Union of Concerned Scientists

Catalyst

Volume 18, Summer 2018

Sea Level Rise: What Next for Coastal Residents?

The EPA Plan to *Increase* Air Pollution

Interview with Michael Mann

[Union of Concerned Scientists

Catalyst, ISSN 1539-3410, is published quarterly by the Union of Concerned Scientists. Text of articles from *Catalyst*, duly acknowledged, may be reprinted free of charge. Artwork may not be reproduced.

Catalyst is printed on chlorine-free recycled paper with 100% post-consumer content.

EDITORIAL DIRECTOR
Seth Shulman

MANAGING EDITOR
Bryan Wadsworth

PRODUCTION MANAGER
Heather Tuttle

CONTRIBUTING EDITOR
Pamela Worth

CONTRIBUTING WRITER
Elliott Negin

DESIGN
Rigsby Hull

COVER
Maureen Drennan

BACK COVER
Audrey Eyring/UCS

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

This publication is financed by contributions from individual members; you can join UCS by sending a tax-deductible contribution of $25 or more to UCS Development, Two Brattle Square, Cambridge, MA 02138-3780.

NATIONAL HEADQUARTERS
Two Brattle Square
Cambridge, MA
02138-3780

PHONE
(617) 547-5552

EMAIL
ucs@ucsusa.org

WEB
www.ucsusa.org

Pictured on the cover: High-tide flooding in Queens, New York—one of hundreds of coastal communities where sea level rise threatens the housing market. Read more on p. 9.

Fighting to Protect Fuel Economy Standards

By Ken Kimmell

As I write this column, the Union of Concerned Scientists is gearing up for what is likely to be one of the biggest fights of the Trump era—the proposed rollback of vehicle fuel economy and emissions standards. These standards, which UCS led the charge to secure in 2012, have already improved the fuel efficiency of cars, trucks, and SUVs, and will cut carbon dioxide emissions by approximately 500 million tons by 2030, reduce oil consumption by 2.4 million barrels per day, and save consumers an average of $6,000 at the gas pump over the life of a vehicle.

Unfortunately, the reflexively anti-Obama wrecking ball that is the Trump presidency is now swinging to smash these successful standards. The Environmental Protection Agency and National Highway Traffic Safety Administration are expected to propose a new rule that stops all progress on fuel economy after 2020 and, on top of that, attempts to take away the right of California and other states to set their own stricter standards—a right California has exercised for 50 years.

We are fighting this rollback on all fronts, mobilizing our members and supporters, elected leaders in Congress, and leaders of affected states to push back as hard as we can during the public comment period that will soon open on this proposal. We are also holding carmakers accountable for seeking to renege on their commitment to the very standards they agreed to years ago when they needed federal help. Should the Trump administration issue a final decision that weakens these standards, we will take it to court, armed with a scientific record demonstrating that the standards are working as intended.

In the meantime, we need all our members and supporters to let the Trump administration and the auto industry know of the broad public support for cleaner cars. Keep an eye out for UCS action alerts over the next several months and help us stand up against this misguided rollback.

Photos: Viktor Hanacek/picjumbo (road); Richard Howard (Kenneth Kimmell)

WHAT OUR MEMBERS ARE SAYING

Here's a sampling of recent feedback from the UCS Facebook page (*www.facebook.com/unionofconcernedscientists*) and Twitter feed (*www.twitter.com/ucsusa*).

WHAT OUR SUPPORTERS WANTED TO SAY AT EXXONMOBIL AND CHEVRON'S SHAREHOLDER MEETINGS

Ned Flaherty:
How much of today's environmental and climate damage would have been avoided if Exxon and Chevron, instead of concealing the harms of fossil fuels, had ceased polluting the planet when those harms were first discovered?

Lyn Gardner:
Is money more important than saving our Earth and the citizens who live here, both now and into the future? We have a huge responsibility to do the right thing, don't you agree? The right thing should be total transparency!

Ron Masters:
The world already has 50-year supplies of oil and natural gas as proven reserves. Burning all of either resource will exhaust the global carbon budget, making it impossible to achieve the world's goal of limiting warming to 2°C. Why are you still exploring for more oil and gas?

@GheorghiuAndy:
Well, first of all #ExxonKnew, and the first thing @exxonmobil needs to do is to pay for the pollution of the planet and their major contribution to #globalwarming and #climatechange!

ON UCS PUBLISHING INTERNAL MEMOS REVEALING THE EPA'S EFFORT TO DISCLOSE SENSITIVE PUBLIC HEALTH DATA (SEE P. 5):

Patricia Borchmann:
Impressive work by Union of Concerned Scientists. Thank you for posting online for easy public access to see what EPA works hard to conceal.

@Slopiegal:
The words "secret" and "science" do not belong in the same sentence. The Environmental Protection Agency must have a mission statement that demands the best, most-recent, peer-reviewed, published science.

ON THE EPA'S PLAN TO ROLL BACK FUEL ECONOMY STANDARDS

Barbara Bird:
Automobile makers have a choice in this also, and I will buy accordingly.

Ronnie Swett:
If US automakers don't keep on track with fuel economy, the sale of foreign cars will go up, because they'll be way ahead of us.

CORRECTION: *The cover story in the last issue incorrectly listed the EPA's Region 5 as covering 338 square miles. The region covers 338,000 square miles. We apologize for the error.*

[IN THIS ISSUE]

In a First, This Year's UCS Ranking Declines to Name "Greenest" Automaker

In June, the Union of Concerned Scientists issued the seventh edition of its *Automaker Rankings*, a report that compares major US automakers based on the emissions of the vehicles they sell. In a departure from previous editions of the rankings, UCS found that no company deserved to be named as the "greenest" automaker this year.

The report (online at *www.ucsusa.org/autorankings2018*) identifies a number of energy-efficient technologies that are being deployed by the automakers—and leadership from some companies that could drive progress considerably further. The problem is, even though the automakers have these innovative technologies at their fingertips and publicly tout their commitment to sustainability and climate, their lobbyists and trade groups are working with the Trump administration behind the scenes to roll back fuel efficiency standards. This deprives consumers of the efficient choices they deserve.

Among the report's other key findings:

- Fiat Chrysler is the dirtiest of the major automakers, standing out for its failure to invest in cleaner technologies.
- Progress has slowed at Toyota, once a leader in fuel-efficient technology, to the point where its average vehicle sold in 2017 emits *more* global warming emissions than in 2013.
- Honda tops the list of major manufacturers this year, while American manufacturers Ford and GM lag well behind their international competitors.
- Smaller companies such as Tesla now lead the industry in low-emissions vehicles.

The report's author, UCS Senior Vehicles Analyst Dave Cooke, emphasizes that strong government emissions standards are driving the progress we've seen to date, and need to be maintained to help ensure that cars keep getting cleaner—for the climate, public health, national security, and Americans' wallets. "Many automakers, including Ford and Toyota, tout themselves as 'green' companies, and their executives talk a lot in public about sustainability and climate change," he says. "Our rankings are a reminder that we need to judge these companies not just on what they say, but what they do."

