Union of Concerned Scientists

Catalyst

Volume 24, Winter 2024

Countdown to Zero Emissions

The time is now to phase out fossil fuels

Diversifying the Federal Science Workforce

Bringing Change to California's Croplands

[Union of Concerned Scientists

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Welcoming and Creating Systemic Change

There's an anecdote in the pages ahead about the former economic might of the whaling industry, which was centered around New Bedford, Massachusetts, due south from UCS headquarters. Whaling generated so much wealth in part because 18th- and 19th-century people relied on burning whale oil for light.

The broader story (p. 8) is about the clean energy transition now under way, and the detail about whaling is only there to support the author's point: that the systems and technologies we rely on can and do change, sometimes dramatically, and sometimes to a point past the bounds of our imaginations.

But what a point!

For the consumers, profiteers, and casualties of the whaling industry, I'm guessing its systems and processes seemed entrenched, a behemoth too mighty to shift. From our view in 2024, it's obvious that the industry could not continue.

Systems change and evolve. And it's our charge at the Union of Concerned Scientists to help transform them into systems that serve more of us—and serve us better. I'm reminded of author Ursula K. LeGuin's famous quote, "Any human power can be resisted and changed by human beings."

You'll see more examples of perhaps previously unthinkable changes in the rest of this issue, including our West Coast staff's thoughtful analysis (p. 18) on repurposing cropland in California's Central Valley. Doing so would benefit small- and medium-sized farmers, save water, and protect residents' health—instead of allowing big agribusinesses to continue extracting as much wealth as they can from the region. You'll read about how systems we've been told are reliable can completely fail us when we need them the most (p. 22), underscoring the urgent need for change. And I hope you're excited for our goal of setting a record for STEM voter turnout in this year's presidential election (p. 7).

From where I sit in the organization, I have the privilege to work with each of our programs and see firsthand the ways in which UCS cooperatively and collaboratively stewards positive change in the world around us. I'm excited for the future, and grateful for your support as we forge the road ahead. {C}

Pallavi Phartiyal *is vice president of programs, policy & advocacy at UCS.*

Photos: Tara Rice (Pallavi Phartiyal), Adam Gryko/Adobe Stock (lantern), Feng Yu/Adobe Stock (light bulb)

UCS ON THE RECORD . . . AND HAVING AN IMPACT

"The science demands we cease doubling down on fossil fuels. Not only is this infrastructure—especially gas plants—not up to the task of supplying power when it's needed most, but it continues the vicious cycle of releasing heat-trapping emissions that exacerbate climate change impacts and in turn strain the electric grid."

***PAUL ARBAJE**, UCS energy analyst, from a press statement about a new analysis assessing the reliability of gas power plants (see p. 22)*

"Offshore wind projects can be counted on to perform exceptionally well in periods of extreme cold, because . . . their supply of 'fuel' automatically ramps up for such events."

***SUSAN MULLER**, UCS senior energy analyst, from a post in the UCS blog* The Equation *about how New England's Vineyard Wind project—which first came online in early 2024—will be more reliable in wintry weather than gas- or coal-fired power due to higher average winter wind speeds*

"The people of Sri Lanka feel the impacts of climate change every day, yet those effects are overwhelmingly caused by the self-serving, irresponsible actions of the fossil fuel industry and nations unwilling to do their part to stop the climate crisis. My family and the people of Sri Lanka deserve better."

***SANJALI DE SILVA**, communications officer at UCS (right), from a 2023 post she wrote for the UCS blog* The Equation. *Sri Lankan President Ranil Wickremesinghe quoted De Silva's words in a speech and invited her to meet with him while she was visiting family in Sri Lanka.*

"We've been trying to figure out how to communicate the urgency of climate change for decades. You have to find this balance of being both scientifically accurate—because that is your credibility and your trust and your personal comfort and self-esteem as a scientist [—and] communicating in really powerful ways."

***KRISTY DAHL**, UCS principal climate scientist, quoted in a* Wired *story on how scientists are communicating climate extremes—and hope*

"Every year of delay will force greater suffering and mounting climate damages upon people around the nation—even as fossil fuel companies and their shareholders rake in billions of dollars in profit."

***RACHEL CLEETUS**, UCS climate and energy policy director, from a press statement responding to NOAA's annual report that ranks 2023 first in the number of billion-dollar climate and extreme weather–related disasters*

Photo: Aroshini De Mel

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Presenting the UCS Science Defenders

At the end of each year, the Union of Concerned Scientists celebrates the efforts of Science Defenders: individuals or groups who have put science to work to change the world for the better. We're pleased to introduce our 2023 winners.

PRACTICING SCIENCE AS PUBLIC SERVICE

V-SCI: Launched in 2020, the Virginia Scientist-Community Interface, or V-SCI, is an independent group of scientists who volunteer their time and expertise to help address local issues. V-SCI's members work in partnership with local organizations on projects as disparate as analyzing the costs of residential energy and protecting the habitat of an endangered species of fish. "As a grad student, I sometimes felt that our science *could* support meaningful change in the world—but there was a disconnect," says V-SCI President Hannah Mast. "Once I found V-SCI, it felt like exactly what I'd been looking for."

PURSUING ENVIRONMENTAL JUSTICE FOR THE DINÉ

Dr. Tommy Rock: For decades, mining companies operated uranium mines in the Navajo Nation, employing Tribal members while providing few—if any—protections for their health and safety. When demand waned, many companies abandoned their mines, leaving the Navajo/Diné people with contaminated water, soil, and air. Rock is a professor at Northern Arizona University and a member of the Navajo/Diné tribe whose grandfather, a miner, died of cancer. In helping to identify and remediate uranium contamination, he says, "I'm trying to improve the quality of life for rural, isolated communities, while also preserving our traditional way of life and empowering people. This work is personal."

PROTECTING GROWING BRAINS

Project TENDR: This group of more than 50 scientists, health professionals, and advocates is working to address the effects of neurotoxins and pollutants on children's developing brains. Led by Maureen Swanson of The Arc, Dr. Irva Hertz-Picciotto from the University of California–Davis, and Dr. Tanya Taiwo from Bastyr University, Project TENDR has published seven peer-reviewed articles in medical and scientific journals. "We recently had a major influence on federal initiatives around eliminating lead exposure, a long-held goal," the team says. "Our most meaningful achievements result when we offer expertise and insights that no one else can."

HELPING COMMUNITIES BREATHE EASIER

Dr. Richard Peltier: Based at the University of Massachusetts–Amherst, Peltier and his team collect and interpret data on air pollution around the world, especially in the Global South. They've also worked with grassroots environmental justice organizations to help make the scientific case for limiting carcinogenic emissions from industrial facilities. He says if scientists are not listening to communities and modifying research to meet their needs, they're practicing "colonial" science. "It might get you a new paper you could publish, but it's not the right thing to do."

Illustration: Nick Iannaco/UCS

UCS Aims to Amplify Downwinders' Calls for Justice

For decades, people living and working near the Hanford Site, a plutonium-processing facility in Washington State, were exposed to radionuclides. UCS has been working with "downwinders" near US nuclear facilities to bring attention to, and increase compensation for, potential health impacts resulting from similar exposures.

About two and a half hours southwest of Seattle, WA, sits the Hanford Site, a manufacturing facility that produced the plutonium inside the atomic bomb that the United States dropped on Nagasaki during World War II, and for thousands of other nuclear weapons. After decades of production, Hanford is one of the biggest environmental cleanup sites in the country. In the past year, UCS staff conducted two site visits, met with partners, and began working with community members and groups advocating for those living and working in proximity to Hanford, to understand their concerns about community exposure to historic radionuclide releases. These "downwinders" have experienced various chronic health conditions like thyroid disease and other illnesses, but research into the connection to exposures from the site has been limited and highly criticized. They're concerned that there has been little to no government acknowledgment, compensation, or support for what they've endured.

One of UCS's goals is to work with these communities to identify what best serves their needs, including understanding what is known and unknown about the health impacts of the Hanford site, and better documenting what communities have experienced. We are also working to include previously overlooked populations who were exposed to radionuclides released from Hanford, such as members of four Tribal nations who were displaced and whose lands have been contaminated, as well as migrant farmworkers.

