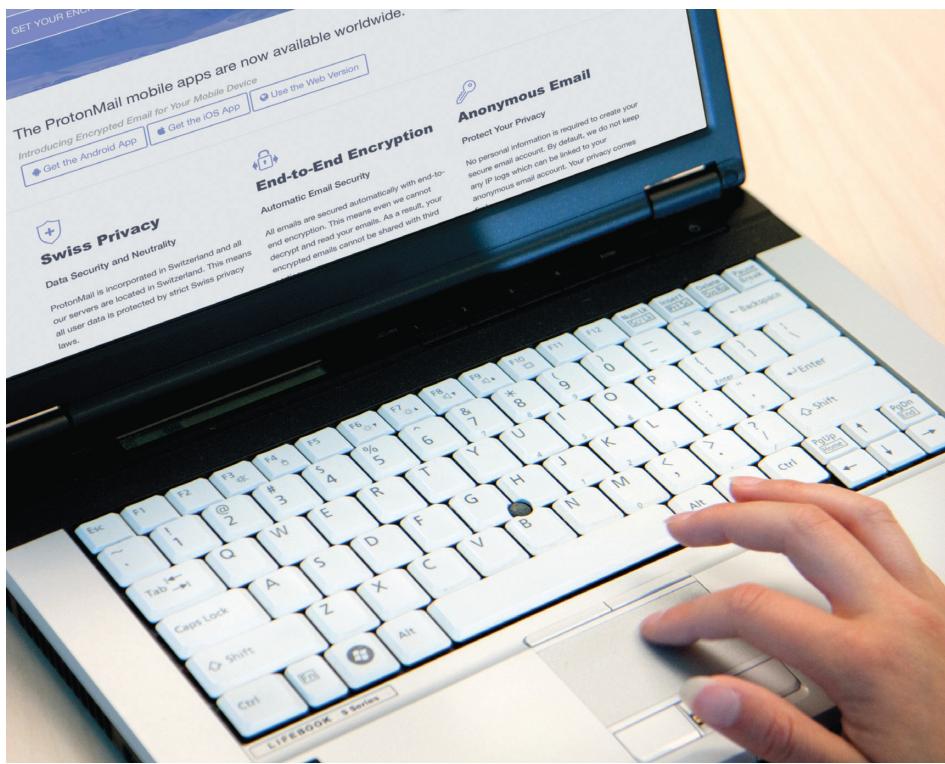


Photo: lifestylepics/Alamy Stock Photo

Join the Call

At UCS, we're committed to upholding hard-won protections of Americans' health and safety, fighting for policies that combat climate change, and defending the vital role science plays in our democracy. In each of these areas, the Trump administration is actively seeking to overturn many important changes we helped achieve over the course of decades. UCS is responding with a powerful combination: the enduring power of science and a highly energized community of scientists and others.

UCS will host a conference call for our members on **Wednesday, June 7 at 3:00 p.m. EST** to discuss the organization's efforts to stand up for science in response to actions taken by the Trump administration and Congress. Please join UCS President Ken Kimmell as he leads a conversation with UCS experts (including Gretchen Goldman, research director in the Center for Science and Democracy at UCS and coauthor of the January report *Preserving Scientific Integrity in Federal Policymaking*) about how the organization is putting science into action and fighting back against the unprecedented attacks on science by our federal government.

Get the toll-free phone number when you reserve your space for the conference call at www.ucsusa.org/membercall.

UCS West Coast Office Marks 25 years



UCS staff members Adrienne Alvord and Jason Barbose celebrate at the California state house in 2016 after passage of newly strengthened global warming emissions reduction targets—targets UCS helped shape and support.

Back in 1992, when the only UCS offices were located on the East Coast, a talented UCS transportation analyst asked to continue working for the organization from California after her partner got a job in Berkeley. She argued persuasively that California would be a great place for a UCS outpost: the state was poised to set emissions standards for vehicles that would be stricter than the federal government's, and she saw the potential for UCS to play a role in helping the state demonstrate environmental leadership in that area and others. Plus, with UC Berkeley, Stanford, and Lawrence Berkeley and Lawrence Livermore National Laboratories anchoring a large science and research community in Northern California, UCS already had a robust membership base in the state.

The organization saw merit in the idea and the UCS West Coast office was born. Twenty-five years later, the prescience of that plan couldn't be clearer.

From air quality and climate change to renewable energy, the UCS West Coast office has played a key role in an impressive succession of trailblazing victories, helping California promote the adoption of low- and zero-emission vehicles, pass legislation to lower heat-trapping carbon emissions, and create a robust market for renewable energy. In particular, UCS

played a key role in passing three successively more stringent renewable energy standards and, in 2006, the landmark state law AB 32—the nation's first economy-wide carbon reduction law.

Back then, UCS batted back dire predictions that the emissions reduction policies we championed would result in economic ruin for California. Since then, the numbers speak for themselves: California is the world's sixth largest economy—up from eighth a decade ago. Petroleum consumption is down despite population growth, emissions are down and on track to meet the state's 2020 goals, employment is up, and the state economy is strong. In other words, we have solid evidence to show that environmental leadership has helped

promote economic growth, not inhibit it.

Today, the UCS West Coast office has many more ambitious plans on the docket, including pathbreaking work that shows how a high percentage of renewables can be seamlessly integrated into the electric grid, points the way toward a climate-resilient infrastructure, and encourages the adoption of sensible water policies in California. In addition, our work in Oregon and Washington is building toward a region-wide price on carbon emissions.

We are proud of what our West Coast colleagues have accomplished with your support, and expect their efforts will continue to point the way forward for the rest of the nation and the world in the decades to come.

Introducing the Got Science? Podcast



Have you caught episodes of the new UCS podcast yet? Recent installments find our engaging correspondents tackling a variety of hot topics—from federal science under President Trump, to self-driving cars, to the relationship between science and environmental justice.

With guest spots from all-star UCS staff and scientists around the country,

Got Science? explores topical and timely issues, and keeps you up to date on what's happening at the intersection of science and policy.

New episodes are released every two weeks. Browse and listen for free at www.ucssusa.org/podcast, or find us on iTunes—or whichever app you use.

UCS Finds Serious Safety Culture Problems at the Nuclear Regulatory Commission



The Nuclear Regulatory Commission (NRC) regularly reminds nuclear power plant owners of the importance of a positive safety culture—defined as a “collective commitment...to emphasize safety over competing goals to ensure protection of people and the environment.” As the NRC itself notes, safety suffers when plant workers are unwilling to raise concerns because they believe they will be ignored or, worse, retaliated against. Some plants with a poor safety culture

have developed problems so severe that their reactors had to be shut down for more than a year.