Photo: RainerPlendl/iStockphoto

Poll Showcases Farmers' Strong Support for Sustainable Agriculture

This spring, UCS surveyed some 2,800 farmers across the political spectrum in seven midwestern states about their views on sustainable agriculture. The results were impressive: nearly three-quarters of the farmers surveyed said they want a US farm bill that prioritizes sustainable agriculture and conserves soil and water. What's more, 72 percent said they would be more likely to support a candidate for public office who prioritizes farm success through sustainable agriculture rather than business as usual. Learn more, and see state-by-state survey results, at *www.ucsusa.org/farmersurvey.*

"Farmers are eager for ways to safeguard natural resources while also improving their bottom lines," says Karen Perry Stillerman, a senior analyst in the UCS Food and Environment Program. "They are telling us they want more tools, technical assistance, and financial support to help them adopt these practices. Their elected officials would be wise to listen."

UCS Helps Win All-Electric Bus Fleet in San Francisco

The San Francisco Municipal Transportation Authority—the second-largest bus fleet in the state of California—approved a transition to 100 percent zero-emissions buses by 2035. UCS worked hard with coalition partners for this win: a letter to the city's transportation authority that we helped draft with local and national partners launched the process; UCS offered public comments at key meetings; and we got help from UCS Science Network members. "This is a very positive step in San Francisco to fight air pollution and global warming," says UCS Outreach Coordinator Emily Heffling. "We're hoping many other cities will follow suit."

Political Motives Exposed at the EPA

Talk about getting caught red-handed: this spring, documents obtained by UCS through a Freedom of Information Act (FOIA) request revealed that a so-called "restricted science" proposal floated by former EPA Administrator Scott Pruitt was blatantly driven by politics. The documents confirm that Lamar Smith, the chair of the House Science Committee, initiated a conversation with the EPA about implementing Smith's repeatedly failed "restricted science" legislative effort through administrative means.

The "restricted science" effort seeks to disqualify many important independent health analyses currently used by the EPA by requiring the disclosure of personal health data—a violation of US privacy laws. As UCS discovered, correspondence between several EPA political appointees, including EPA Deputy Assistant Administrator Nancy Beck, a former staffer at the American Chemistry Council (the chemical industry's trade association), explicitly discussed incorporating loopholes and exemptions to the proposed rule that would limit its impact on studies conducted by industry. As Yogin Kothari, senior Washington representative with the Center for Science and Democracy at UCS explained: "The documents made it abundantly clear that the EPA was knowingly using a political ploy to try to undermine independent scientific analysis."

UCS made the cache of documents publicly available, and the story earned widespread media coverage, exposing this attack on science and its possible impact on public health. Media coverage of the story helped UCS gather nearly 1,000 scientists' and experts' signatures and comments calling on the EPA to reject the proposed "restricted science" guidance. The documents are available at *www.ucsusa.org/EPA-FOIA*.

Photos: Dusan Kostic/Adobe Stock (farmer); Ekevara Kitpowsong/Special to S.F. Examiner (bus)

Major Boost for US Offshore Wind Power

The first US offshore wind farm was installed off the coast of Rhode Island in 2016 and has been providing clean electricity to New England ever since.

With several significant new approvals, the US offshore wind power industry has passed an important threshold in recent months, with project-driving mandates from Northeast and mid-Atlantic states over the next decade totaling more than 8,000 megawatts. That's equivalent to the amount of electricity used by nearly 5 million homes (try out the math at *http://blog.ucsusa.org/offshore-wind-calculator*). And with the help of UCS analytical work and advocacy, especially in Massachusetts, the United States is now poised to become a major player in offshore wind power, despite having lagged behind Europe for a quarter century.

Here are some of the details: Earlier this year, Massachusetts and Rhode Island approved projects totaling 1,200 megawatts, Maryland utilities regulators approved two offshore wind farms totaling 368 megawatts, and Connecticut took proposals for 200 megawatts' worth of projects. New Jersey Governor Phil Murphy signed into law a goal of 3,500 megawatts of offshore wind by 2030.

AN ENORMOUS OPPORTUNITY

Equally notable, the Trump administration has allowed major lease sales of federal waters for offshore wind projects to move forward, maintaining the Obama administration's support for the technology. As Interior Secretary Ryan Zinke has said, "We think there's an enormous opportunity for wind."

A big piece of this opportunity is economics: rapid advances in turbine power and installation efficiency in Europe are driving offshore wind energy prices toward parity with fossil fuel energy sources far faster than predicted. With the biggest offshore wind companies in Europe now trying to stake claims in the US market, Trump's Energy Department says there could quickly be a "robust pipeline" of nearly 24,000 megawatts.

To put that into perspective, Europe took 25 years to get to its current 16,000 megawatts of offshore wind power.

MORE JOBS, FEWER EMISSIONS

A robust pipeline also means jobs. The clean energy agencies of New York, Massachusetts, and Rhode Island say the 8,000 megawatts of forthcoming projects could create up to 36,000 jobs. The US Department of Energy says that a market for offshore wind equivalent to that in Europe could match that continent's current 75,000 jobs in the sector.

As for reduction of global warming emissions, Europe is well on track for onshore and offshore wind to provide 21 to 38 percent of the continent's electricity needs by 2030. With enough wind resources in the United States to power the nation twice over, the prospects are looking increasingly strong for offshore wind to become a major source of energy in this country in the decades to come.

Photo: Derrick Z. Jackson

Working to Curb the Military in Outer Space

While many Americans focus on the all-too-real threat of terrestrial war, UCS Senior Scientist Laura Grego is trying to forestall the possibility of war many miles above our heads. Grego is one of 25 experts worldwide who are now drafting a guide to what military activities are legal in space: the Woomera Manual on the International Law of Military Space Operations.

Though more than 100 nations are party to an Outer Space Treaty created 50 years ago, updated agreements to keep space secure from conflict have stalled. The Woomera Manual aims to fill this gap by clarifying how existing international law, including humanitarian law, already provides important constraints. Grego was invited to join the Woomera Manual group based on her expertise in space security technology and policy. She and the team are working on the project now and expect to publish the manual in 2020.

New Developments in Fossil Fuel Lawsuits

This spring, communities in Colorado and Washington State followed the example set by others in California and New York in bringing lawsuits against fossil fuel companies for their culpability in climate change. In April, two Colorado counties and the city of Boulder sued ExxonMobil and Suncor Energy (Canada's largest oil company) to hold them responsible for climate-related damages. And, in May, Washington's King County (which includes Seattle) sued the five largest oil companies on similar grounds.

In late June, as *Catalyst* went to press, a federal judge dismissed one of the suits that had been brought by San Francisco and Oakland against the five biggest privately owned oil companies, claiming climate change–related damages. The ruling holds that Congress and the administration—rather than the courts—should resolve the issue of company responsibility for climate damages. Nonetheless, the judge agreed with the plaintiffs that climate science has demonstrably shown that "the combustion of fossil fuels has . . . materially increased carbon dioxide levels," driving up average global temperatures and raising sea levels. Likewise, he acknowledged that the oil companies "have allegedly long known the threat fossil fuels pose to the global climate," yet funded public relations campaigns that "downplayed the risks."