UCS Ups the Pressure on "Forever Chemicals"

In the last months of 2023, the Environmental Protection Agency (EPA) addressed a dangerous loophole that allowed US industrial facilities to avoid disclosing the release of PFAS—so-called forever chemicals—in its public reporting, the Toxics Release Inventory. The inventory tracks chemicals that can harm our health and the environment and is intended to inform communities about potential contamination in the air, water, or on land. The EPA rule closing this loophole was finalized in response to a lawsuit filed by Earthjustice on behalf of UCS, frontline communities, and environmental organizations. UCS research has uncovered unsafe levels of PFAS in drinking water near military bases and outlined the harms of exposure, which include increased cancer risk and disruptions to children's development. UCS also endorsed the PFAS Action Act of 2023, introduced in the US House of Representatives as a means of regulating these toxic chemicals.

UCS Senior Bilingual Campaign Organizer and Policy Advocate Camilo Esquivia-Zapata was recognized in 2023 as a Young, Gifted & Green 40 Under 40 awardee for his consistent leadership and commitment to advancing racially equitable solutions to environmental injustices. To his left is UCS Senior Energy Campaign Manager Elise Tolbert, a previous 40 Under 40 awardee.

Photos: Jeff T. Green/Getty Images (Hanford); Elise Tolbert/UCS (Camilo Esquivia-Zapata)

UCS Helps Secure Climate Progress at UN Summit

Rachel Cleetus, policy director in the UCS Climate and Energy Program, speaking in a panel discussion (above left, second from right) and briefing reporters on the latest developments (above right) during the COP28 climate discussions held in late 2023.

A delegation of staff members from UCS was on hand as COP28, the most recent annual United Nations climate summit, concluded late last year in Dubai, United Arab Emirates, with a historic global agreement on the need to transition away from fossil fuels. UCS Climate and Energy Policy Director Rachel Cleetus says the UAE Consensus marks an important step forward even though it falls short in significant ways.

"We've been fighting 30 years for a global agreement that says we must rapidly phase out the production and use of fossil fuels," she says. "But the final text doesn't go far enough to ensure a sharp turn away from fossil fuels within this critical decade and beyond, nor does it secure a commitment from wealthier nations—which bear the most responsibility for climate change—to provide financing for low- and middle-income countries to make a clean energy transition."

Ahead of COP28, UCS organized a letter from more than 650 scientists to President Biden urging bold climate action. And in Dubai, the UCS team met with then-US Special Envoy for Climate John Kerry, the US negotiating team, staffers from the US congressional delegation, and negotiators from other countries to advocate for science-based priorities.

CONTINUED FOSSIL FUEL INTERFERENCE

Among the bright spots from the COP28 agreement was text calling for "[t]ransitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science." The consensus also calls for globally tripling renewable energy and doubling the annual rate of energy efficiency improvements by 2030, phasing down coal-fired power, and accelerating the deployment of zero- and low-emissions vehicles and supporting infrastructure.

Additionally, the Loss and Damage Fund, established at COP27 to provide low- and middle-income, climate-vulnerable countries with resources to address extreme impacts of climate change, was operationalized on the first day of COP28, with initial pledges from several nations.

"This was a significant win for climate justice," says Cleetus, while noting that the pledges fall well short of what is needed.

Unfortunately, the influence that fossil fuel companies wield over world leaders was evident in Dubai, as a record number of fossil fuel lobbyists registered for COP28, and their interests were made manifest in objections raised by oil-producing states including Saudi Arabia. "We won't succeed in securing necessary climate action," Cleetus says, "unless the power of the fossil fuel industry is dismantled, and they are held accountable."

This year, ahead of COP29, UCS will work to keep highlighting the synergy between robust, fair global commitments and domestic policies that address the climate crisis.

Visit https://act.ucsusa.org/win24-cop28 to read our COP28 blog series.

Photos: Sanjali De Silva/UCS

Hacker Who Targeted UCS Is Sentenced

An Israeli hacker who was paid to infiltrate the email accounts of UCS staff—and individuals at other nonprofits working to hold ExxonMobil and fellow fossil fuel companies accountable for spreading climate disinformation—received his sentence this winter in federal court. Aviram Azari will serve nearly seven years in prison after pleading guilty to several charges stemming from his role in what the University of Toronto's Citizen Lab dubbed the "Dark Basin" hacking operation. (You can find more on this story in the summer 2023 issue of *Catalyst*, available online.)

During Azari's trial and sentencing, he never revealed who hired him to conduct these attacks. UCS Accountability Campaign Director Kathy Mulvey says, "While the conviction and sentencing of Mr. Azari has shed light on the hacking-for-hire enterprise, we're still eager to see the bad actors behind the attack publicly named and held accountable."

A MILLION-DOLLAR BOOST FOR SCIENCE, THANKS TO YOU

Through the generosity of more than 12,500 UCS members, our year-end Million Dollar Match for Science was one of the most successful membership drives in this organization's 54-year history—not just meeting the campaign's goal of raising $2 million by December 31, but more than doubling it!

This funding comes as we face a contentious election season, continued gridlock on Capitol Hill, corporate disinformation, and other challenges. It helps ensure our scientists and experts have the necessary resources to tackle our most urgent priorities and seize substantial opportunities to make progress in driving fair, science-informed solutions that matter. You can further bolster our efforts by renewing your UCS membership early this year—visit **https://act.ucsusa.org/win24-renew** to learn more. Thank you again for your continued support!

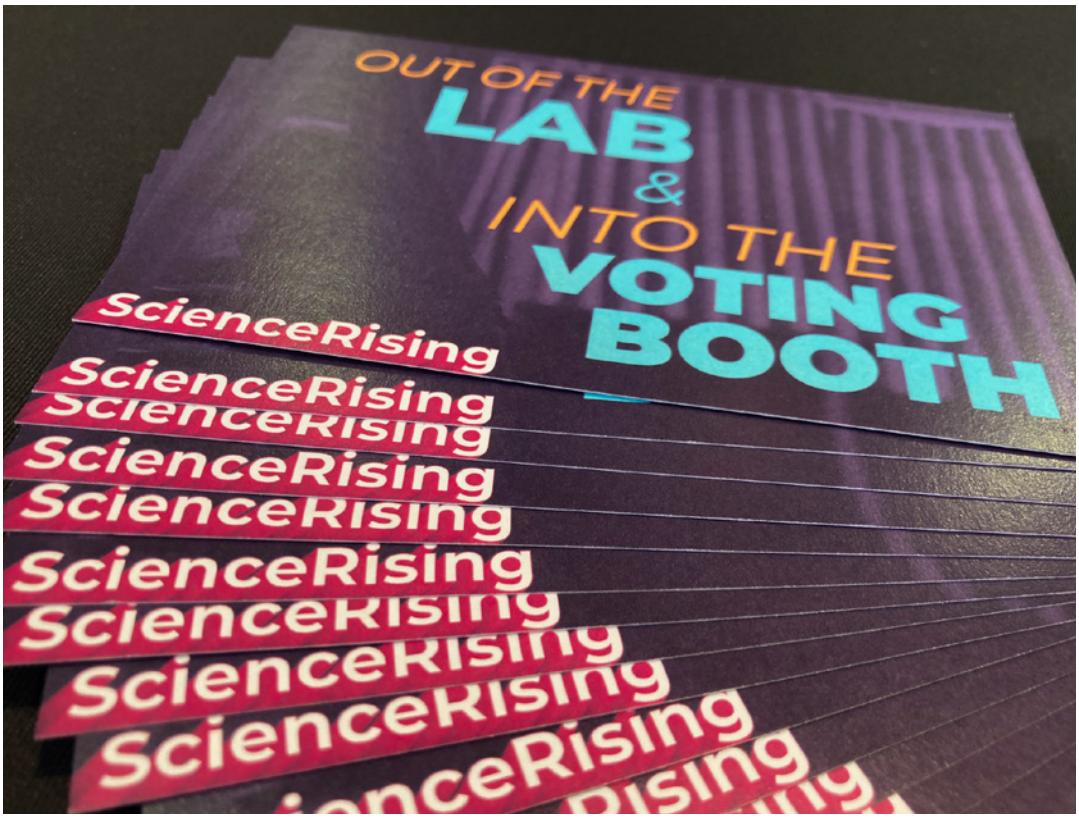


Photo: Matt Heid/UCS

Mobilizing the STEM Student Vote in 2024

Troubled by data showing that students in STEM disciplines (science, technology, engineering, and math) were less likely to vote in presidential elections, UCS helped launch Science Rising in 2018—offering trainings, voter registration opportunities, and other initiatives designed to boost the STEM vote. Our efforts paid off in 2020, when STEM student voting increased by double digits, according to a National Study of Learning, Voting, and Engagement report.