According to a recent UCS report, however, it is not enough for plant owners to foster a positive safety culture; the NRC itself must do the same. The report, *The Nuclear Regulatory Commission and Safety Culture: Do As I Say, Not As I Do*, draws on internal survey results and other data to show that the NRC’s own safety

culture needs attention. For example, while three-quarters of senior and middle-level managers at the NRC report having a positive opinion about the agency’s processes for handling differing viewpoints, less than half of the NRC’s workers share that outlook.

According to Dave Lochbaum, the report’s author and head of the UCS Nuclear Safety Project, for the NRC to effectively do its job, its staff must be confident they can report any problems they observe without reprisal and know the agency will address them. But Lochbaum says the “evidence suggests that conditions within the NRC are as bad as—if not worse than—those existing at the nation’s troubled nuclear plants.” Just as plant owners have downplayed and dismissed clear and present signs of safety culture problems, the data suggest that NRC management is just as dismissive of similar indicators within the agency. As Lochbaum puts it, “When it comes to chilled work environments, the NRC may have the largest refrigerator in town.”

For more details, read the full report at www.ucsusa.org/nuclear-power.



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store.ucsusa.org



CLEAN

**NEW UCS ANALYSIS SHOWS THAT RENEWABLE ENERGY
IS RIDING A WAVE OF MOMENTUM IN STATES ACROSS THE COUNTRY.
WHICH STATES ARE LEADING THE WAY TO A CLEANER FUTURE?**

ENERGY TAKES HOLD

BY BRYAN WADSWORTH

Across the United States, falling costs and improving technology are driving record growth in renewable energy. Consider the astounding surge in solar power: in 2016, the amount of new solar power coming online nearly doubled from the previous year—enough to power 2 million typical US homes. For the first time ever, solar energy accounted for more new electricity generating capacity than any other resource. And with more than 50,000 new jobs added last year, solar energy now accounts for nearly twice as many electricity sector jobs as all fossil fuels combined.

Recent analysis by the Union of Concerned Scientists crunches all these numbers—and many more—to determine which states are driving clean energy momentum. One key finding: support for renewable energy transcends our nation's divided politics. The Trump administration may have installed former fossil fuel industry insiders in key positions of power, but the decisions states have made about their energy future tell a very different story about where our electric sector is headed.

Wind and solar energy are winning in the marketplace even in states whose leaders haven't explicitly championed the health and climate benefits. To be sure, many coastal, urban states are showing strong clean energy growth. But solid-red states in the heartland—Idaho, Iowa, Kansas, North and South Dakota, and Wyoming—also rank among the clean energy leaders by some measures.

Texas offers another powerful example. Politicians in the Lone Star State sought to encourage competition in 1999 by deregulating the state's electricity market, setting a modest target for clean energy generation. The boom in wind power they spurred led state legislators to raise the renewable electricity standard in 2005, and Texas sped past that revised target 15 years

Wind and solar energy are winning in the marketplace even in some surprising places.

ahead of schedule. It now leads the nation in wind capacity, with almost three times as much as any other state. And last year, when the Texas electric grid operator looked at a range of scenarios to determine its cheapest source of electricity for the next 25 years, solar power came out on top *in every scenario*. In other words, the people responsible for supplying Texas with its electricity are now predicting that the state can meet its electricity needs without adding any new fossil fuel capacity.

In Texas and elsewhere, states are finding that shifting from dirty fossil fuels to renewable resources brings real benefits: new revenue and jobs for communities in need of both (see the sidebar), improved public health through better air and water quality, and a more stable climate. What's more, smart clean energy choices can lessen the negative impacts of fossil fuel power that are particularly felt among communities of color and low-income households, which are often located close to polluting power plants, more sensitive to energy price spikes, and vulnerable to flooding.

RANKING THE STATES

Accurately charting state momentum on clean energy—to determine who the leaders are—is a bit trickier than it might seem. You could of course measure how much installed renewable



Hawaii leads the nation in residential solar power projects. Tapping into renewable energy not only reduces electricity costs but also creates jobs in local communities.

energy capacity a state has already put into place, and how it's doing on energy efficiency. But to get a sense of where a state is headed, you also need to track how much renewable energy has come online recently, and how much capacity is being built. A variety of other measures merit consideration too, such as whether a state has an ambitious renewable electricity standard, how many clean energy jobs it has added, or even the amount of airborne pollution from power plants a state has managed to reduce through its energy choices.

The new UCS analysis *Clean Energy Momentum: Ranking State Progress* (online at www.ucsusa.org/EnergyProgress) takes an in-depth look in order to give credit where it is due on a range of variables. The result is a unique, easy-to-understand scorecard that assesses all 50 states on 12 different metrics—and finds a heartening amount of clean energy momentum even in some surprising places.

CAN PRESIDENT TRUMP STALL CLEAN ENERGY'S MOMENTUM?

In March, President Trump signed an executive order aimed at dismantling the Clean Power Plan, a 2015 policy that had incentivized the growth of renewable energy by requiring states to lower carbon emissions. It's unclear how effective this effort will ultimately be but, no matter what, it can't change the reality that clean energy is a bright spot for the US economy, providing more full- and part-time jobs in the electricity sector than natural gas and more than twice as many as coal. The rapid expansion of solar power jobs is particularly noteworthy, tripling since 2010.

Equally important, these are good-paying jobs that benefit people in all walks of life: solar installers earn on average \$26 per hour, and wind turbine technicians—projected to be the fastest-growing occupation from 2014 to 2024—earn on average \$48,800 annually. Neither job requires a four-year college degree, and they are available to people in rural and low-income areas. Solar and wind power also employ Hispanic or Latino people and veterans at higher rates than the overall US workforce. Plus, the solar and

wind sectors are winning support in diverse quarters. Farmers and cattle ranchers, for instance, like that they can continue to run their businesses while generating substantial extra revenue by leasing small pieces of their land for wind turbines.

Backing like that helps boost bipartisan support for clean energy and keep its momentum going. On February 13, a group of governors comprising 12 Democrats and eight Republicans sent a letter to President Trump asking him to “strengthen America’s energy future” by extending government support for a modernized electricity grid, offshore wind, and more research. The letter noted that 70 percent of US wind farms are located in counties with below-average incomes, and urged that any major infrastructure bill put forth by the Trump administration include funding for an electricity grid that is more secure and can accommodate more renewable energy.