The ruling is a setback for San Francisco and Oakland taxpayers who are bearing the mounting costs of climate change–related damage in their communities, but it will not directly affect suits filed by a handful of other municipalities and counties. As UCS Climate Accountability Campaign Director Kathryn Mulvey notes, "Given these companies' significant contribution to climate change—and their decades of deception about climate science—it is long past time that they be held liable for the harm they have caused."

Photos: Omari Spears/UCS

HOOPERS ISLAND, MARYLAND

**Data provided by third parties through the Zillow Transaction and Assessment Dataset (ZTRAX). More information on accessing the data can be found at www.zillow.com/ztrax. The results and opinions presented in this report are those of the Union of Concerned Scientists and do not reflect the position of Zillow Group.*

THE LOOMING COASTAL REAL ESTATE BUST

A new UCS analysis calculates the threat rising seas pose to the US housing market.

By Pamela Worth

Ten years ago, bad real estate investments triggered an economic crisis that few saw coming. Those who did had the unenviable task of sounding an alarm over complex and then-unfamiliar concepts such as mortgage-backed securities, subprime loans, and credit default swaps.

Today, the climate scientists and economists studying sea level rise at the Union of Concerned Scientists see another slow lurch toward crisis in the US real estate market, different and perhaps more intransigent, as hundreds of thousands of coastal properties are increasingly threatened with flooding. At least this potential crisis is easier to explain: climate change is causing sea levels to rise at an accelerating rate, which means many coastal properties are at risk of chronic high-tide flooding in the near future.

Flooded properties will lose value and, given how widespread the problem is, likely trigger significant deflation in real estate values in many coastal communities, creating problems not just for homeowners but also for mortgage lenders, insurers, real estate developers and investors, and even for communities' tax bases.

Furthermore, while past crashes in the housing market have tended to be temporary, sea level rise is only getting worse under current conditions. For a better sense of what to expect, the UCS team examined information on coastal homes and commercial properties provided by the real estate company Zillow,* and overlaid these data with previous UCS analysis of time frames for chronic flooding in US coastal communities. The results are published in the new UCS report *Underwater: Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate*.

"Most homeowners, communities, and investors are not aware of the financial losses they could soon face," says UCS Lead Economist and Climate Policy Manager Rachel Cleetus, who coauthored the report.

Kristina Dahl: Mapping What's at Stake

UCS Senior Climate Scientist Kristy Dahl uses her passion for maps and spatial analyses to quantify the effects of sea level rise for broad audiences.

"Communicating through maps is a very powerful way to show people what we're facing in the coming decades," she says. A lifelong lover of beachside communities, Dahl also understands the overwhelming sense of loss contained within the coordinates and data.

"For the first few months of working on this report, I was consumed by the analytical challenge," she says. "But we were building much more than a bunch of maps of a danger to coastal communities. People have built their lives in these places and care very deeply about them. I strive to keep that in mind no matter how deep into the numbers I am."

Dahl says she joined UCS for the organization's ability to present science and analysis in compelling and accessible ways. She hopes that coastal communities will use *Underwater* and its analysis to help prepare for the future.

"I study sea level rise because I want our coasts to retain their vitality," she says. "By understanding the gravity of the risks we face, my hope is that we can agree to try to reduce those risks and preserve as much as we can of our coastal heritage."

HAMPTON BEACH, NEW HAMPSHIRE

According to the authors, by 2045, or within the lifetime of a typical 30-year mortgage issued today, more than 300,000 existing US homes and commercial properties will be at risk of chronic, disruptive flooding—properties currently valued at $135 billion. By the year 2100, those numbers balloon to 2.4 million homes and 107,000 commercial properties currently worth more than $1 trillion.

Equally troubling are the numbers in the near term: nearly 150,000 existing homes and 7,000 commercial properties are at risk within 15 years, meaning properties worth some $65 billion in today's dollars face a near-term threat.

With the publication of *Underwater*, UCS scientists and economists are sounding the clearest of alarms.

"Our results suggest there's a lot of unrecognized risk that's lying below the surface and poised to come rushing to the fore," says report coauthor and UCS Senior Analyst Erika Spanger-Siegfried.

WHAT WE STAND TO LOSE

The UCS team set a specific threshold to define chronic flooding: high-tide flooding that occurs 26 or more times a year—or every other week on average. Many coastal cities and towns can expect this frequency of flooding in the decades ahead (for details on where, when, and the extent of flooding, see the 2017 UCS report

Many communities developed over time for greatest-possible proximity to the ocean. But today the ocean is rising, and the cost of that proximity is becoming evident.

When Rising Seas Hit Home or visit the interactive map at *www.ucsusa.org/RisingSeasHitHome*).

"Our estimates may be conservative," says Spanger-Siegfried. "Less frequent flooding would probably get most homeowners and communities to take action. Plus, we're not even factoring in the effects from storms in these projections."

This frequency of flooding will be enough to prompt changes in property values—sharp declines for some, slower declines for others. The difference will depend on how much coastal real estate within a given community is at risk, and whether communities have sufficient resources to invest in flood-proofing measures.

"Unfortunately, in some places, the risks are so high that communities may come to the realization that retreat is the 'best worst option,'" says Spanger-Siegfried, adding a note of caution on the limitations of protective measures such as seawalls. "They won't work everywhere, and they can be prohibitively expensive to build and maintain. They're usually better at protecting communities from damaging waves than keeping out high tides."

For homeowners, their greatest asset could be irreversibly depreciated. As property values decline, and people who are willing and able to leave their flooded homes do so, coastal cities and towns could lose significant tax revenue—hindering the ability to fund schools, road maintenance, emergency services, and the very infrastructure improvements that might forestall some of the worst effects of flooding. Even for coastal dwellers whose homes are unaffected by flooding, property taxes could rise to compensate for an eroding tax base. Services could be cut. Infrastructure could be neglected.

These are not abstract concerns: the authors of the *Underwater* report found that, in roughly 120 communities along our coasts, 20 percent of the local tax base comes from properties at the highest risk for chronic flooding in the next 30 years. About a quarter of those cities and towns could lose more than half of their tax base.

Zooming out to the national economy, financial markets that trade on coastal mortgages and large-scale coastal development could take huge hits. Municipalities' credit ratings could be downgraded. This aggregation of losses could have negative reverberations throughout the US economy—from which it would be difficult to recover, says Cleetus.

(continued on p. 20)

Photos: David Harp (Maryland, p. 8); Brenda Ekwurzel/UCS (Kristy Dahl); Patricia Lane Evans (New Hampshire)

"No Worthier Battle" than Defending Climate Science

INTERVIEW WITH MICHAEL MANN

How did you become a climate scientist?

MICHAEL MANN: From the earliest days I can remember, I was always asking questions of my parents—and my other relatives, and teachers, and anybody who would listen. I was always curious about the natural world, about the way things work, and I always enjoyed solving problems.

So that led me to pursue a degree in applied math and physics at the University of California–Berkeley, and I went to graduate school at Yale University to study theoretical physics. And then I realized there was this fascinating, huge, unsolved problem that required math and physics: the problem of modeling Earth's climate. And that's what led me into the field of climate research.