With the start of another presidential election year, Science Rising is ready to set a record for STEM voter turnout in 2024. UCS will be training students and faculty members on effective strategies to boost STEM voter turnout on their campuses. If you want to learn more about Science Rising and get involved, visit www.sciencerising.org.

COUNTDOWN TO ZERO

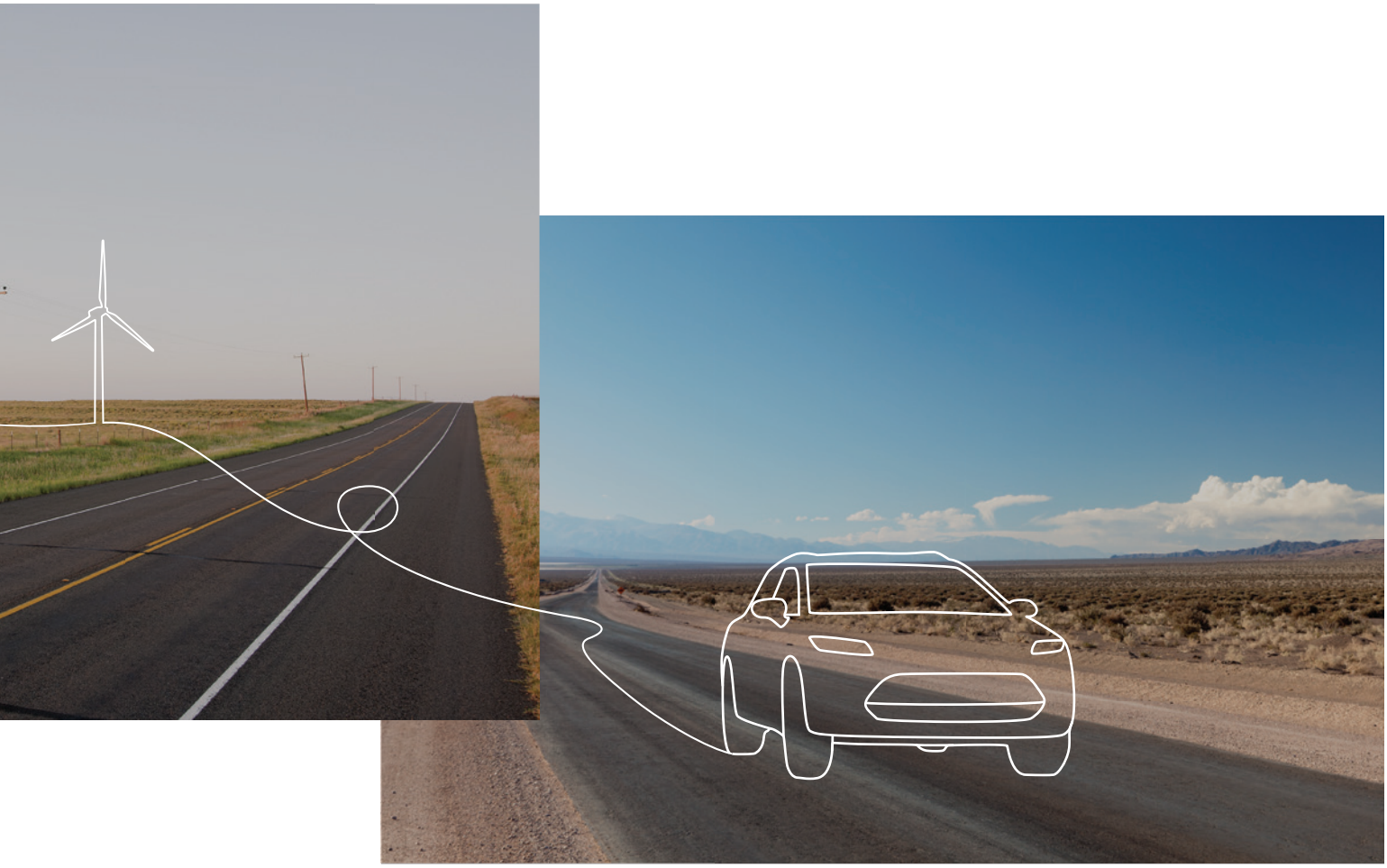
While time is running short to get to net-zero heat-trapping emissions, momentum is growing to change the way we power our world. New UCS analysis shows we can make it—and earn climate, economic, and health benefits in the process.

BY SETH SHULMAN

Members and supporters of the Union of Concerned Scientists are likely all too familiar with the huge effort needed to reduce the pollution caused by our reliance on fossil fuels, and that we have no time to waste given the disastrous impacts of climate change that are already upon us. But there's another side to this story: across the globe, we are in the midst of the biggest energy transformation since the Industrial Revolution—arguably one of the biggest energy transformations ever. And evidence of the growing momentum toward clean energy is all around us.

Consider that, for the first time, the United States generated more electricity from wind and solar than it did from coal during the first five months of 2023, and is projected to do so—for the first time—for the whole year in 2024. Even more impressive is the mind-boggling amount of additional clean energy now in the pipeline. According to the Lawrence Berkeley National Laboratory, as of the end of 2022 there were more than 10,000 proposed wind and solar projects—representing *double* the country's current electricity capacity—actively seeking interconnection to the transmission system.

Of course, siting, permitting, and building all this new capacity and the additional transmission capacity to support them in a timely fashion will be an enormous task. But the transformation is happening. For one thing, the Inflation Reduction Act of 2022 (IRA)—the largest federal funding bill for climate action in history—committed nearly *$400 billion* to support low- and zero-carbon technologies including wind and solar power, battery storage, and electric vehicles.



Photos (L-R): surfleader/Getty Images, Glasshouse Images/Getty Images, Pavel Tochinsky/Getty Images; Illustration: Nick Iannaco/UCS

A year and a half since the IRA's passage, these expenditures are already having a significant impact. The White House says the United States has created more than 170,000 new clean energy jobs, and the American Clean Power Association says 83 new manufacturing plants have been announced that will produce solar power equipment, wind turbine parts, or batteries, representing some $270 billion of capital investment through July 2023. That's as much as the previous seven years of clean energy investment combined.

Meanwhile, progress on electric vehicles (EVs) is ramping up rapidly, too. By one count, since the passage of the IRA, US companies had, as of December 2023, announced some $78 billion in new investments in factories making EVs and their components. Seventy-nine factories are now either proposed or under construction, and the sector has already added nearly 50,000 new jobs.

Numbers such as these reveal the enormity of the shift under way. But unfortunately, US oil and fossil gas production also hit all-time highs in 2023, which threatens to undermine climate progress. The all-important question is: Can we accelerate the clean energy momentum already under way, while ensuring the benefits flow to all communities in an equitable way? Will we be able to move fast enough to meet international climate commitments while protecting people, ecosystems, and the planet?