Given the foothold solar and wind power have gained in solidly red states, the president could pay a steep political price if he doesn’t heed the governors’ advice.

Here are some highlights:

Largest increase in percentage of renewable energy:

Kansas tripled its wind power production between 2011 and 2015. Wind power also propelled Maine, Iowa, and Oklahoma to top rankings by this measure.

Renewable energy capacity now being built: Wyoming leads the nation with 1,600 watts of new renewable energy capacity per capita under way, followed closely by North Dakota with more than 1,000 watts.

Increases in state renewable electricity standards: New York and California rank first, each having pledged to produce an impressive 50 percent of their electricity from clean energy sources by 2030.

Residential solar capacity per household: Hawaii is the runaway winner, as abundant sunshine and the highest electricity prices in the nation have encouraged one in seven Hawaiian households to install rooftop solar panels. California comes in second (and boasts the nation’s highest total capacity of residential solar power overall). It’s also worth noting that some states not known for their sunshine, such as Massachusetts, New Jersey, and Vermont, also rank in the top 10.

Renewable energy jobs: Nevada leads in solar power jobs per capita, North Dakota in wind power jobs, and Vermont in energy efficiency jobs. Massachusetts, however, ranks first in

clean energy jobs overall based on strong results in both solar and efficiency.

Reducing pollutants: New Hampshire and Delaware lead the nation in percentage reductions of airborne pollutants, while Rhode Island and New Jersey boast the lowest per capita emissions of sulfur dioxide, which contributes to toxic smog. Vermont has the most aggressive target for reducing the heat-trapping carbon emissions that drive global warming—a 60 percent reduction below 2005 levels by 2030—followed by Oregon at 50 percent.

Adoption of electric vehicles (EVs) and plug-in hybrid vehicles: California is miles ahead, with EVs or plug-in hybrid vehicles now accounting for more than one of every 30 new cars sold last year in the state.

PUTTING IT ALL TOGETHER

As these data show, clean energy is taking hold around the country. But which states are showing the most progress overall? That requires further analysis. For instance, despite Texas’s unquestionable success with wind power and its status as a clear national leader in total wind capacity and jobs, the state does not rank among our winners because it has more work to do to boost clean energy as a percentage of its overall electricity mix. And, in the years since Texas met its renewable

(continued on p. 21)

Pollution Affects Americans Unequally

INTERVIEW WITH ROBERT BULLARD

You are often called the “father of the environmental justice movement.” How do you define environmental justice?

ROBERT BULLARD: Environmental justice centers on fairness, equity, and particularly racial justice. For decades, the movement has worked to make sure that all communities—especially communities of color and low-income communities—are given equal protection. We have environmental laws on the books in the United States, but they’re often not applied and enforced equally.

Environmental justice emphasizes the fact that poor people and people of color get more than their fair share of things that other people don’t want: from landfills and lead smelters to refineries and chemical plants. It also asks that we make sure the things that make communities healthy and sustainable—such as grocery stores, farmers markets, access to clean and renewable energy—flow to communities that get left behind.

You’ve been taking on these issues for many years. How did you get into this work?

ROBERT BULLARD: It has been a long time! I’ve worked on issues related to the environment, race, and justice for the last four decades. It started when I was a new sociology professor in Houston, two years out of graduate school. My wife had filed a lawsuit against the state of Texas, the city of Houston, and Harris County for proposing and planning a landfill in the middle of a black middle-class community in the suburbs. The idea of putting a landfill in a middle-class suburb was unheard of; the only factor

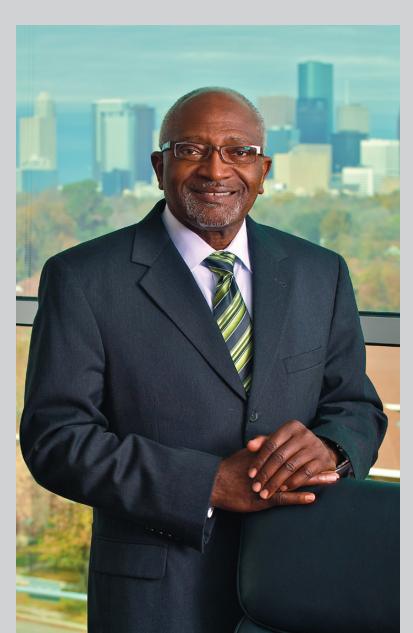
that made it different is that it was a black community. My wife needed someone to collect data and I got drafted into that process.

Working with my students, we completed the study in 1979. We found that five out of five city-owned landfills were located in black neighborhoods. Six out of eight city-owned incinerators were in black neighborhoods. And more than 80 percent of the garbage dumped in the city from the 1930s up to 1978 was being dumped in black neighborhoods. Black people only made up a quarter of Houston’s population at the time.

This was the first environmental racism, or environmental discrimination, lawsuit to be brought using civil rights laws. So, all my years fighting landfills and incinerators and waste dumps and issues of industrial pollution that hit African American communities and communities of color in the Gulf Coast hardest—the work all sprang from that one study in Houston.

The environmental injustice that has drawn the attention of Americans most recently is the contamination of municipal water in Flint, Michigan. How has the movement for environmental justice been affected by this ongoing crisis?

ROBERT BULLARD: There are lots of lessons to be learned from Flint. The saddest is that there are many Flints around this country. Flint is not the only case of old, industrial cities where the infrastructure is crumbling and posing risks to people’s health. The silver lining is that it made the rest of the country realize that we have tremendous infrastructure problems that need to be fixed.



ROBERT BULLARD is the former dean of the Barbara Jordan-Mickey Leland School of Public Affairs at Texas Southern University. A sociologist by training with a doctorate from Iowa State University, Dr. Bullard has been a professor at the University of Tennessee, the University of California-Berkeley, and Clark Atlanta University. Dr. Bullard has written 18 books on topics including environmental racism, urban land use, transportation, housing, and sustainable development. In 2013, he was the first African American to win the Sierra Club’s John Muir award, and in 2014, the organization named its environmental justice award for him. Dr. Bullard is currently working to launch an equity consortium to address the health, well-being, equity, and environmental issues that affect vulnerable families in select Gulf Coast states.

“Poor communities must have access to scientists, and the information generated in reports and studies must be translated so communities can use it to speak for themselves.”

How can science and scientists be an asset for the environmental justice movement, both from within the movement and in support of it?

ROBERT BULLARD: Environmental justice is important for the science world, because it takes a lot of issues out of the laboratory that are antiseptic and pure and puts them into the real world and into policy. Scientists can take research that shows disparities and inequality, and work with policy analysts and decisionmakers to push for change. It doesn't mean all scientists have to go out and become advocates on the ground. But their research can be very powerful when placed in the hands of policy and decisionmakers.