You're well known—perhaps unfairly, considering the breadth of your work—for your collaboration on the famous "hockey stick" graph depicting global average temperatures over time. What are the origins of this graph that has given you so much grief from climate change deniers?

MICHAEL MANN: The project I was working on at the time had nothing to do with climate change initially; it had to do with long-term climate cycles. To identify these cycles, we used tree rings, corals, ice cores, and lake sediments—natural archives we can use to extend the climate record back in time.

As a by-product of that analysis, we decided to use those records to reconstruct climate patterns from hundreds of years ago. And when we did, we realized that this work had implications for human-caused climate change. Because when we plotted average temperatures far back in time, it became clear that the warming spike that we've seen over the past century has no precedent as far back as we could go—at least a thousand years.

We published that work in the journal *Nature*, back in 1998. The curve that showed the average temperature of the Northern Hemisphere, which has come to be known as the hockey stick because of its shape—the blade of the hockey stick being the rapid warming of the past century, and the handle being the longer-term trend as you go back a thousand years—that took on a life of its own.

Why do you think this one graph gained so much traction?

MICHAEL MANN: It told a simple story. You didn't need to understand the physics of the climate system to understand that there is something unprecedented about the warming we've seen over the past century. It was the one result in that article that got all the attention. And suddenly I found myself in the center of the larger, fractious debate over human-caused climate change, because of the deep implications the hockey stick had.

You might be the scientist most frequently maligned by those who deny that climate change is real, caused by humans, and a serious problem. Why do you think your work has received so much backlash?

MICHAEL MANN: There have been coordinated and well-funded efforts by fossil fuel interests and their various

MICHAEL MANN is a distinguished professor of atmospheric science and the director of the Earth System Science Center at Pennsylvania State University. Among his many honors, he recieved the Award for Public Engagement with Science from the American Association for the Advancement of Science in 2018. He is the author of more than 200 peer-reviewed and edited publications, numerous op-eds and commentaries, and books including *The Hockey Stick and the Climate Wars: Dispatches from the Front Lines* (Columbia University Press, 2012) and, with cartoonist Tom Toles, *The Madhouse Effect: How Climate Change Denial Is Threatening Our Planet, Destroying Our Politics, and Driving Us Crazy* (Columbia University Press 2016).

Photo: Dave Bowman/NASA

> *"I don't think there's any more important thing I could be doing with my life than trying to inform this discussion about what might be the greatest challenge we face as a civilization."*

front groups to discredit climate scientists, and scare us so we would stop participating in the larger public conversation. I certainly was among several scientists who were subject to these attacks.

What they're trying to do is obscure the scientific consensus, and fool people, and provide fodder for politicians to do the bidding of fossil fuel interests rather than what's right for the constituents they're supposed to represent. That can be frustrating, to see politicians repeating these debunked talking points that have been focus-grouped and poll-tested. That's why they're using them: they're false, but they have this veneer of credibility and that's all that they think they need.

How have these attacks affected you?

MICHAEL MANN: There were times when it felt like it was too much, and I started to question whether I signed up for all this. You know, when I went off to graduate school, little did I think that I was preparing for a career of battling these forces of denialism.

However, I don't think there's any more important thing I could be doing with my life than trying to inform this discussion about what might be the greatest challenge we face as a civilization. Given the choice, I would choose the same path.

In your book* The Madhouse Effect, *you mention that people frequently ask you about a "tipping point" for the climate, after which the damage caused by unchecked carbon emissions becomes irreversible. Do you believe there is such a point?

MICHAEL MANN: My answer is disappointingly nuanced, because, in reality, there is no one climate tipping point. There are probably many. Dangerous climate change to me isn't a cliff. It's more like a minefield that we're walking on, and we will certainly set off mines if we continue. We don't know exactly where they are; all we know is that as we walk out onto the minefield, we subject ourselves to greater danger and risk. And that's why we have to stop marching onto that minefield—by bringing down our carbon emissions dramatically.

What would you say to early-career scientists to encourage them?

MICHAEL MANN: Know that if you're doing cutting-edge science in any field where the findings might collide with powerful special interests, you have to expect that they will push back through any means available to them. Often that involves attacking scientists. So, have courage, and if you're being attacked by these sorts of folks, it's not because you're doing bad science.

If you're a climate researcher today, especially one who engages with the media and communicates to the public, then you're going to be challenged. You'll want to make sure your research stands up to the scrutiny of your fellow scientists, because there are people who will look to discredit it in any way possible.

The battle to inform the public about science and its implications—there's no worthier battle, in my view, to be involved in. It's not a skill set that science necessarily selects for, but I think we're seeing younger scientists today who are more engaged in communication and outreach. If you're looking for a silver lining, then that's certainly one. {C}

Photo: geniusksy/Adobe Stock

CALCULATING EPA'S

Photo: Klaus Eppele/Adobe Stock

THE THREAT TO THE AIR WE BREATHE

UCS analysis shows how a proposed rollback could bring dramatically dirtier air to a neighborhood near you.

By Elliott Negin

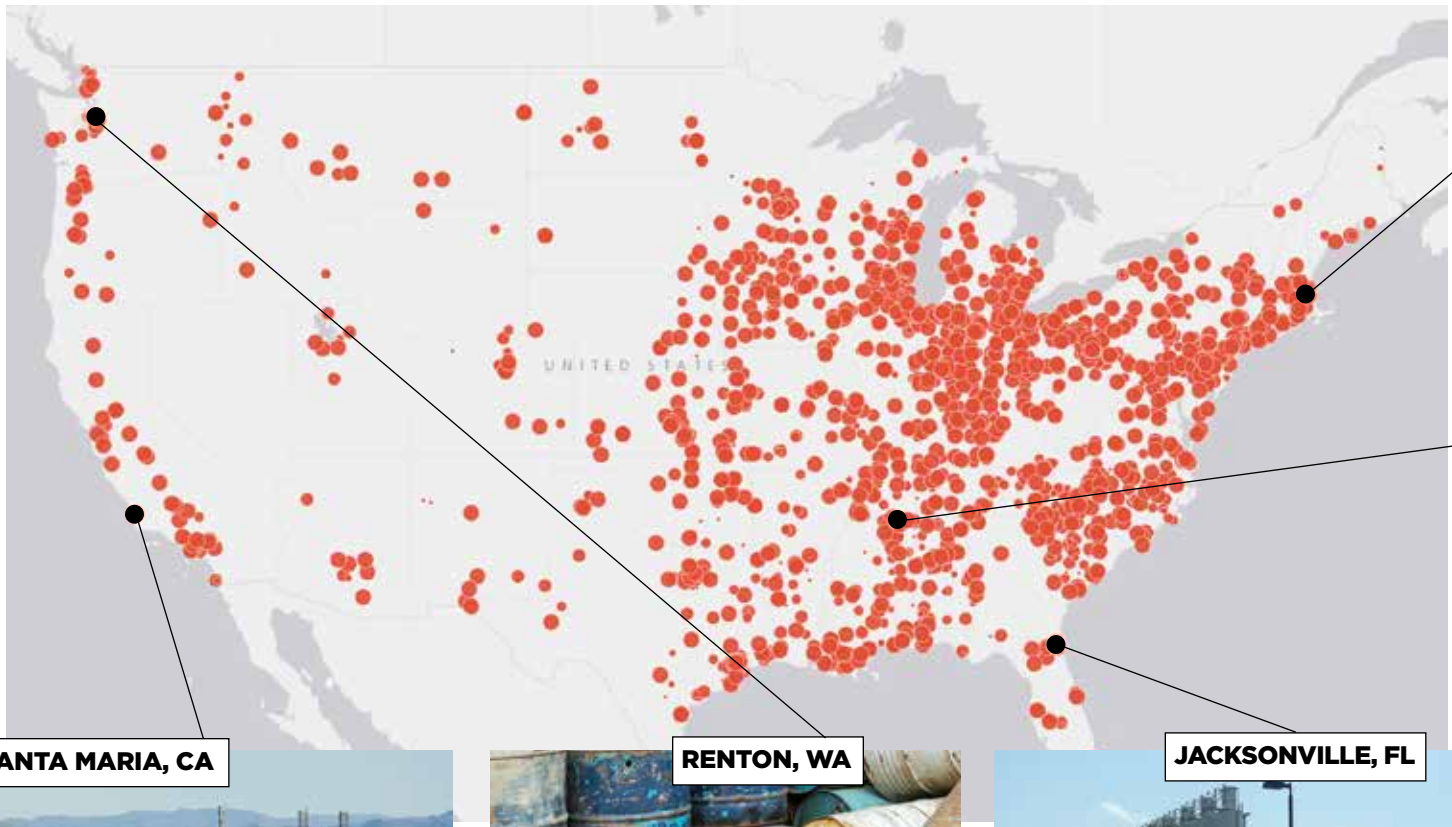
When asked about his take on environmental protection shortly after the 2016 election, President-elect Trump was unequivocal.