THE NEED FOR SPEED

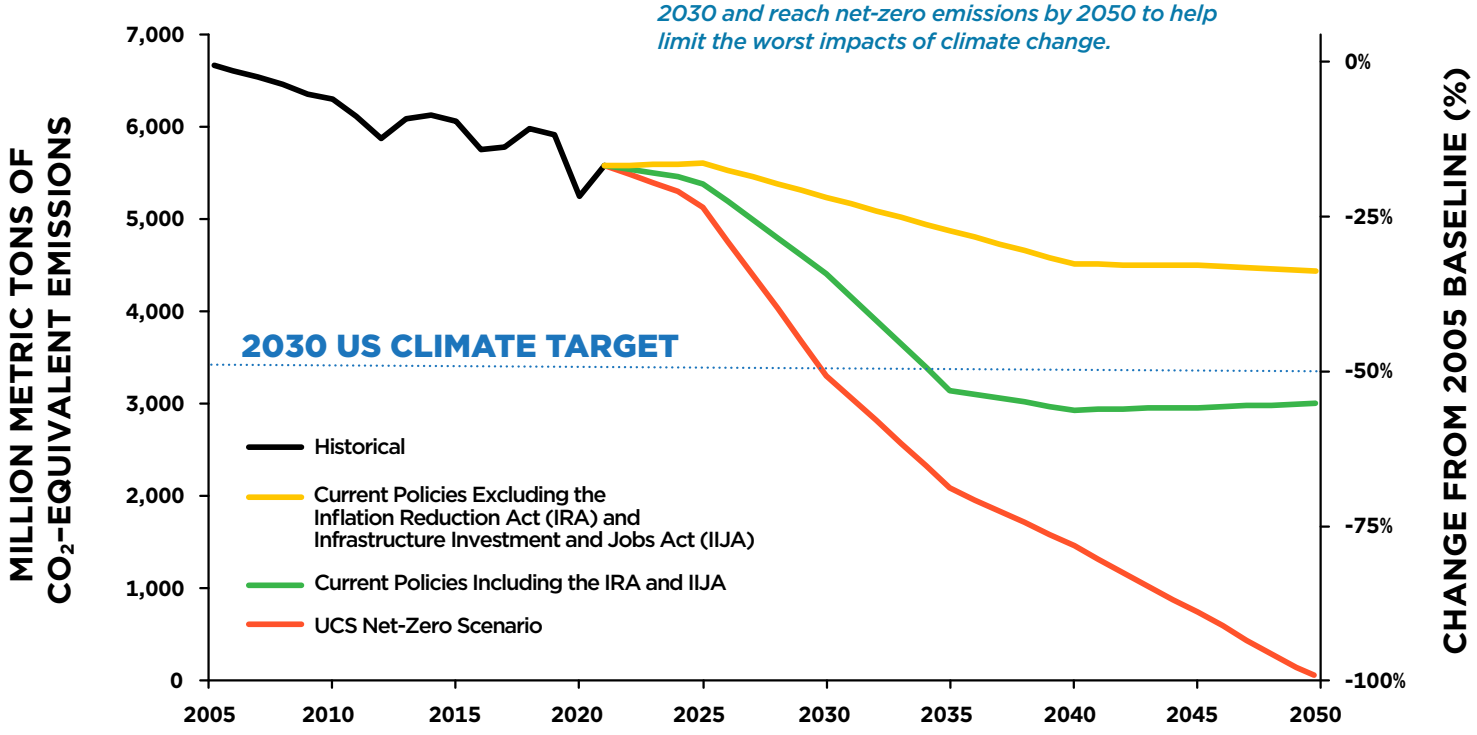
An interdisciplinary team of UCS experts set out recently to crunch the numbers about the speed and scale of our energy transformation. Their report, *Accelerating Clean Energy Ambition*, finds that, with concerted action to build on existing state and federal clean energy policies, the United States can reach its climate goals.

"We're not saying it'll be easy, but we know that a cleaner and more just energy future is within our reach," says Steve Clemmer, report author and director of energy research and analysis at UCS. "We outline a viable, cost-effective path for the United States to meet its emissions reduction targets."

What's more, Clemmer says, the team found that moving at the speed and scale needed will generate tremendous benefits. Not only will this allow us to avoid the enormous costs associated with climate damages, but it will also lower near-term consumer energy costs and dramatically reduce air pollution and improve public health at the same time.

NET HEAT-TRAPPING EMISSIONS IN THE UNITED STATES

Existing climate and energy policies are not sufficient to meet US climate targets. Additional policies are needed to cut our heat-trapping emissions in half by 2030 and reach net-zero emissions by 2050 to help limit the worst impacts of climate change.



THE URGENT NEED FOR A FOSSIL FUEL PHASEOUT

UCS supports a fast and fair global phaseout of fossil fuels to meet climate, health, and environmental justice imperatives. What does that look like?

First, it means a rapid and steep decline in the production and use of coal, oil, and gas, with a goal of getting to zero. UCS modeling shows that, with smart, comprehensive policies, we can cut heat-trapping emissions to at least half their 2005 levels by 2030 and to net zero by 2050. Phasing out fossil fuels is central to meeting these targets.

The default position of governments at every level across the country should be to reject the expansion of fossil fuel production and the buildout of infrastructure that could remain in place for decades to come. At the same time, governments—and businesses across all sectors—should steadily reduce their fossil fuel production and consumption.

To advance a phaseout that is both fast and fair, policymakers and regulators must oppose and dismantle the fossil fuel industry's disproportionate political influence over environmental, land use, and energy policy, while enacting policies and regulations that lead to a decline in fossil fuel use. Despite their claims and greenwashing campaigns, the fossil fuel industry has shown time and time again that it can't be trusted to lead this transition.

To learn more about UCS's position, visit our website: **https://act.ucsusa.org/win24-fossil-fuel-phaseout.**

The analysis also finds that while the IRA will help stimulate much of the near-term private investment in clean energy and related infrastructure needed to decarbonize the US economy—more than $1 trillion through 2035—that is still not enough. We will need additional policies and investments across all sectors if we are to succeed at slashing emissions in half by 2030 and reaching net-zero emissions by 2050. While the IRA roughly doubles the current pace of annual emissions reductions to about 3 percent per year through 2030, the analysis shows that the United States will need to accelerate its reductions to roughly 5 percent per year to achieve its climate targets.

SETTING PRIORITIES

The key to bridging the gap is swift action to dramatically ramp up the deployment of clean energy technologies and related infrastructure while also making sure to phase out fossil fuels.

How do we do it?

Clemmer emphasizes that the main solutions have long been clear. First, he says, we need to generate electricity primarily via wind and solar power instead of by burning coal and fossil gas. Second, we need to retool the transportation, building, and industrial sectors to run on clean electricity instead of dirty fossil fuels. And third, we need to do everything we can to increase energy efficiency in each of those sectors, thereby lowering overall energy demand.

The good news is that all these solutions can be accomplished with proven and commercially available technologies, and they can reduce energy costs for consumers. The UCS report urges federal and state policymakers to build on current policies by setting science-based emissions reduction goals and enacting ambitious policies to achieve those goals in every sector of the US economy. In addition, policymakers should adopt near- and long-term plans to cut fossil fuel production and use, reject fossil fuel infrastructure expansion, limit the role of carbon capture and storage and other carbon management strategies (which can be costly and do not address upstream emissions), and hold fossil fuel companies accountable for fraud and damages related to the climate impact of their products.

As report co-author Rachel Cleetus, lead economist and policy director of the UCS Climate and Energy Program, explains, "The urgency of the climate crisis requires a sharp turn away from fossil fuels toward clean energy solutions. Our analysis found that an ambitious suite of policies to meet US climate goals would cause overall fossil fuel use to fall 82 percent between 2021 and 2050. Oil would drop by 85 percent, gas by 72 percent, and coal would be eliminated entirely and rapidly." (See the box above.)

(continued on p. 21)

Photo: Oleksandra Troian/Getty Images; Illustration: Nick Iannaco/UCS

It's Possible to Shift Public Opinion and Political Will

INTERVIEW WITH CHITRA KUMAR

CHITRA KUMAR joined the Union of Concerned Scientists last May as the managing director of the Climate and Energy Program. She provides leadership, strategy, and oversight for the UCS teams working to transform the US energy system, hold fossil fuel polluters accountable, and make sure people have the tools and resources they need to build healthy, resilient communities in the face of climate change. Prior to joining UCS, Kumar was a high-ranking official in the US Environmental Protection Agency (EPA), advising senior Biden administration officials and EPA leaders on environmental justice and climate policies and programs.

You worked for more than 20 years in the federal government. What drew you to UCS and into the world of nonprofit advocacy?

CHITRA KUMAR: I have learned so much about how government can help society address the crises we are facing related to environmental degradation, social ills, and economic problems. I also know very well what the limitations of government are.

The two big things the EPA does are to provide funding and write regulations. I worked on both over the course of four presidential administrations. I learned that rules are written, pulled back, and rewritten with the pendulum swing of elections or by the courts. Now, I can be "upstream" influencing the language in legislation so that taxpayer-funded programs make the most sense, include a justice and equity lens, and have the most benefits according to our organization's value system.