Poor communities must have access to scientists, and the information generated in reports and studies must be translated so communities can use it to speak for themselves, in committee hearings and town hall meetings and task forces and commissions that are making decisions about their lives. The people most impacted must be in the room when decisions are made, with the best information they can find. We can't just have environmental groups speaking for people on the front lines.

It's also important that we have scientists who come from these communities impacted by pollution. We need a growing generation of people of color and low-income people who can speak to these issues and be these policy experts and health experts—they can do it better because they come from these communities. That's the challenge we've been working on.

What do you predict for the future of the environmental justice movement?

ROBERT BULLARD: In the short term, when we talk about loosening regulations and allowing industries to pollute at will, there's a lot of data showing rising asthma rates and rising cancer rates, which result from pollution in communities that are on the front lines breathing this stuff every day.

Long-term, I am optimistic that the movement will not relent. This is a good time to rally organizations and talk about collaborations across the board: health, energy, housing, transportation, food security—all these issues now converge. We're not just talking about the next four years. We're talking about a strategy that's much longer than that. That's how we've

been able to sustain our movement. For communities of color—and I can speak personally as an African American—our long view has stretched out far longer than four years. And for Native Americans, I know it's much longer.

It has taken centuries of disparity—of discrimination, racism, imperialism, and colonialism—to get to where we are today. We're talking about dismantling some very powerful institutions. It's not an easy task and we recognize that. We're going to shore up our troops and get people to understand: this is about building a healthy, sustainable, and livable nation for everyone.

Progress is slow but we are relentless. If you are by nature a sprinter, this work is not for you. You need to be a marathon runner.

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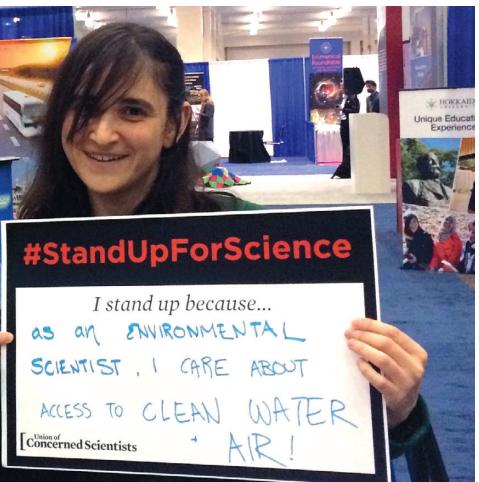
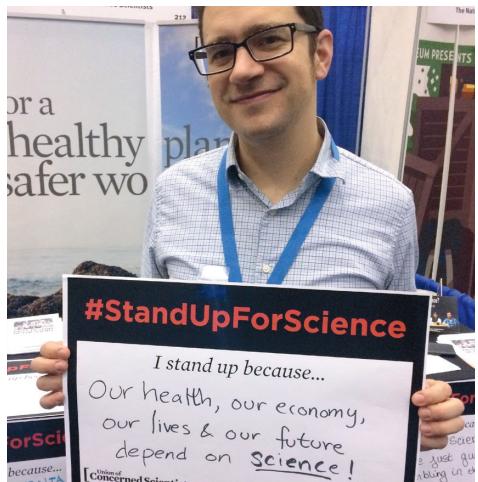
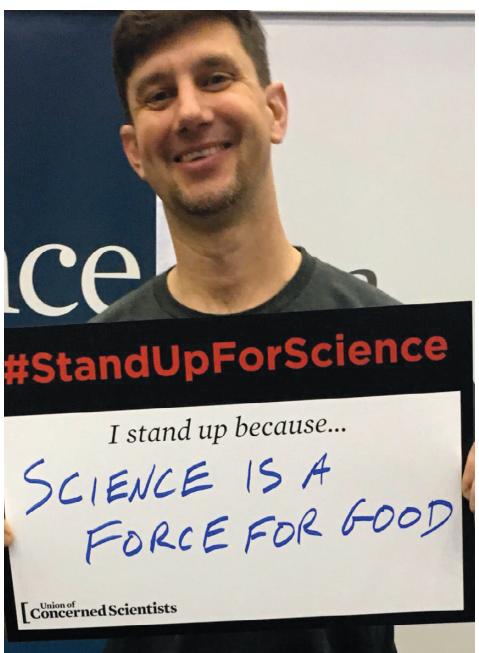
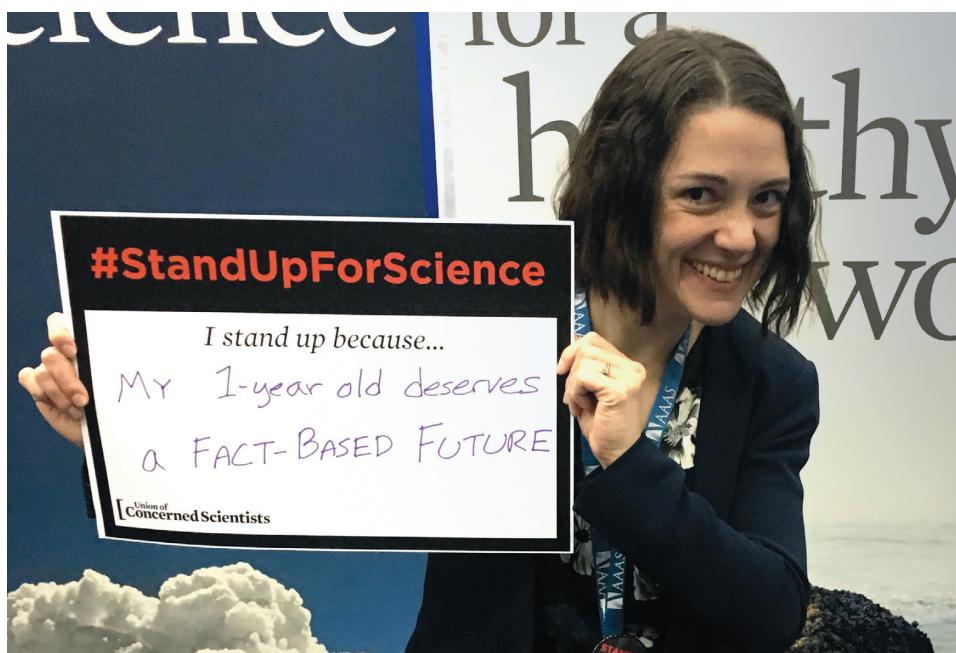
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IN CHALLENGING TIMES UCS SUPPORTERS TAKE ACTION



AN ENERGIZED MEMBERSHIP PUSHES BACK, REFUSING TO ACCEPT THE TRUMP ADMINISTRATION'S HARMFUL POLICIES AS THE NEW NORMAL.