"Clean air," he said, "is vitally important."

Since taking office, however, the Trump administration has quietly begun the process of rolling back decades of progress in reducing air pollution. Perhaps the most alarming move to date is a proposed rule change that would allow hundreds of industrial facilities across the country to dramatically increase their emissions of the most hazardous air pollutants. Some of these pollutants—arsenic, benzene, dioxin, mercury—have been linked to cancer, brain damage, birth defects, respiratory illness, or premature death.

To anyone who values clean air, that sounds like a terrible idea. But it wasn't clear exactly how much additional pollution this seemingly arcane, under-the-radar proposal could cause, and proponents disingenuously insist that it would actually encourage emissions reductions. To pin down the real-world ramifications of revoking the rule, Juan Declet-Barreto, climate scientist and Kendall Fellow at the Union of Concerned Scientists, led a team to crunch the numbers.

"We knew that changing this longstanding science-based policy would increase toxic air pollution," Declet-Barreto says. "We also knew it would make more people sick. But we wanted to find out just how much more air pollution would result and where. And we wanted people across the country to be able to use our research to figure out how their own communities could be affected."



RECLASSIFYING MAJOR POLLUTERS

As detailed in a memo issued earlier this year, the Environmental Protection Agency (EPA) plans to change a policy dating back to 1995 that designates industrial facilities as "major sources" of air pollution if they annually emit 10 or more tons of a single toxic pollutant or 25 tons or more of a group of pollutants, and requires them to install "maximum available control technology" (MACT) to curb their emissions.

As the policy is currently applied, once a facility is designated as a major source, it is permanently subject to the MACT rule, known as the "once-in, always-in" policy. The technologies required by the policy—scrubbers, filters, and the like—have dramatically reduced emissions of 187 hazardous air pollutants listed in the 1990 Clean Air Act amendments, sometimes by as much as 95 percent.

Disregarding that success, the new proposal would allow major-source facilities that have reduced their emissions below the 10- or 25-ton limits to request reclassification. That would enable them to discontinue using MACT-mandated pollution control equipment and free them from MACT reporting requirements as long as their emissions remain below the 10-/25-ton threshold.

SEE THE IMPACT WHERE YOU LIVE

So just how much more pollution would result from this change? Declet-Barreto and his fellow UCS scientists analyzed several government databases to assemble a complete list of the facilities currently subject to the MACT rule, identify which facilities would be affected by the change, and determine how many tons of pollutants they might now be allowed to emit.

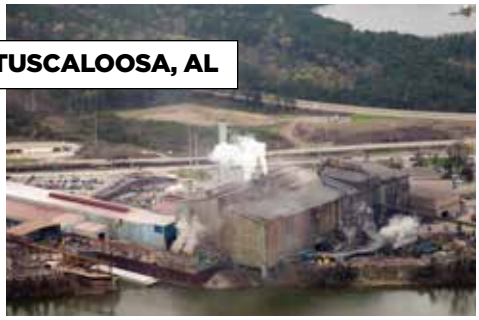
The result of the team's efforts is an interactive map on the UCS website, showing where the proposed policy change would have the most impact (available at *www.ucsusa.org/HAPrisk*).

THE NUMBERS ARE STAGGERING

All told, 2,766 industrial facilities nationwide are subject to the MACT rule. Of these, more than two-thirds—1,926 major-source facilities—emit less than 25 tons. The new guidance would permit them to collectively increase their toxic pollution by as much as 35,000 tons annually if they were all reclassified. That represents a potential 25 percent jump in dangerous air pollutants over current levels.

While it is unlikely that facilities formerly classified as major sources would remove their pollution control devices, it is likely that they would turn the devices off or run them at lower capacity to cut energy, operating, and maintenance costs.

Photos: Steve E. Miller/Santa Maria Sun (Santa Maria, CA); holwichaikawee/Shutterstock.com (Renton, WA); City of Jacksonville (Jacksonville, FL); John L. Wathen/Hurricane Creekkeeper (Tuscaloosa, AL); BanksPhotos/iStock.com (Charlestown, MA)



And while these facilities would have to comply with other air pollution laws, they would no longer be regulated or inspected as stringently as major-source polluters.

"There's ambiguity about how this new approach will work in practice," says Declet-Barreto. "But we can be certain that giving polluters a pass will disproportionately affect certain neighborhoods in industrial towns, many of which are already dealing with high levels of toxic pollution. Low-income communities and people of color will likely suffer the most."

WHO WILL BE HARDEST HIT?

At least 25 states have their own air pollution standards that may at least partially compensate for the absence of the federal rule, but 21 other states rely exclusively on federal regulations, so facilities in those states that emit less than the 10-/25-ton threshold would no longer be subject to the MACT rule if reclassified.

As the UCS map reveals, of those 21 states, the three with the largest number of affected facilities are (in order of total facilities) North Carolina, Alabama, and Kentucky. Without the MACT once-in, always-in rule, 86 industrial plants in North Carolina could increase their hazardous emissions by 1,464 tons per year, boosting annual emissions in that state to 7,456 tons (a 24 percent jump). Alabama's 81 facilities could increase their toxic output by 1,259 tons annually, increasing that state's total emissions by 13 percent. And 69 plants in Kentucky could spew an extra 1,314 tons of pollutants into the air per year, yielding a 26 percent increase in that state's total emissions.