UCS is a credible nonprofit that uses the best science for this kind of advocacy. This organization does not just write reports that sit on a shelf. Here, our work is used to effect change *today*.

You oversee a wide array of issues and campaigns as the managing director of our Climate and Energy Program. What excites you about the work now under way?

CHITRA KUMAR: It is exciting—especially as a former government official who could never do this type of work—to see our corporate accountability work up close, to learn how we advocate for change when industries have captured the political space. By revealing the deceptive tactics they've used, like with tobacco, it's possible to shift public opinion and political will. This gives me hope.

I'm impressed by our climate scientists who have done cutting-edge research that allows UCS to have more depth and play a key advocacy role domestically and internationally. What an honor it was for our team to be part of [the recent United Nations] negotiations in Dubai!

What our team brings to the table is tremendous expertise on transitioning the power grid to renewables, knowledge of the ins and outs of state and federal regulations, and the confidence of the regional transmission organizations. This country needs advocates with a deep understanding of the power system, like them, to go in and push back on the status quo. They are great advocates in that space and play a critical role the federal government could not do on its own.

We're in the middle of this pivotal decade, trying to curb emissions fast to prevent the worst climate change outcomes. With so much at stake and so much hard work to do, what are you most focused on right now?

CHITRA KUMAR: The country is implementing a historic level of funding: billions of dollars from the Inflation Reduction Act and Bipartisan Infrastructure Law. But federal and state government and local organizations are not prepared to handle it in such a short time frame.

What keeps me up at night is the concern that the places with higher capacity and most privilege will be best able to take

Photos: Tara Rice (Chitra Kumar); hedgehog94/Adobe Stock (ad)

> ***This country needs advocates with a deep understanding of the power system, like UCS, to go in and push back on the status quo. They are great advocates in that space.***

advantage of federal funding. I'm afraid they'll be the fastest, while the places that need more time to bring people on board, more support to get their foot in the door, and more attention to issues of justice and equity—I fear those communities, the most marginalized and disadvantaged, will lose out on the benefits of critical investments that could transform their futures to be more prosperous, thriving, and sustainable.

Over the next couple years, there will be a tsunami of money for investments like rooftop and commercial solar, building electrification, installing EV chargers, planting trees, heat mitigation, and cooling centers. All that funding will have a multiplier effect, but it's going to take people in communities to stitch all this funding together, to make more than the sum of the parts.

What UCS and organizations like ours must absolutely do is [serve as a] watchdog. We must track and show who is benefiting and who isn't so the programs can be continually improved. We must work with communities and leaders who have a broader reach than us, to get the money into their hands. At the same time, we need to be respectful partners and allies to such organizations. As a "grass-*tops*" organization, we must seek ways to open doors for grass*roots* ideas in the places of privilege that we occupy.

Working on climate change is not for the faint of heart. How do you center yourself and help your staff stay focused on UCS's most important priorities?

CHITRA KUMAR: I have a mindfulness practice that helps me have humility and lightness and remember that fixing all of society's ills is not on me, not on us. I say to myself every morning: let me do my best today. And at the end of every day, I can say I tried my best today, let me rest tonight, and tomorrow I will offer my best again. What that looks like is being clear about our strategies, being focused enough to get done the things we are great at, and being willing to say, "I've run my leg of the race and now I will pass the baton to the next advocate," whether that is a colleague, a coalition partner, or someone in government. {C}

This interview was edited for length and clarity.

BUILDING A STRONGER STEM WORKFORCE

The federal government has largely recovered from the Trump administration's "brain drain," but more work is needed to attract scientists who reflect the nation's diversity.

BY SETH SHULMAN

Back in 2017, the incoming Trump administration reassigned Joel Clement, a top government scientist and climate policy expert at the Department of the Interior, to a desk job collecting royalty checks from the fossil fuel industry. Clement opted to leave his government position. He signed on as a fellow at the Union of Concerned Scientists and became one of the most prominent people to blow the whistle on the Trump administration's unprecedented attacks on science.

Not all of Clement's colleagues chose to speak out the way he did, but their actions spoke for themselves. As UCS documented in the 2021 report *The Federal Brain Drain*, Clement was one of thousands of government scientists who left their jobs at federal agencies during the Trump years. Not all agencies were equally affected, but our analysis showed a steep decline in capacity at many: the Environmental Protection Agency (EPA) lost nearly 700 scientists during this period, and the much smaller Fish and Wildlife Service (FWS) lost roughly 200—more than 6 percent of its scientific workforce.

Photos: Drazen/Adobe Stock

The scale of the losses was especially significant because most experts at these agencies work to improve public health and protect our environment. The public relies on government scientists for everything from accurate weather predictions to warnings of food-borne illnesses. The loss of scientific capacity during the Trump administration was a stark reminder that the health of science at federal agencies is vital to *public* health—to keeping our air and water clean, staving off global pandemics, and surviving the impacts of climate change.

RESTORING CAPACITY

So, how is federal science faring today?

Our latest report on the subject, *Strengthening and Diversifying the Federal STEM Workforce*, finds some good news: the six key agencies we studied have all made strides in building back from the Trump slump (see the figure).

The data show that most of these science-heavy agencies are now at or near their 2017 capacities, while one outlier, the Food and Drug Administration (FDA), has seen significant growth in its scientific workforce over the past several years. And while the EPA and FWS continue to have slightly smaller workforces of STEM (science, technology, engineering, and math) professionals than in 2017, both show incremental increases during the Biden administration.

These overall trends bode well for the nation's public health and environment. But it is worth noting that building back to 2017-level capacity doesn't necessarily mean that our federal agencies have enough scientists to fulfill their missions. When we last surveyed government scientists in 2022 (the results were published in early 2023; see box on next page), we found that, at five of the six agencies surveyed, respondents cited limited staff capacity as the greatest barrier to science-based decisionmaking, over 15 other possible answers. Sixty-two percent of the scientists we surveyed (1,030 respondents) reported experiencing burnout in the last two years, and 70 percent of those who reported burnout said it was due to lack of staff capacity.

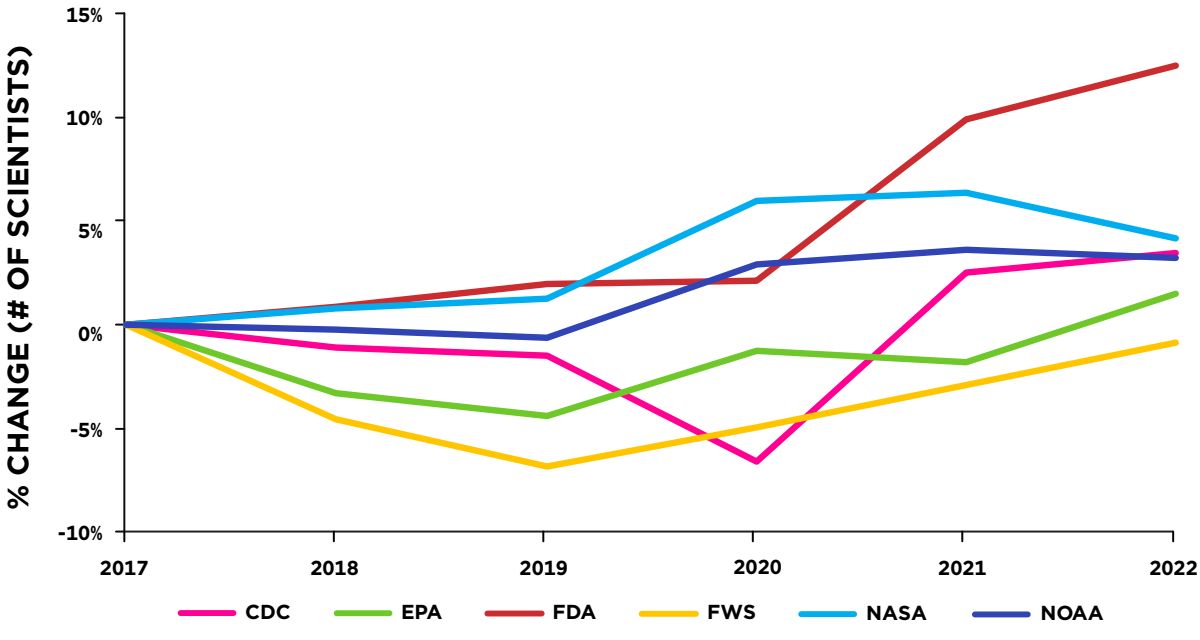
Considering the multitude of problems currently facing the United States, one could argue that the total number of STEM professionals at federal agencies should be *growing*.