BY PAMELA WORTH



This winter, in the run-up to the appointment of Scott Pruitt as administrator of the Environmental Protection Agency (EPA), Dr. Genie Moore, a research professor at Vanderbilt University, joined other active Union of Concerned Scientists members working to block Pruitt's Senate confirmation.

Pruitt was—and continues to be—an exceptionally poor choice to lead an agency whose mission is to protect America's air and water. As attorney general in Oklahoma, Pruitt consistently fought EPA measures to reduce global warming emissions and famously sued the EPA more than a dozen times to try to block the agency from enforcing environmental protections. He also accepted hundreds of thousands of dollars in campaign contributions from fossil fuel companies.

Moore, like a growing number of UCS members—scientists and nonscientists alike—felt strongly enough about the fight over Pruitt's nomination to step up her involvement.

"Over the years, I've sent out a number of emails and made phone calls to my state and US lawmakers. But in the current environment, I'm making many more legislative contacts than I've ever made before—usually several every week," she explains. "This is because environmental issues that I believe should be settled are now under attack."

As a vote on Pruitt's nomination neared in January, UCS staff identified key Republican legislators who might be persuaded to break ranks and vote against Pruitt. Then the organization put out the call to UCS supporters and members of the UCS Science Network in these legislators' districts.

The result: nearly 4,000 UCS members called legislative offices; hundreds of scientists in Maine, Ohio, and Tennessee signed letters registering their opposition to Pruitt's confirmation; and hundreds more called legislative offices. Some members, including Moore, accompanied UCS staff to deliver their letters to legislators' offices.

For her part, Moore joined a group of Science Network members and others to hand-deliver petitions opposing Pruitt's nomination to Tennessee Senator Bob Corker's office in Nashville. "I had never been," she says. "I didn't even know where the office was." She and her UCS group managed to get an audience with the senator's staff. They were not able to dissuade Corker from supporting Pruitt's nomination, but Moore is undeterred and even felt emboldened by the visit. As clean air and water continue to be threatened, she says, she'll go again.

"I live in a very red district and state and environmental issues are not high on the list of most politicians here," Moore explains. "But I am not going to stop. They are going to continue to hear from me several times a week on issues that touch on the environment or other causes I am concerned with."

ENERGIZED MEMBERSHIP

Today, with climate science deniers occupying powerful positions among our political leadership, proposing cuts to the EPA, the National Oceanic and Atmospheric Administration, and other agencies, stoking fear among federal scientists, and rolling back science-based protections to our health and safety, UCS members are taking action as never before. “We’re seeing a definite uptick in actions by our members,” says Danielle Fox, campaign and Science Network manager for UCS. “Pruitt may have won his confirmation battle, but momentum is on our side. It’s important for legislators to know when their constituents aren’t happy, and we’ve got a growing number of members determined to do all they can to hold our elected officials accountable.”

Indeed, with federal protections for the environment, public health, and safety in danger, UCS is stepping up its political strategy to include more in-person visits to elected officials.

“Our supporters are increasingly meeting legislators where they live,” says Fox. “Constituents who care about an issue can really make a difference when they meet directly with their representatives and explain the local impacts of legislation around that issue.”

Signs of an increasingly energized UCS membership abound: as *Catalyst* went to press, we had already mobilized record numbers of UCS members to participate in the People’s Climate March and arranged for Science Network members from target

Already, some 500 Science Network members have volunteered to be watchdogs for science.

states to meet with their elected officials on Capitol Hill while they were in Washington, DC. And we’ve seen increased engagement not just on federal issues but on state and local ones too. For example, after abnormal winter weather in the Golden State dumped much-needed rain and filled in Northern California’s dangerously depleted snowpack, UCS recognized that media coverage of water conditions in the state would likely focus on the short-term effect of storms but neglect to explain the longer-term effects of climate change. Staff in our West Coast office reached out to California members, asking them to write to their local papers and request better coverage of water supply and climate change. Nearly 100 members rose to the challenge, writing letters to the editor and submitting them to 47 separate newspapers in the state; several of the letters were published.

HOW TO GET SCIENTISTS FIRED UP

A key UCS mechanism for political engagement in the scientific community is our Science Network, comprising more than 20,000 experts in fields ranging from public health to physics. UCS mobilizes Science Network members to use their expertise in ways that make a difference: delivering testimony to their representatives, signing on to expert letters

to elected officials, conducting research and environmental impact assessments for community groups, serving on federal advisory committees, and more.

Over the winter, many new—and newly energized—Science Network members reached out to UCS to ask if there was more they could do to help defend science. It turns out there was.

“In response to the current political environment,” says Fox, “we’re committed to monitoring, exposing, and pushing back on attempts to stifle scientific integrity and dismantle scientific protections. We realize that we’re just one organization. And we know the job will require the help of scientists across the country.”

Enter the Science Network watchdogging campaign. As of this writing, more than 500 scientists and other experts across the country have volunteered to be watchdogs for science, monitoring the current administration and its efforts to suppress, distort, or deny facts and evidence. These Science Network watchdogs participate in monthly conference calls briefing them on the latest news from Washington, DC, and their own communities. They receive customized information on events, legislation, and other opportunities for them to take local action.

So far, the Science Network watchdogs are gearing up to push back against rollbacks on regulations, write letters to the editors in their towns and cities, and meet with legislators to share their expertise. Resources for watchdogs and all Science Network members, including a watchdog toolkit for download, are available at www.ucsusa.org/sciencenetwork and www.ucsusa.org/sciencewatchdog.

“The goal is to keep our science watchdogs—and all our activists—informed but not overwhelmed,” says Fox. “It can be hard to sort through what’s real, what’s actually harmful, what’s immediate, and where you can make a difference. We try to do that for you.”

A ROLE FOR ALL UCS MEMBERS

Over the course of the nearly 50 years since UCS was founded, the organization has recognized that our success rests on combining science and technical analysis with advocacy, and strength in numbers to develop and implement solutions that improve the world we live in. This strategy has allowed UCS to operate successfully in all kinds of political climates. Throughout, we’ve always encouraged our supporters to speak up about issues that matter.

Thanks to UCS members of all kinds, we have the flexibility to react quickly to harmful policies and bad news—and we have the people power to make a difference. Because of you, we’re ready to lead the fight to defend science.

