



Union of
Concerned Scientists



Catalyst

Volume 20, Fall 2020

**Clean Air Win
in California**

Powered by UCS teamwork

**The Case for
Eliminating ICBMs**

**Avoiding Climate
Catastrophe**

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

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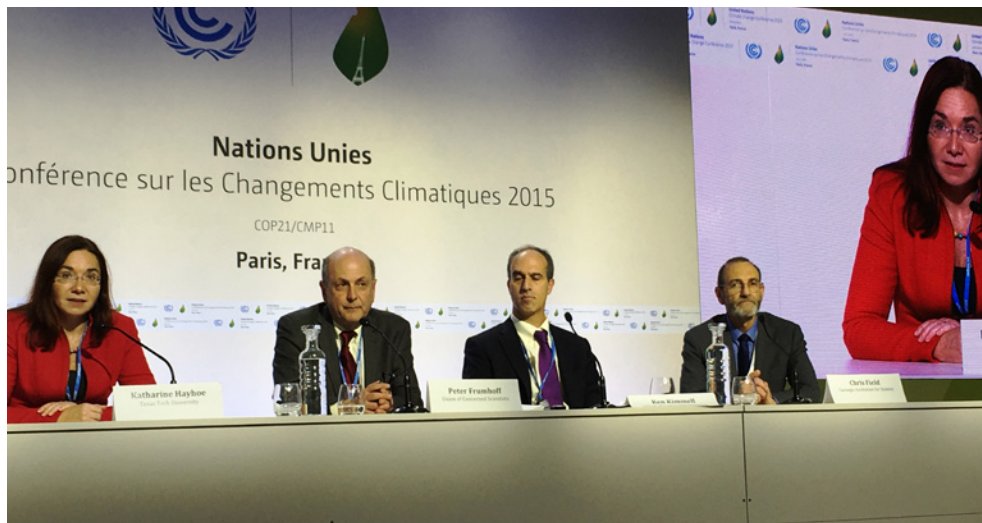
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In Gratitude



The author (third from left) at the historic United Nations conference on climate change held in Paris in December 2015, which led to the international Paris Agreement to reduce emissions worldwide.

By Ken Kimmell



Writing this column is bittersweet for me: it will be my last one as president of the Union of Concerned Scientists, as I am stepping down at the end of this year.

When I began this job six years ago, I called it “the honor of my lifetime.” I’ll never forget the excitement of my first year, 2014, when I saw UCS play an influential role in the Obama administration’s effort to address climate change, including successfully persuading the administration to increase the impact of the Clean Power Plan. It was the first time in history that a final EPA rule was more ambitious than a draft rule.

In 2015, I led a delegation of UCS staff and others to Paris to witness the historic approval of the Paris climate accord, an agreement that my colleague Alden Meyer spent the better part of his professional life working toward. I left Paris full of hope that the world was turning a corner.

When Donald Trump was elected in 2016, we recoiled from an onslaught of attacks on science, rollbacks of essential safeguards, and hateful and divisive rhetoric. I am proud

I’ll never forget the excitement when I saw UCS, in my first year, successfully persuade the EPA to increase the impact of the Clean Power Plan.

of the way UCS grew more visible and muscular during this time; we became the leading voice for science, and we pushed back hard on immoral and inhumane policies of the Trump administration, even when those policies were not squarely within UCS’s issue lanes.


(continued on p. 20)




WHAT OUR SUPPORTERS 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).

ON THE TRUMP ADMINISTRATION SHORTENING THE 2020 CENSUS TIMELINE


 @MarkRuffalo:
Filling out the census is the most important thing you can do besides voting. This is where funding and representation are allocated for your communities. Don't let the bad guys scare you or make you feel it's not important. Get on it now.

ON MINNESOTA SUING FOSSIL FUEL COMPANIES FOR CLIMATE-RELATED FRAUD (SEE P. 6)

 James Melton:
Like the tobacco industry, they leveraged the money earned from killing their customers to create the impression they were causing no harm. Now they need to be held financially accountable for mitigating the damage done to the Earth.


 Robin Redden:
I hope other states come on board!


ON THE TRUMP ADMINISTRATION EXCEEDING 150 ATTACKS ON SCIENCE

 Thomas Phillips:
We have little hope of working out our problems if these incessant, constant attacks on science continue. This has to stop!


 Gareth Dhaillecourt:
Thank you UCS for staying on top of this.


ON UNIVERSITY BUILDINGS AND SCHOOLS NAMED FOR RACIST SCIENTISTS


 Carol Rahe:
We can and should teach about these people and racism but condemn them instead of honoring them.

 Audrey Smolin:
Thank you for sharing the disgraceful part "science" played in our racist history. What we don't know can truly hurt us.

ON THE 75TH ANNIVERSARY OF THE HIROSHIMA AND NAGASAKI BOMBINGS

 @LeeDB1956:
There are still a few hibakusha [survivors of the bombings] with us. It is vital that we listen to their stories.

 @lpaintthousand:
[As] a daughter of hibakusha from Nagasaki, I hope as many people as possible would realize that nuclear weapons should not be here.