MORE WORK NEEDED ON DIVERSITY

The total number of scientists tells only a piece of the story. It also makes a difference *who* the government is hiring because we all have a stake in a government—including its scientific workforce—that looks like the nation at large. The UCS report argues that diversifying our federal workforce is not only the right thing to do, it is also important for strengthening our government's scientific capacity to solve today's most critical problems. After all, multiple scientific studies have shown that diverse groups problem-solve and make decisions better together than homogeneous ones.

As Anita Desikan, senior analyst for the Center for Science and Democracy at UCS and the report's lead author, puts it,

PERCENT CHANGE OF STEM PROFESSIONALS SINCE 2017 AT SIX FEDERAL AGENCIES



It took some federal agencies five years to restaff after losing scientific experts during the Trump administration; others (such as the Fish and Wildlife Service) are still playing catch-up.

"The work of federal scientists affects all of us. Medical research, pollution monitoring, food safety inspection, and disaster response all rely on getting trustworthy, reliable scientific information. It really matters to have federal agencies fully staffed with the best, most diverse collection of scientists we can get."

Desikan explains that her team held an intensive, two-day roundtable with experts from academia, nonprofit organizations, and government—including Trump-era whistleblower Joel Clement—to develop a suite of recommendations for federal agencies about how to strengthen and diversify their scientific workforces. Five of the roundtable experts became co-authors of the report.

UCS MONITORS THE HEALTH OF FEDERAL SCIENCE

Citing the world-changing effects of climate change, COVID-19, and new technologies such as artificial intelligence, the UCS report *Strengthening and Diversifying the Federal STEM Workforce* says, "There has never been a more urgent time to ensure that the federal STEM workforce is strong. . . . The federal government will need to make science-informed decisions to best protect and support people in the United States, and it needs a strong and diverse STEM workforce to meet this challenge head-on. The recommendations offered in this report will help the federal government recruit and retain a top-tier STEM workforce fully prepared to meet the nation's most significant challenges."

For more information on the state of science in the federal government, refer to the following UCS reports:

- ***Strengthening and Diversifying the Federal STEM Workforce*** **(November 2023) https://act.ucsusa.org/win24-stem-workforce**
- ***Getting Science Back on Track: Voices of Scientists across Six Federal Agencies*** **(February 2023) https://act.ucsusa.org/win24-getting-science-back-track**
- ***The Federal Brain Drain: Impacts on Science Capacity, 2016–2020*** **(January 2021) https://act.ucsusa.org/win24-federal-brain-drain**

FEDERAL AGENCIES NEED TO DO MUCH MORE TO ATTRACT BIPOC PROFESSIONALS TO STEM-RELATED JOBS.

Among the top recommendations: agencies should better advertise the availability of jobs, and offer better pay, mentoring, and workplace conditions to improve retention. Agencies should do more to hold themselves accountable by assessing their progress. And their broader recruitment efforts should include partnering with historically Black colleges and universities (HBCUs), Hispanic-serving institutions, and Tribal colleges and universities.

As Desikan explains, the latter recommendation is among the report's most important because the report found a notable dearth of federal scientists coming from these so-called minority-serving institutions (MSIs), which are national leaders in producing BIPOC (Black, Indigenous, and other people of color) graduates with STEM degrees. For instance, 30 percent of Black Americans majoring in STEM fields graduate from an HBCU.

And yet, analyzing data from some 500 randomly selected government scientists at these science-focused agencies, the team found that at the Centers for Disease Control and Prevention, the EPA, the FDA, the FWS, and the National Oceanic and Atmospheric Administration (NOAA), the vast majority of scientists (ranging from 89 to 96 percent) obtained their highest-level degree from a university that is *not* considered an MSI by the Department of Education. The findings suggest that these agencies need to do much more to attract BIPOC professionals into the federal workforce.

In 2021, President Biden laudably issued an executive order requiring federal agencies to do just that. Since then, some have strengthened partnerships with MSIs or forged new ones. The EPA established an internal council to identify opportunities to partner with HBCUs, while the National Aeronautics and Space Administration and NOAA, among several other agencies, announced new grant programs to train students at MSIs.

"We at UCS celebrate these concrete steps," Desikan says. "But our data show that scientists who graduated from MSIs are woefully underrepresented in the federal workforce, and therefore federal agencies are currently missing the unique perspectives and insights this group of scientists can bring. That's why our experts are offering a powerful set of recommendations. Given the critical role that federal scientists play in informing government decisions that affect people's health and safety, we will all benefit as our federal agencies step up their efforts to build a stronger and more diverse STEM workforce." {C}

Change Is Coming to California's Croplands

By Pamela Worth

The earliest people to live in California's San Joaquin Valley, with its warm, Mediterranean climate, abundant water, and fertile soil, might have thought they were in paradise. When European colonizers arrived, they began centuries of exploitation of the valley's resources (including its people) and changed the landscape of the region to support massive farming operations. As agriculture industrialized, the valley's yields increased, and it became the most profitable agricultural region in the United States, generating more agricultural revenue on its own than Canada, Germany, or Peru—$37.1 billion in 2020.

Despite the wealth it produces, today's San Joaquin Valley is far from paradise. Big agribusinesses over decades have consolidated smaller and mid-size farms into corporate operations. Unsustainable farming and labor practices have led to the destruction of ecosystems; groundwater depletion and sinking land; polluted air, water, and soil; and rural communities poisoned by the indiscriminate spraying of pesticides, where workers who grow our nation's food can't afford to feed their families. Meanwhile, climate change is rendering the valley dangerously hot and dry. The region is at a tipping point, says UCS Senior Climate Scientist Ángel S. Fernández-Bou. "There isn't enough water in California to sustain our current agricultural practices," he says.

The dramatic depletion of groundwater reserves throughout California's Central Valley—the broader region that includes the San Joaquin Valley—has led to new restrictions on groundwater pumping. At the same time, the global price for certain crops has dropped precipitously, making some of the most common land and water uses less profitable for Big Ag. That means these corporations will have no choice but to change the way they work the land. "Land transition is coming to the valley," confirms UCS Western States Regional Director Juliet Christian-Smith.

Fernández-Bou, Christian-Smith, and their colleagues working in California are using science and data to plot out new uses for cropland that must be retired or repurposed. Their vision could usher in a new kind of paradise for the people who live and work there.

"This is going to be a very large-scale change, with a lot of new opportunities. If California does things right, that will have a fantastic ripple effect that will be positive for the environment, for sustainable agriculture, and for people," says Fernández-Bou.

REDUCING AGRICULTURAL WATER USE

Agriculture currently accounts for 80 percent of water use in the Golden State. For California to achieve water sustainability—enough water for its residents and businesses, including agriculture—about 1 million acres of farmland must be repurposed. Working with a team of UCS scientists and partners, Fernández-Bou estimated the environmental and socioeconomic costs and benefits of retiring and repurposing cropland within a mile of 154 rural and disadvantaged communities in the Central Valley, an area totaling about 500,000 acres.