“To be effective in this struggle, we need to use a lot of channels and approaches,” Fox says. “I tell our members to never doubt that they’re making a difference, because we need all kinds of voices and all kinds of responses.”

Above all, we’re inspired by how many people—scientists, science lovers, first-time activists, seasoned movement veterans, even kids (see the sidebar)—are rising to play an active role in our efforts. We’re doing our best to provide worthy outlets for your energy and passion. Together, our actions are working to defend science: its role in our democracy, its free practice and expression, its funding, and the vital part it plays in protecting our health and safety. [\[C\]](#)

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Alex Herr (right), is hiking the White Mountains with her sister, Sage, to raise funds for UCS.

UCS has welcomed thousands of new supporters since the election and we're grateful to our members, new and old. We're also honored and delighted to learn about some original approaches our supporters have used recently to take action and to raise funds for the fights at hand.

The surge in new and often-unconventional ways people have found to support UCS is unprecedented. UCS supporters have created their own matching-gift drives, for example, working with their employers and Facebook pages in some cases to triple the size of their donations. Some have tweeted out their support of UCS and encouraged others to join them. Other UCS enthusiasts have brought friends, family, and colleagues together for bake sales and other events, sold handcrafted jewelry, dedicated a portion of their book proceeds to UCS—and even climbed mountains for us.

Patricia Herr and her two daughters, Alexandra, 13, and Sage, 11, are ardent all-season hikers who live in New Hampshire. Alex and Sage are well known among mountaineering

and hiking communities for tackling difficult peaks with the tenacity of adults; each began hiking at four or five years old. Winters in the Granite State are cold and snowy, but this hasn't stopped the three from

by climate change, is frightening. I often wonder if my children will see the same kinds of immaculate sights I see now. I also wonder if the precious White Mountains will still be protected when I am older, or if

“As a young person, I am concerned about the future of my generation heading into this new era.”

—Alex Herr

pursuing their goal of completing the White Mountains Grid: hiking to the summits of each of the 48 White Mountain peaks 12 times (that's 576 summit hikes). They've used their hikes to raise funds for causes they care about. After the last election, the Herrs decided to use their White Mountains Grid goal to fundraise for UCS.

On Alex's blog, where she chronicles the family's hikes and encourages readers to support UCS, she wrote this:

“I am in love with Earth's mountains and wildlife, so the thought of pollution and extinction, caused

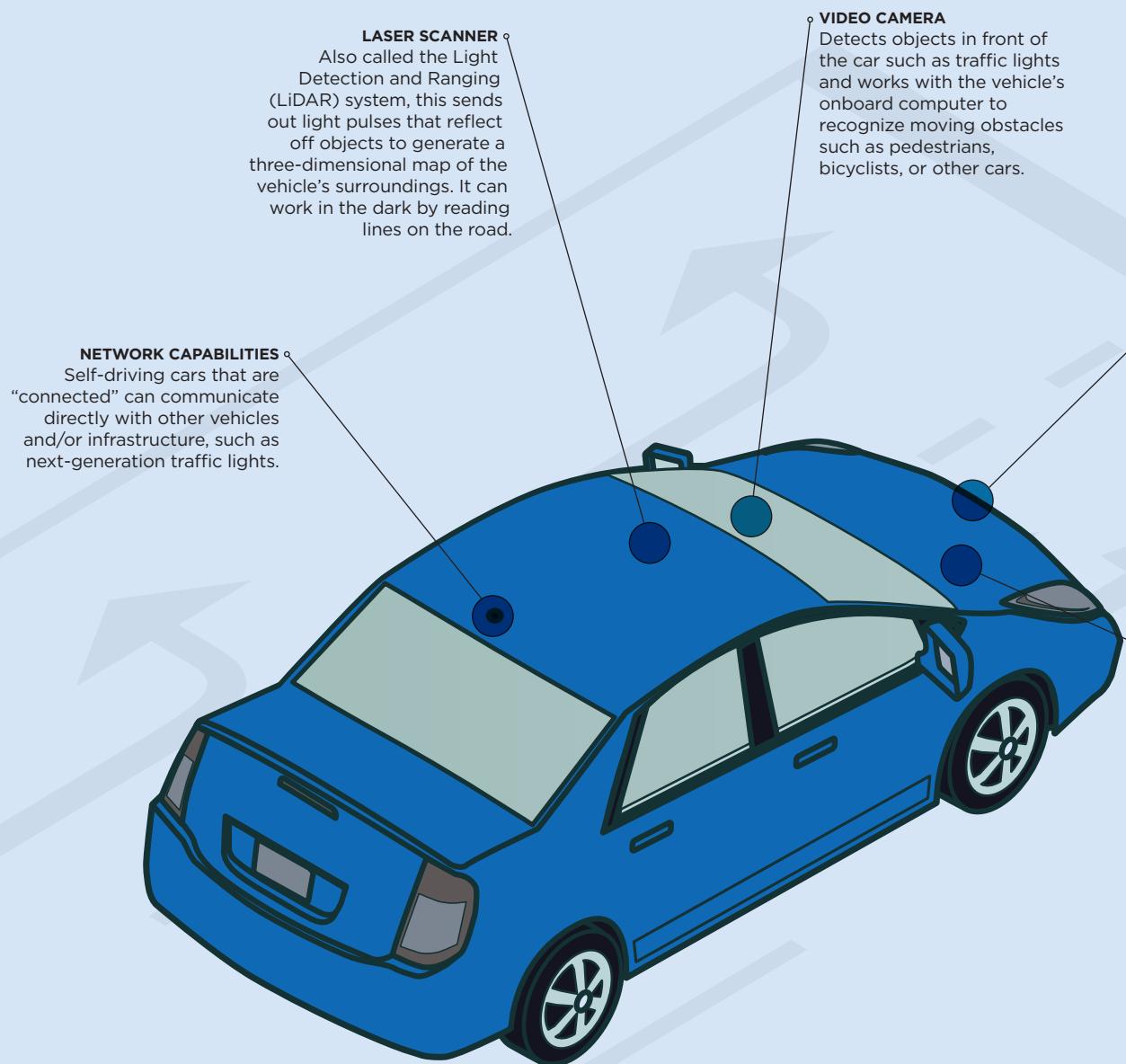
people will have disrupted the tranquility and beauty of the trails, mountains, and animals.