 @DavidHendel:
I hope that we never forget this devastation and loss of life. While the cycle of history almost always seems to come full circle, I truly hope that we can see this as our worst mistake with power that we've never had the right to wield against another.

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You Can Recognize—and Stop—COVID-19 Disinformation



During a crisis, people need accurate information to make good decisions and stay safe. With the COVID-19 pandemic devastating communities of color, Indigenous communities, and low-income communities, the need for reliable information is more urgent than ever.

Scientific experts should play a key role in providing such information to the public. During the COVID-19 pandemic, however, federal scientists, especially CDC scientists, have been silenced, shut out of decisionmaking, and prevented from communicating with the public. As a result, harmful disinformation on COVID-19 has spread almost as quickly as the disease itself, drowning out credible

sources of scientific information and causing confusion about how to protect people's health and safety.

Instead of allowing scientists to speak, the Trump administration has amplified disinformation campaigns by publicly dismissing health-care workers' concerns over the lack of capacity and resources to treat COVID-19 patients, by inciting confusion over available COVID-19 treatments and the vaccine development process, and by pressuring states and cities to reopen without considering scientific evidence. The consequences of inaccurate information about this disease can be lethal: consider the Arizona man who died after ingesting a form of chloroquine because

he and his wife thought it would prevent COVID-19, or more broadly, those who refuse to wear face coverings because they believe them to be ineffective—or even dangerous because they trap the carbon dioxide we exhale (a claim that has been debunked; scientists agree that mask wearing reduces viral transmission and allows for normal respiration).

When disinformation is deadly, knowing how to identify it and prevent its spread can save lives. The Union of Concerned Scientists has compiled a free online resource center to help anyone spot and stop COVID-19 disinformation. When you visit <http://act.ucsusa.org/covid-disinfo>,

you'll find tools to help you identify inaccurate information and counter its spread. The site also offers links to reliable sources of information on COVID-19.

Genna Reed, lead science and policy analyst with the Center for Science and Democracy at UCS, narrates two videos on the site that lay out strategies for limiting disinformation's damage. "In the absence of effective coordinated federal leadership and clear, accurate, science-based guidance on COVID-19, disinformation thrives," she says. "We want to do our part to educate people about how to spot disinformation about this disease before it does damage by spreading."



Dr. Anthony Fauci of the National Institutes of Health speaks about the coronavirus pandemic on July 30, 2020.

Meet Your New Roommate: An Award-Winning UCS Short

A UCS-produced video supporting clean energy progress (“Your New Roommate”) has won a Telly Award honoring excellence in local, regional, and cable television, including public service announcements. Watch it at <http://act.ucsusa.org/roommate>.



A Road Map for Restoring Federal Science

For government agencies that employ scientists and rely on science to set policies that affect public health, safety, and the environment, researchers with the Center for Science and Democracy at UCS have created a series of recommendations: customized blueprints for strengthening federal science and restoring scientific integrity. The suite includes agency-specific suggestions for, among others, the Centers for Disease Control and Prevention, the Department of the Interior, and the Environmental Protection Agency, along with recommendations for the federal scientific enterprise

overall on issues such as equity and conflicts of interest.

“Basically, we looked at every area where improvements to scientific impartiality, independence, and integrity could be made,” says Jacob Carter, research

scientist with the Center for Science and Democracy and co-author of the series. “We wanted to show how agencies can prevent the politicization of science under any administration. Because when agencies turn what should be

evidence-based decisions into politics-based decisions, real people suffer—often the most vulnerable and marginalized people.” Find the recommendations online at www.ucsusa.org/resources/roadmap-science-decisionmaking.

OUR SCIENCE GETS THE MEDIA’S ATTENTION

According to the consulting agency M+R, UCS has an outsized impact in traditional and social media. In its annual study of 100 nonprofit organizations and the media coverage they garner, M+R found that UCS work was mentioned 700 times in major news outlets, compared with an average of 459 times among the others. On Facebook, UCS articles were shared about 6,500 times—more than twice the average of the other organizations—and 73 percent of those shared stories resulted in readers taking action, reinforcing our status as an organization that turns analysis into inspiration.

With New Lawsuits, Legal Pressure on Fossil Fuel Companies Grows



At a press conference announcing his state's lawsuit, Minnesota Attorney General Keith Ellison holds a document circulated within ExxonMobil, dated October 19, 1979, that confirms executives knew burning fossil fuels contributed to climate change. Despite this knowledge, ExxonMobil and other oil and gas companies chose to spread misinformation about global warming.

In June, Minnesota Attorney General Keith Ellison filed a consumer fraud lawsuit against ExxonMobil, Koch Industries, and the American Petroleum Institute, the leading US oil and gas industry trade association. The suit follows a line of reasoning that UCS has been promoting since 2015, as it alleges that the two companies and the trade association violated state consumer protection laws by misleading Minnesotans about the role fossil fuels play in causing the climate crisis. For more than 20 years, the Koch Industries' owners, billionaire brothers Charles and the late David Koch, along with ExxonMobil, sponsored a network of think tanks and advocacy groups that deny the scientific consensus on climate change

and downplay the threat posed by their products.