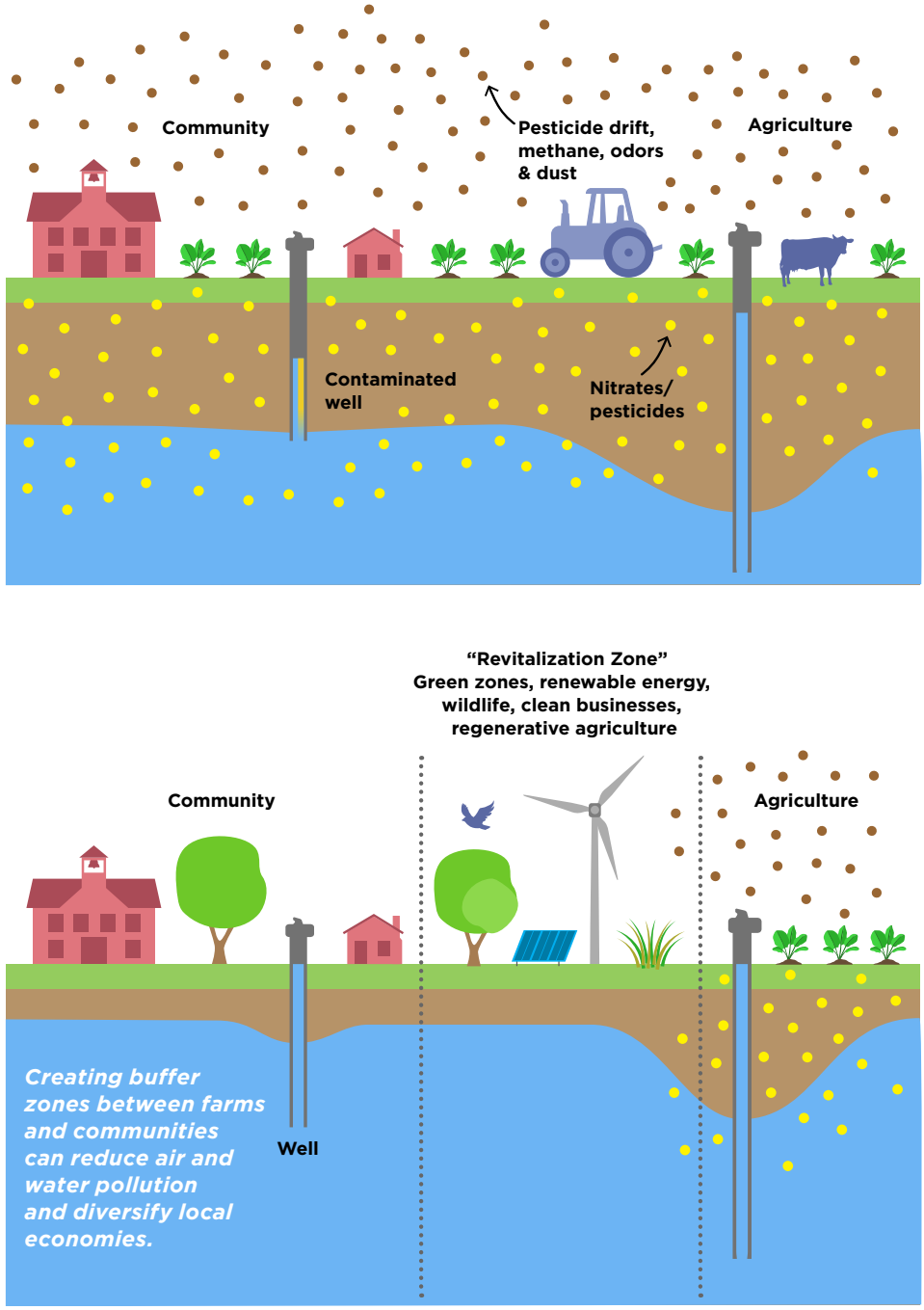
"Our idea was to create a physical separation between communities and agriculture—so if agriculture already must be retired in an area because of the water constraints, the people living there should see some benefits," Fernández-Bou says. "Right now, there's not enough separation. Pesticides sprayed from planes drift into people's homes. The air quality can get so bad, people get nosebleeds."

The team found that creating these buffers between communities and cropland could reduce agricultural water use by 576 billion gallons per year, equivalent to the annual indoor water

At a community workshop in Firebaugh, a town in the San Joaquin Valley, Ángel S. Fernández-Bou describes how to make homemade air filters to reduce indoor air pollution caused by nearby agricultural operations. Repurposing cropland around these communities can reduce air pollution, among other benefits.

Photo: Pablo Ortiz/UCS

REPURPOSING CROPLAND BENEFITS LOCAL COMMUNITIES AND ECOSYSTEMS



use of two-thirds of all Californians. Retiring this land could also reduce global warming emissions; drastically decrease fertilizer contamination of aquifers, rivers, and creeks; reduce pesticide exposure; and create lasting economic opportunities for residents. The detailed findings can be read at https://act.ucsusa.org/win24-cropland-repurposing.

"We don't need to—and must not—remove agriculture entirely," Fernández-Bou says. "We can transform it from unsustainable to sustainable. I would like to see farmers keeping their land and thriving." One sustainable option his team recommends is agrivoltaics: siting solar panels on farmland. Fernández-Bou says the panels provide shade for certain crops and animals, maintain moisture in the soil, and can generate a stable income for farmers. Other land could be repurposed into parks, wildlife corridors, and clean industry sites.

Through the Inflation Reduction Act and the Infrastructure Investment and Jobs Act, there are good incentives for converting cropland into renewable energy sites, Christian-Smith says. And UCS is an implementation partner in a California initiative called the Multibenefit Land Repurposing Program, which allocates funding to people transitioning their land for less water-intensive purposes; UCS staff are helping define the criteria for who will be awarded the funding.

"We're trying to shape the selection criteria to prioritize protecting community health and to provide incentives for farmers who want to practice regenerative agriculture," says Christian-Smith.

Fernández-Bou says the idea for revitalization zones came out of conversations with people living in the San Joaquin Valley. He and his colleagues have been working in these communities to help residents prepare for what's coming—not the easiest pitch, since the transition will necessitate cutting many existing jobs in agriculture. "Farmers appreciate when we're direct and honest with them. And they're aware of water scarcity and climate change," he says.

Christian-Smith agrees. "We're not only helping in a top-down way to set the priorities for the funding program, we're also working from the grassroots up, trying to help communities that are surrounded by agriculture to create projects that can compete for the new funding."

"For decades, the San Joaquin Valley has suffered from pollution and poverty," she says. "We can change that, and help make it a place that's known for good jobs and a healthy environment." {C}

Illustration: Anthony Eyring/UCS

Thomas Brown Cares about Science, Students, and the Future

After retiring from teaching thousands of students the importance of scientific literacy for over 34 years, Tom Brown is still thinking about science's role in our society. "Even though I'm not teaching anymore, I read about how science is being ignored," he says. "I'm concerned about science keeping its voice, and not being shut down." This concern motivates Brown to stay involved with local and national issues. He frequently contacts his elected representatives to urge them to base policies on science and evidence, and he supports the Union of Concerned Scientists by designating UCS as a beneficiary of the estate plan he shares with his wife.

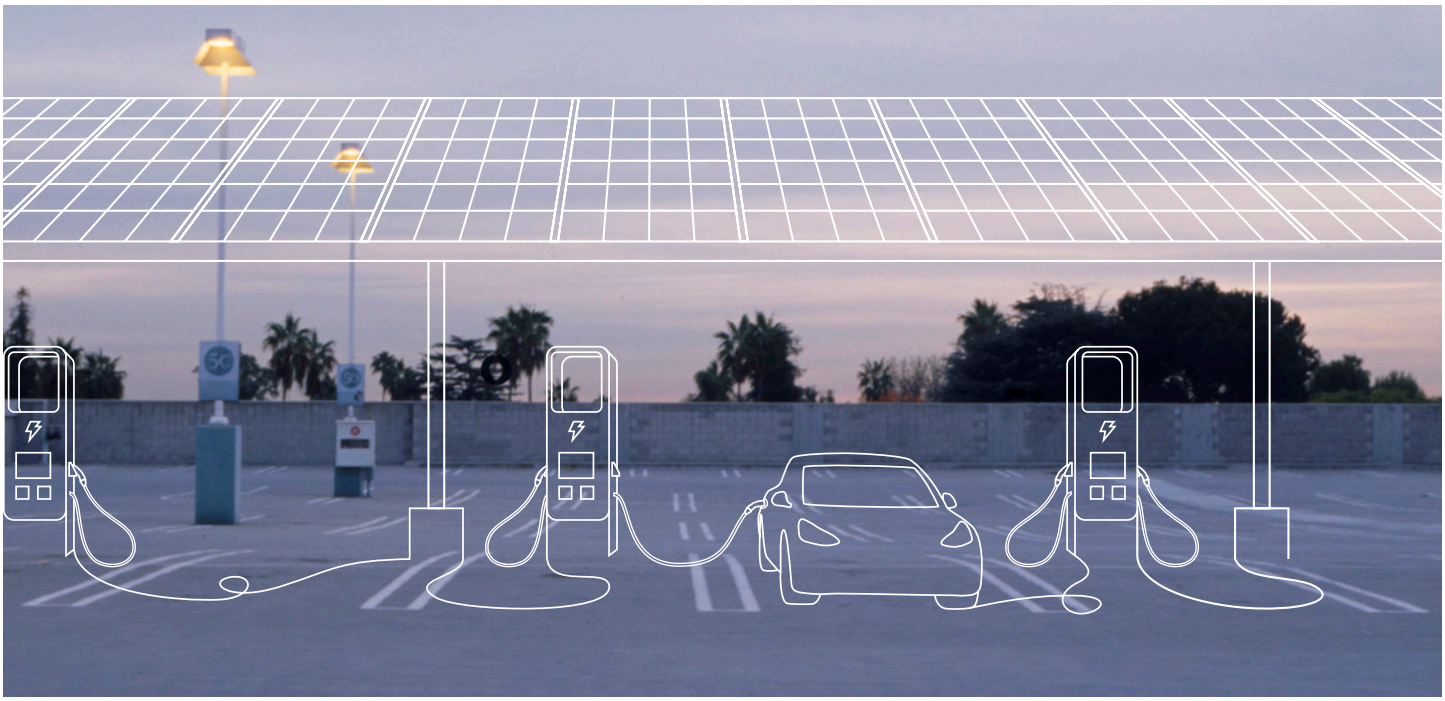
In developing this plan, the Browns thought about their values and legacy. "We talked about the fact that we wanted to give to organizations that were significant for us," Brown says. "For a long time, all I could give was a little at a time. This felt like a way for me to do just a bit more."