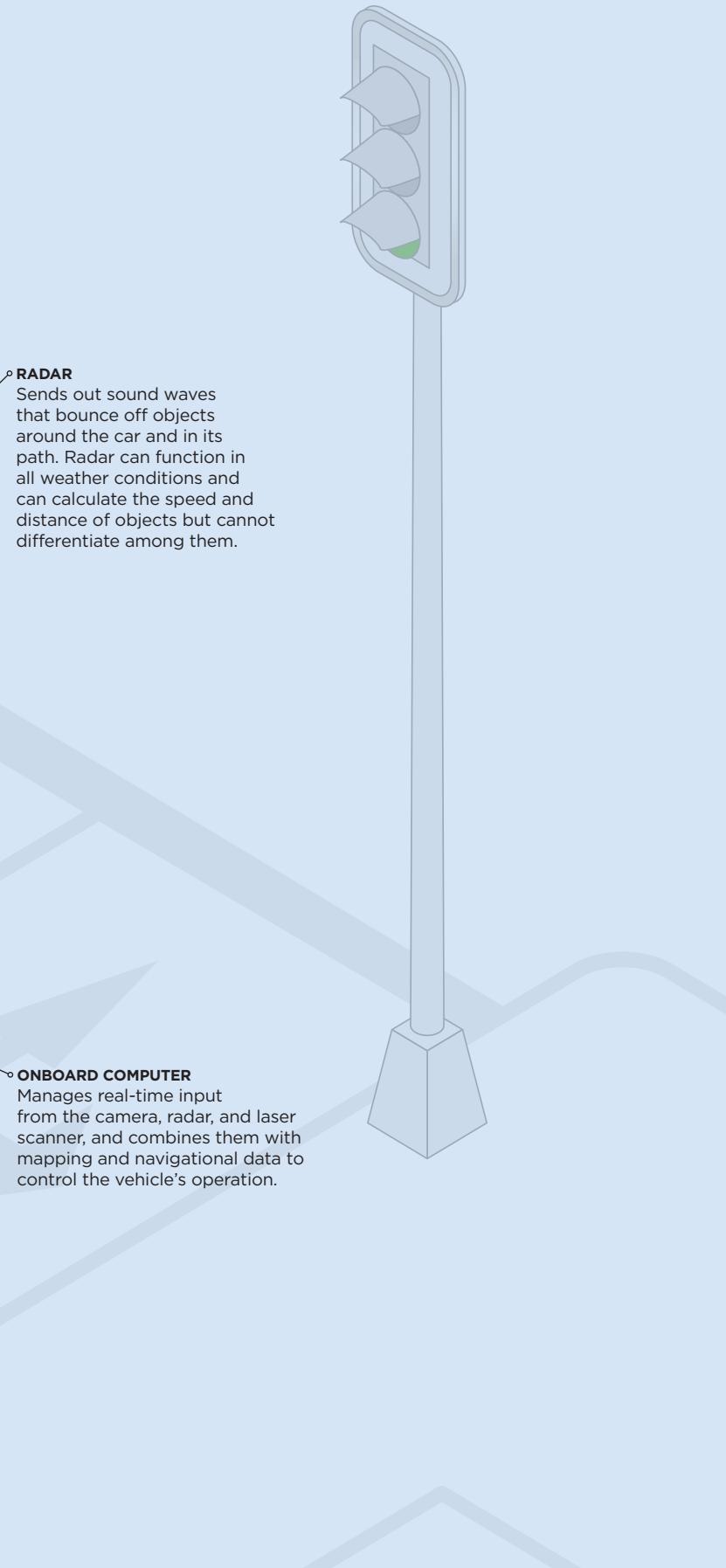
“We strive to do our part to support science-based research and education concerning climate change. . . As a young person, I am concerned about the future of my generation heading into this new era.”

Thanks to Alex and to all the UCS donors who are going above and beyond to help us face the challenges of the current political environment. You can learn more about the Herr family's adventures at www.alexinthewhitemountains.com.

Self-Driving Vehicles

Self-driving vehicles—also known as autonomous or “driverless” vehicles—are cars or trucks that operate without human drivers, using a combination of sensors and software for navigation and control. A growing number of partially autonomous vehicles are already in use, employing such technologies as parking assist and lane departure alert. These and other technologies are evolving fast; many major automakers—and some outside the auto industry, such as Google—now have self-driving cars in development and are vying to be the first to get them on road.





Steering toward a Just Future for Transportation

Autonomous vehicle technology may be the most significant innovation in transportation since the mass introduction of automobiles in the early 20th century. However, if self-driving vehicles are to deliver positive outcomes, public policy must guide the evolution of this technology.

For example, self-driving cars could perpetuate our national reliance on personal vehicles and erode public transit. Or, self-driving cars could reduce the cost and increase the convenience of ride-hailing services such as Lyft and Uber, encouraging more people to forgo owning a vehicle. That could also alleviate some inequities experienced in underserved communities. If self-driving vehicles lead to more miles traveled on America's roads, the fuel used to power these vehicles take on even greater importance; widespread deployment of clean, renewable electricity could significantly reduce the transportation sector's climate impact.

UCS experts have analyzed the potential impacts of self-driving cars, from safety to jobs to climate change, and developed seven principles that would maximize the benefits of this technology. Among these: ensure the safety of these vehicles, prioritize the goal of cutting pollution, support a just transition for displaced workers, and integrate self-driving vehicles with mass transportation for the benefit of all. Read the full principles at www.ucsusa.org/avprinciples.

Planting Smarter



Research reveals a range of benefits from adding oats (pictured here) and alfalfa to typical Corn Belt crop rotations, and our analysis shows that these benefits for farmers and the environment hold up at scale. Public policy changes could increase adoption of more diverse rotations.

By Seth Shulman

For corn and soybean farmers in Iowa and other midwestern states, the status quo presents a problem: despite record harvests in 2016, US farm incomes have dropped to some of their lowest levels in more than a decade. What's more, the current farming system that predominates throughout Iowa and much of the Midwest—rotating between fields of corn and soybean every two years with heavy fertilizer use and plowing (or “tilling”) bare fields between crops—is taking a toll on vital soil and water resources. Farm fields are eroding at unsustainable rates, and nitrogen pollution from agriculture costs the nation an estimated \$157 billion per year in human health and environmental damages.

There's a better way.

A new UCS analysis models what would happen if Iowa farmers adopted an extended, no-till crop rotation system. The findings? Farmers could adopt the system on as much as 40 percent

of the state's farmland, generating a winning combination of benefits: higher yields, less erosion, and dramatically less fertilizer use with its associated costs, water pollution, and global warming emissions.