New England states, however, face the biggest percentage increases in toxic air pollution.

Massachusetts, which has 25 major-source facilities that would be affected by the rule change, could potentially see a 244 percent annual rise in toxic air pollution, from 220 tons to 757 tons. Seven of those facilities are in the Boston metro area and now emit nearly 14 tons a year. If they all increased their annual emissions to 25 tons, which would be allowable if the once-in, always-in requirement were revoked, they would emit an extra 161 tons of pollution—a more than tenfold increase.

Thirteen plants in Connecticut, meanwhile, could increase their annual emissions by 281 tons, driving up total toxic air pollution in the state 385 percent, from 73 to 354 tons. And, in the most extreme case, six plants in Rhode Island could emit an additional 134 tons, increasing total emissions in the state from 16 to 150 tons, an 838 percent jump.

WHAT YOU CAN DO

Fortunately, the change to the MACT rule is not yet a done deal. The EPA memo is merely a guidance document that explains how the agency intends to interpret existing rules. It also indicates that the agency will go through the standard rulemaking process to codify revisions to the once-in, always-in policy.

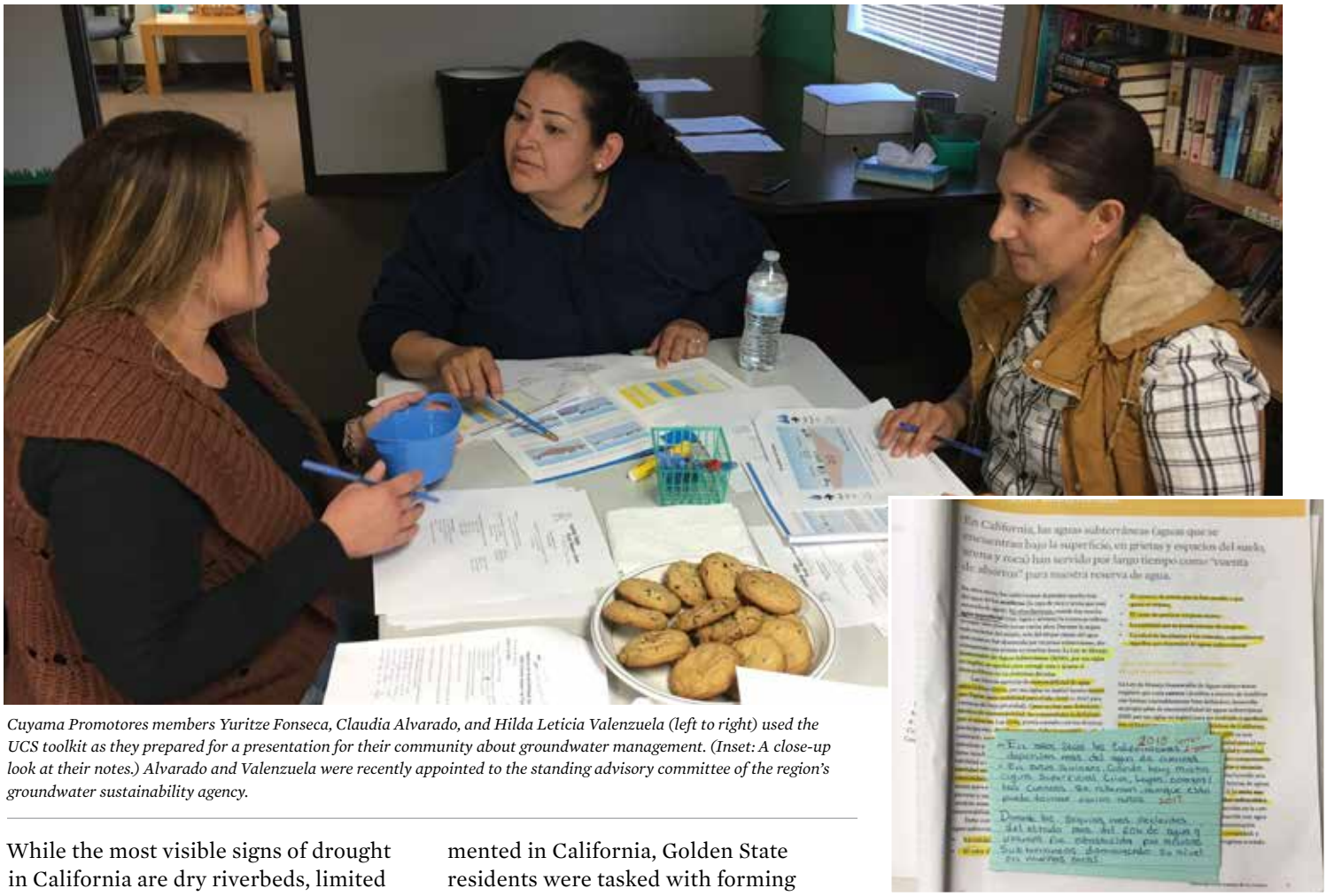
The rulemaking process can take 12 to 18 months and involves a public comment period, offering UCS members and supporters a chance to weigh in directly. Beyond that, lawsuits by states and public interest groups could also do much to slow the process, if not scuttle it altogether.

"Our research clearly shows that this move would sabotage the EPA's mission of protecting public health and the environment, threatening many communities with dramatic increases in toxic air pollution," says Declet-Barreto. "Our map allows people across the country to see how these changes could affect their families and their communities. Hopefully it will encourage them to speak up and fight for cleaner air." {C}

TAKE ACTION

Visit the UCS website at **www.ucsusa.org/HAPrisk** to see how this proposed rollback will affect the air near you. The interactive maps calculate the potential increases at individual facility locations as well as within US congressional districts. **You can use the information to contact your elected official** and urge them to take action to oppose this dangerous rule change.

Groundwater Planning: Helping Local Activists Have a Say



Cuyama Promotores members Yuritze Fonseca, Claudia Alvarado, and Hilda Leticia Valenzuela (left to right) used the UCS toolkit as they prepared for a presentation for their community about groundwater management. (Inset: A close-up look at their notes.) Alvarado and Valenzuela were recently appointed to the standing advisory committee of the region's groundwater sustainability agency.

While the most visible signs of drought in California are dry riverbeds, limited snowpack, and depleted reservoirs, some of the state's more serious water supply problems are hidden from view. An overreliance on underground aquifers in the state has led to concerns that California could run out of groundwater, causing significant environmental harm. The Union of Concerned Scientists has been working for years to promote science-based groundwater sustainability policies on the West Coast and figure out sensible ways to execute them.

When the Sustainable Groundwater Management Act of 2014 was implemented in California, Golden State residents were tasked with forming groundwater sustainability agencies (GSAs) that would create their own plans for preserving this vital resource. UCS worked to support fledgling GSAs with guidance on their plans, and today these groups have become almost as Californian as In-N-Out Burger, with dozens operating in the regions where the risk of groundwater depletion is highest.