As a National Board–certified science teacher, Brown often brought UCS materials into his classroom as teaching aids. "With my physical science class, I would pull charts and information from UCS about nuclear power," he says. "The visuals helped my students with low reading levels. And with my biology classes, I would have them read different parts of various UCS publications on food and nutrition, and on climate change, hand-picking the essential parts."

Brown has had such an impact on his students that many keep in regular contact with him, including one he walked down the aisle at her wedding, and another whose wedding he officiated this summer. He sees a similar sense of community at UCS.

"It's an organization of incredibly dedicated individuals who are focused on using science to make the United States, and the world, better for not just the present but for the future," he says. When he's felt discouraged by the federal government's slow pace of progress on climate change, he's been cheered by the work UCS does in the states to accelerate the transition to clean energy. "It's not just trying to talk to 535 people in Congress and, if you're lucky, a couple of them will listen to you," he says. "By going to the states, progress can build up to that federal level."

What Brown appreciates most about UCS is that it "helps make it easy for other people to have a voice, and for us to put our voices together." {C}



Countdown to Zero

(continued from p. 11)

The analysis emphasizes that state and federal authorities need to protect marginalized communities that have borne the brunt of industrial pollution. These communities should be the prime beneficiaries of investments in clean energy technologies and efforts to cut air, water, and soil pollution, as well as carbon emissions.

HISTORICAL PRECEDENT

All told, the UCS report finds that the United States needs to nearly triple the share of electricity it generates from renewables to 60 percent by 2030, 81 percent by 2035, and 92 percent by 2050. And raising the degree of difficulty even more is the reality that many forces—especially those that profit most from business as usual—are actively trying to slow or stop the changes we need to build a healthy and prosperous future.

Nonetheless, as difficult as the challenge seems, history is filled with examples of large and often swift changes, even in the energy field. As a New Englander, I'm comforted by the example of whale oil, which fueled our local economy for decades.

Less than two centuries ago, whaling was an enormous multinational enterprise, as the blubber from hundreds of thousands of whales was boiled down into oil to be burned in lamps. At its height in the 1840s, whaling was the fifth-largest industry in the United States and a seemingly permanent source of energy. But in the second half of the 1800s, whale oil was quickly displaced by kerosene, and soon thereafter by the electric light. Within a matter of just a few decades, the vast, terribly destructive whale oil industry was history.

AS OF THE END OF 2022 THERE WERE **MORE THAN 10,000** PROPOSED WIND AND SOLAR PROJECTS—REPRESENTING **DOUBLE THE COUNTRY'S CURRENT ELECTRICITY CAPACITY**—ACTIVELY SEEKING INTERCONNECTION TO THE TRANSMISSION SYSTEM.

ENORMOUS BENEFITS

By the UCS team's estimate, a rapid and decisive shift to clean energy can boost the US economy with nearly $1.8 trillion in cumulative capital investments through 2035 and nearly $3.7 trillion through 2050, while avoiding some $575 billion in projected climate damages by 2035, and nearly $1.3 trillion by 2050. And these steps will significantly reduce harmful air pollution, avoiding as many as 73,000 premature deaths by 2050 and saving up to $800 billion in public health expenditures.

As Clemmer explains, "The solutions are clear: transitioning equitably to clean energy, increasing efficiency, and electrifying our cars and homes offer a crucial pathway for the United States to meet its climate goals. It's a big job, but we find that these steps will not only limit the worst impacts of climate change, they will also reduce our energy costs and improve our health." {C}

Photos: Paula Brown (Thomas Brown); Day Of Victory Stu/Adobe Stock (ad); Peter Starman/Getty Images (parking lot); Illustration: Nick Iannaco/UCS

The Grid's Reliance on Gas Carries Risks

By Mark Specht and Paul Arbaje

On February 9, 2021, the temperature in Dallas, Texas, fell below freezing and stayed there for nearly 10 straight days. The unusually cold temperatures, accompanied by a snow and ice storm dubbed Winter Storm Uri, took a toll on the region's power infrastructure—especially gas-fired power plants. As a result, the operator of the Texas electricity grid was forced to implement rolling blackouts. More than 4.5 million of its customers lost power, some for as long as four days, and 246 people died—the majority due to hypothermia. The grid operator said it narrowly avoided a catastrophic collapse, which could have left most of Texas in the dark for weeks or even months.

Winter Storm Uri exposed the inaccuracy of the fossil fuel industry's claims that gas is a reliable resource for electricity generation. In fact, the production, transportation, and burning of gas is particularly susceptible to disruptions during extreme weather—not just cold snaps, but also heat waves and droughts. Equipment failures resulting from freezing temperatures can shut down power plants, but a lack of fuel or a slowdown in the supply chain can cause problems too, as when wells freeze up.

Given that extreme weather is becoming more frequent and severe as climate change continues to intensify, and that fossil gas currently accounts for 43 percent of the United States' total electricity generating capacity, you might wonder what we can do to avoid a similar crisis.

WE CAN DO MUCH BETTER

The good news is that there are many ways we can make the US electricity grid more reliable. On the supply side, the most obvious solution is that we can transition away from fossil fuels to clean, renewable resources like wind and solar. When supported by energy storage and an updated transmission system, geographically distributed renewable resources can bolster grid reliability while eliminating both global warming emissions and toxic air pollutants that harm public health, particularly in communities of color where gas plants are disproportionately located.

Reducing or shifting demand for electricity can help too, enhancing reliability during cold snaps or heat waves and reducing the need to build large-scale infrastructure such as pipelines. The Union of Concerned Scientists is working to keep the lights (and heat) on by calling on regional grid operators and regulators at both the federal and state levels to consider the risks of widespread gas plant failures when evaluating the reliability of these resources. We're working to break down existing barriers to clean energy solutions, to increase scrutiny of gas plant operations and to make plant owners more accountable to the public. Our lives may depend on it. {C}

Mark Specht *is Western states energy manager and senior analyst in the UCS Climate and Energy Program.* ***Paul Arbaje*** *is an energy analyst with the program. Read more from them on our blog,* The Equation, *at https://blog.ucsusa.org. Read their latest analysis of gas plant reliability,* Gas Malfunction, *at https://act.ucsusa.org/win24-gas-malfunction.*

Cold snaps are just one example of extreme weather that can disrupt gas-fired electricity generation, keeping people from getting power when they need it most. Increasing our reliance on gas is not only bad for the climate, but also a risky bet as climate-induced extreme weather becomes more frequent.

Photos: nenets/Shutterstock (frozen valve); Mego-studio/Adobe Stock (ad)

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