INNOVATIVE CROP ROTATION

The UCS analysis builds on a long-term study conducted since 2003 by researchers at Iowa State University that shows moving from today's dominant two-crop rotation system to a more diverse rotation involving three or four crops (such as adding oats and a cover crop of red clover, which acts as a “green” manure) can increase crop yields and maintain similar per-acre profits. Average corn yields were 2 to 4 percent higher and average soybean yields 10 to 17 percent higher compared with the two-crop system and, especially given the reduced fertilizer costs, the diverse rotations were just as profitable as rotating between corn and soy alone.

UCS analyzed the economic and environmental potential of expanding diverse crop rotation systems, paired with no-till methods, and found that Iowa's farmers could scale them up to 20 to 40 percent of the state's farmland—some 5 million to 11 million acres. Doing so could:

- reduce soil erosion by 88 percent compared with tilled corn soy; and
- save taxpayers between \$241 million and \$505 million annually in cleanup costs and reductions in global warming emissions.

As Kranti Mulik, the UCS report's lead analyst explains, “There are barriers to adoption that need to be overcome, but this looks like a win-win-win scenario for midwestern farmers: producing higher yields, maintaining profits, while protecting the soil, cutting pollution-causing fertilizer and pesticide use, and reducing global warming emissions.”

You can read the full report on the UCS website at www.ucssusa.org/RotatingCrops.

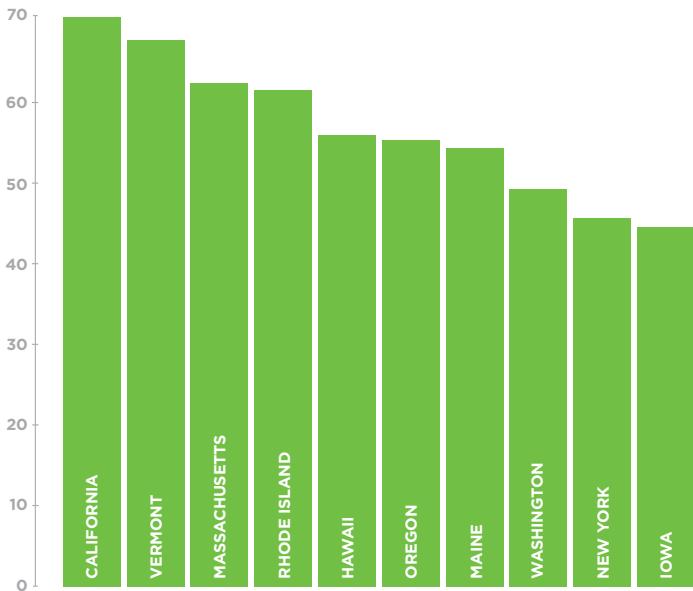
Clean Energy Takes Hold

(continued from p.11)

electricity target well ahead of schedule, it has failed to set a new, higher target, costing it momentum. The lesson: policies matter, and state leadership is vital, especially now in the face of a Trump administration that, as UCS President Ken Kimmell put it, appears to have created a government “of, by, and for the fossil fuel industry.”

The good news is the new UCS analysis demonstrates that any state can become a leader and reap all the economic and environmental benefits that clean energy brings. All that’s needed is to establish a suite of strong clean energy policies that allows for multiple approaches and technologies.

Top 10 States Leading the Way in Clean Energy



To determine the clean energy momentum state ranking, UCS analyzed the 50 states on 12 metrics, such as job creation, pollution reduction, renewable energy in the electricity generation mix, and policies to advance clean energy. California leads the way, with strong showings on eight metrics and the number one position in electric vehicle adoption. (A state's overall score is the total of their metric scores. The highest possible score is 120.)

Our overall state leaders in clean energy perform well across a range of metrics (see the figure). First-place California and runners-up Vermont and Massachusetts, for example, each rank in the top 10 on at least eight separate metrics. These and other state leaders show how smart energy policies can yield swift and demonstrable results for their residents. They also point the way forward for others. As clean energy continues to take hold across the United States, we need to ensure all Americans share in its benefits. {C}

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Changing How We Pay for Electricity Can Help Boost Clean Energy

By Julie McNamara



Our electricity grid is designed to provide power whenever we need it, with every flick of the switch or adjustment of the thermostat. Most of us are charged a single flat rate for electricity regardless of when we turn on our lights, crank up our air conditioning, or do our laundry. As a result, we use electricity whenever we want because we have no reason not to.

The problem with this setup? It's incredibly costly and inefficient. Because the grid needs to be equipped to handle peak periods of enormous electricity use,



A still from our "Grid of the Future" video (www.ucsusa.org/upgradethegrid). Time-varying electricity rates can help increase the percentage of renewable energy we use.

Time-varying rates for electricity can help integrate more renewable energy into the grid.

we build and maintain many extra power plants as backup—even though we need them just a handful of times per year.

And as we race toward a clean energy future supplied by greater amounts of renewable electricity, flat rates cause another problem. Wind and solar power production is variable, so we need ways to fill the gaps when the wind dies down or clouds cover the sun. But flat rates don't encourage consumers to adjust their electricity usage based on when our renewable resources are abundant and when they're not. That means we wind up relying on fossil-fueled generators to compensate for the variation in wind

and solar power, even though that often means higher costs, more pollution, and added global warming emissions.

A BETTER WAY

Instead of charging a flat rate for electricity, utilities can use time-varying rates—rates that move higher and lower to discourage and encourage use at different times. By taking advantage of what economists call “price signals,” time-varying rates shift prices in a way that signals consumers to alter when and how they use electricity. As a result, these rates can help unleash the power of flexible demand, allowing us to take a vitally important step forward on the path to a clean energy future.

There are three main forms of time-varying rates: time-of-use rates, critical peak pricing, and real-time pricing. These rates vary in granularity from patterns of peak and off-peak periods that repeat each day to five-minute intervals that closely track the dynamic real time prices of energy markets.

Adopting any of them can help electric utilities seamlessly integrate more renewable energy onto the grid. Consumers can save money with time-varying rates by making simple adjustments to their routines, such as pressing “delay start” on a dishwasher. Plus, the recent mass deployment of smart meters—electricity meters capable of tracking the timing of electricity use, not just the total amount—is spurring the development of many new opportunities for consumers to adjust their electricity use, and respond to price signals that can help incentivize the growth of renewable energy.

For more details on the environmental and economic benefits of time-varying rates and flexible demand, go to www.ucsusa.org/timevaryingrates.

Julie McNamara is an energy analyst in the UCS Climate and Energy Program. Read more from Julie on our blog, The Equation, at <http://blog.ucsusa.org>.

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