Unfortunately, GSAs are not always representative of the people who will be most affected by the policies they draft, says UCS Western States Outreach Coordinator Coreen Weintraub. "Large landowners often have an outsized say in groundwater management," she says, "even though the issue clearly affects the health and well-being of all residents."

PUTTING THE UCS GROUNDWATER TOOLKIT TO WORK

To help encourage better representation in GSAs, Weintraub and her colleagues in the UCS Oakland office created a printed "toolkit"—in both English and Spanish—called *Getting Involved in Groundwater* (*Participe en el manejo de su cuenca)*. Supported by a series of

Photos: Cuyama Valley Family Resources Center

workshops the UCS team conducted in counties around the state, the toolkit (online at *www.ucsusa.org/CAgroundwatertoolkit*) helps English and Spanish speakers learn more about their stake in groundwater management, and how they can get involved to represent their communities' interests and needs.

Groundwater to a group of Spanish-speaking women who call themselves the Cuyama Promotores ("promoters"). Interest and engagement in groundwater management is crucial in this particular region, says Weintraub.

"They need it, because the Cuyama Valley has a critically overdrawn groundwater basin," she says. "And there's been some questionable investment in agriculture there, because the water supply may not match the needs of growing operations."

The Cuyama Promotores used their knowledge to successfully demand representation in the region's groundwater management process.

These efforts have yielded results even beyond the cities and towns UCS team members personally visited. In a remote town in the Cuyama Valley, home primarily to agriculture and oil operations, a social services agency passed around *Getting Involved in Groundwater* to a group of Spanish-speaking women who call themselves the Cuyama Promotores ("promoters"). Interest and engagement in groundwater management is crucial in this particular region, says Weintraub.

"They need it, because the Cuyama Valley has a critically overdrawn groundwater basin," she says. "And there's been some questionable investment in agriculture there, because the water supply may not match the needs of growing operations."

The Promotores studied the toolkit and delivered a presentation about it to other Cuyama Valley residents. And then they successfully used their knowledge to demand representation in the area's groundwater management planning process. Two of the Promotores have now been appointed to the standing advisory committee of the Cuyama Basin GSA.

"They're going to advocate for the community's needs as the agency works to draft its sustainability plan," says Weintraub. "We're glad the toolkit helped them be conversant in the language of groundwater issues. Now they can bring their own local knowledge and awareness of the problems—and their enthusiasm—to help create a plan for the Cuyama Valley that will work for everyone." {C}

A significant amount of California's groundwater is used for irrigation. Groundwater sustainability agencies work with farms, residents, governments, and other water users to create comprehensive plans for managing and preserving this vital resource.

Photo: Herr Loeffler/Adobe Stock

Using our guide and online toolkit, Californians—even those with little to no experience discussing groundwater issues—can prepare themselves to effectively participate in shaping the vision and plan for their community around maintaining groundwater supplies.

In California and interested in learning more about water management? Download the toolkit (in English or Spanish) at **www.ucsusa.org/CAgroundwatertoolkit.**

CHARLESTON, SOUTH CAROLINA

"Unlike housing market crashes of the past, where property values eventually rebounded, chronically inundated properties will only go further underwater as seas rise—literally and figuratively," she says.

HOW DID WE GET HERE?

It hasn't always been a bad idea to build a new home on the water, or to invest in coastal real estate—people have always settled along coasts. But sea level rise is forcing us to rethink our choices, including the outdated incentives and public policies that encourage coastal development.

"Property values in most coastal real estate markets do not currently reflect the risk of flooding from sea level rise," Cleetus says. "This is an across-the-board problem."

Few guidelines—for home insurers, real estate developers, zoning boards, mortgage providers, credit rating agencies, home buyers, or anyone with a financial stake in coastal properties—take sea level rise into account, in part because many of these actors don't have the right information, and in part because markets tend to favor short-term profits. Prospective home buyers in particular should be entitled to accurate information about the risks of chronic flooding from sea level rise but, in most cases, mortgage providers, real estate agents, and insurers are under no obligation to disclose these risks. (UCS has developed a list of smart questions for prospective home buyers to ask; learn more at *www.ucsusa.org/underwater*.)

On the government side, federal, state, and local policies have created incentives that not only reinforce the status quo, but potentially expose more people and property to risk. For example, says Cleetus, the way we think about disaster aid is shortsighted.

"As a nation, we invest far too little in measures to reduce flood risks before disasters strike instead of just in their aftermath—even though studies have shown that these types of investments provide six dollars in benefits for every dollar invested," says Cleetus. "We should be doing more to protect communities before the fact."

HOW DO WE PREVENT THIS CRISIS?

The *Underwater* authors drew upon today's best scientific evidence to project about six feet of sea level rise by the end of the century. Of course, if carbon emissions are reduced, melting of ice is limited, and warming stays below 2°C, the difference could potentially be enormous. Using an optimistic projection, the number of homes at risk from chronic flooding by 2060 drops from 625,000 to 138,000. By 2100, emissions reductions could help spare more than 2 million homes: from 2.4 million at risk to 340,000.

Sadly, says Spanger Siegfried, the best-case scenario is not where we're headed currently. "Given current emissions, the reduced sea level rise projection is something we should definitely work for," she says. "But we shouldn't plan for it. Each year that global emissions increase, a more moderate projection becomes more impossible to achieve."

Sensible, science-based policy solutions, Cleetus says, are our best bet to prepare for rising seas and avoid a market crash.

"There are so many opportunities for progress—for example,

Photos: Paul Zoeller/The Post and Courier via AP (South Carolina); Humboldt Baykeeper/Creative Commons (Flickr) (California); Ryan Green/Getty (ad)

SAN JOSE, CALIFORNIA

restoring the federal flood risk management standard [repealed by President Trump]," she says. "Or updating federal flood risk maps to reflect sea level rise. Changing policies around disaster management to encourage more risk mitigation, and less business-as-usual rebuilding. And providing resources and information for homeowners in high-risk communities to understand their risk and figure out their options."

These policy solutions must be holistic, coordinating the efforts of private markets and federal, state, and local governments, Cleetus says. They must also be equitable, and protect the many thousands of US coastal residents who either will not be able to afford to relocate or will want to stay and sufficiently adapt their homes and communities to chronic flooding.

The solutions must also be timely.

"The cliff's edge of market deflation is visible in many coastal communities—if you choose to look," Cleetus says. "We must act wisely with our remaining time." {C}

The Faulty Rationale behind a Dangerous New Nuclear Weapon

By Lisbeth Gronlund

When President Trump took office, he inherited an arsenal of some 2,000 ready-to-use nuclear weapons. It consists of five different warheads on long-range missiles in underground silos, on submarines, and on air-launched cruise missiles, and several types of bombs that can be dropped from airplanes. These weapons have an astonishingly wide range of explosive yields—from 0.3 kiloton (50 times smaller than that of the bomb that destroyed Hiroshima) to 1.2 megatons (80 times greater).

But this array of destructive capacity is apparently not enough for the Trump administration, which plans to deploy a new warhead on submarines: the W76-2 Trident warhead, with a reported yield of 6.5 kilotons, would replace some of the existing, higher-yield (100-kiloton) W76 warheads. It will be relatively quick and inexpensive to produce the new "low-yield" W76-2 warheads, which could be placed on submarines before Trump's term is up.

Of course, "low-yield" is a misnomer—if used against a Russian city, this weapon could kill tens of thousands of people and injure far more.

In its 2018 assessment of US nuclear forces—called the Nuclear Posture Review (NPR)—the administration argues that the new Trident warhead "will help counter any mistaken perception of an exploitable 'gap' in US regional deterrence capabilities." The term "regional deterrence capabilities" is code for low-yield nuclear weapons that would be used in a regional, conventional conflict.

The administration already has some 2,000 ready-to-use nuclear weapons at its disposal. But apparently that's not enough.

In other words, according to the NPR, the United States needs the new W76-2 warhead because, without it, Russia will mistakenly believe it could use nuclear weapons in a conventional conflict without fearing a US nuclear response because of a perceived gap in US low-yield capabilities.

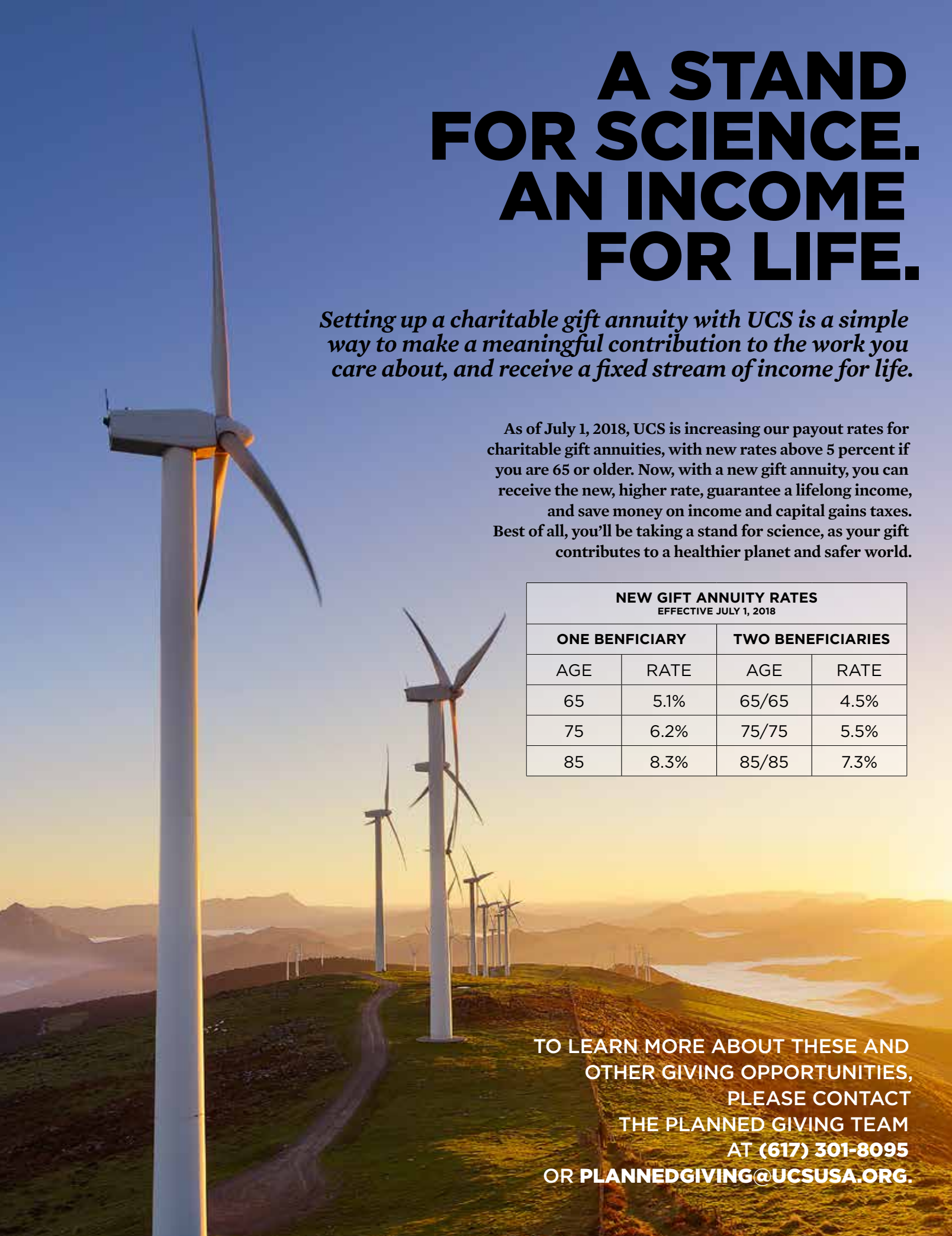
Claiming there is a gap is absurd. The arsenal already includes warheads with yields of 5 and 10 kilotons.

A renewed interest in nuclear war-fighting is evident throughout the NPR, which calls for tighter integration of US nuclear and conventional forces, including training and exercising with integrated units, so US forces can fight "in the face of adversary nuclear threats and employment." That means preparing to fight even if Russia uses low-yield nuclear weapons, and the United States responds in kind.

Deploying this new warhead, which adds to current US low-yield nuclear capabilities, would take US policy in precisely the wrong direction, increasing the role of nuclear weapons in US security plans and indicating that the United States considers such weapons to be usable. {C}

Lisbeth Gronlund, *a senior scientist at UCS, codirects the organization's Global Security Program. You can read more of her work on the* All Things Nuclear *blog, at* www.allthingsnuclear.org.

Photos: Richard Howard (Lisbeth Gronlund); Seaman Benjamin Crossley/US Navy (missile); mimadeo/Adobe Stock (ad)



A STAND FOR SCIENCE. AN INCOME FOR LIFE.

Setting up a charitable gift annuity with UCS is a simple way to make a meaningful contribution to the work you care about, and receive a fixed stream of income for life.

As of July 1, 2018, UCS is increasing our payout rates for charitable gift annuities, with new rates above 5 percent if you are 65 or older. Now, with a new gift annuity, you can receive the new, higher rate, guarantee a lifelong income, and save money on income and capital gains taxes. Best of all, you'll be taking a stand for science, as your gift contributes to a healthier planet and safer world.

NEW GIFT ANNUITY RATES EFFECTIVE JULY 1, 2018			
ONE BENFICIARY		TWO BENEFICIARIES	
AGE	RATE	AGE	RATE
65	5.1%	65/65	4.5%
75	6.2%	75/75	5.5%
85	8.3%	85/85	7.3%

TO LEARN MORE ABOUT THESE AND OTHER GIVING OPPORTUNITIES, PLEASE CONTACT THE PLANNED GIVING TEAM AT **(617) 301-8095** OR **PLANNEDGIVING@UCSUSA.ORG.**

Union of Concerned Scientists
Science for a Healthy Planet and Safer World

Two Brattle Square
Cambridge, MA 02138-3780

SCIENCE RISING

With your support, UCS is STANDING STRONG for the values that protect our health and safety—and our democracy.

Learn more at *www.ucsusa.org.*

@UCSUSA

www.facebook.com/unionofconcernedscientists