A day after the Minnesota lawsuit was announced, the attorney general in Washington, DC, Karl Racine, sued four of the world's largest oil companies (BP, Chevron, ExxonMobil, and Royal Dutch Shell), contending that they have been aware *since the 1950s* of the threat posed by fossil fuels but launched public relations campaigns to manufacture doubt about the reality and seriousness of climate change. And in September, the city of Hoboken, New Jersey, filed a similar lawsuit for climate change-related damages, alleging that consumers, investors, and the general public were intentionally misled by oil and gas companies and their lobbying groups.

Minnesota was one of the first states to file suit against the tobacco industry in the 1990s, and its case—the only one that made it to trial—resulted in a groundbreaking settlement of \$6 billion over the first 25 years and \$200 million annually thereafter to the plaintiffs. The case also pried loose 35 million pages of documents that revealed details of the tobacco industry's campaign disputing the link between smoking and disease. Records publicized by UCS in our 2015 report, *The Climate Deception Dossiers*, show that the tobacco and fossil fuel industries used many of the same strategies and tactics to mislead the public.

The Minnesota and Washington, DC, lawsuits are similar to fraud cases

brought by the Massachusetts and New York attorneys general against ExxonMobil, and follow other legal actions to hold fossil fuel companies accountable. At least 10 counties and cities—including Baltimore, Boulder, Charleston, Honolulu, New York City, and San Francisco—as well as the state of Rhode Island are seeking compensation for damages caused by rising sea levels, wildfires, and extreme weather events linked to climate change. UCS analysis has provided scientific underpinning for many of these cases. Learn more about the connection between climate science and legal accountability at our Science Hub for Climate Litigation: www.ucsusa.org/resources/science-hub-climate-litigation.

Minimizing COVID-19 Risk during Hurricane Season



Although Hurricane Laura spared the city of Galveston, Texas, residents evacuated ahead of the storm, masking up as they boarded a bus to Austin.

Before the peak of the US hurricane season, as the pandemic was spreading rapidly in storm-prone southeastern states, scientists at

UCS and Columbia University partnered to release a study on the potential effects of large-scale evacuation measures on

COVID-19 transmission rates. The study, awaiting journal publication, models a hypothetical scenario in which a Category 3 hurricane requires residents of certain Florida counties to evacuate.

Under the worst-case scenario in this model, if people followed historic evacuation patterns and virus transmission rates increased by 20 percent in their destination counties, there would be roughly 61,000 additional COVID-19 cases in the origin and destination counties combined. With the best-case scenario, if people instead evacuated to communities with low COVID-19 transmission rates and transmission

rates did not increase in the destination counties, there could be fewer than 10,000 additional cases resulting from the evacuation.

“We conducted the study to help inform the work of emergency managers and other state and federal decisionmakers, hopefully with enough time to adapt their normal response plans,” says Kristina Dahl, report co-author and senior climate scientist at UCS. “Minimizing the increase in COVID-19 cases depends on getting people to destinations with low virus transmission rates and ensuring those transmission rates stay low even when there’s an influx of evacuees.”

UCS in the Community

The San Joaquin Valley is an agricultural region whose farms produce a majority of California’s commodities, including citrus, nuts, grapes, cotton, and vegetables. With many residents depending on agriculture for their livelihoods, water quality and availability are top environmental concerns. The valley is home to more than half of the public water systems in the state that fail to meet water quality standards, and the 2012–2016 drought hit the region’s water supply especially hard: so much groundwater was pumped for irrigation that thousands of private and community wells ran dry.

After meeting with San Joaquin Valley residents to discuss their concerns and needs around water access and quality, UCS Western States Climate and Water Scientist Pablo Ortiz designed a community-informed guide to help residents understand and address water and other climate change–related challenges—those they face now, and those likely to come as climate change worsens. The guide, *Climate Change in the San Joaquin Valley: A Household and Community Guide to Taking Action*, available in English and Spanish, provides information and recommendations to help communities advocate for



A Visalia, California, resident whose well has run dry must purchase bottled water weekly to provide clean drinking water for his household.

industrial and agricultural best practices that will preserve water quality and availability in a warming world.

“I want people reading this guide to feel encouraged to advocate for and develop adaptation strategies for climate change,” Ortiz says. “Certainly, San Joaquin Valley

residents do not bear the responsibility for large-scale adaptation efforts. That falls on local, county, and state agencies. But individuals and communities should know what’s coming—and how to advocate on behalf of their communities for solutions now.”

HIGHLIGHTS OF A UCS VICTORY

To get more electric trucks on the road in California, the UCS Clean Transportation team skillfully combined science and advocacy. Here's an inside look.

BY JIAYU LIANG

Millions of Californians live in regions with levels of air pollution that exceed federal standards, particularly in Los Angeles, the Inland Empire, and the Central Valley. Back in November 2016, the agency charged with helping the state meet federal air quality standards—the California Air Resources Board (CARB)—was addressing one aspect of the problem: pollution from trucks. Although trucks and buses make up only 7 percent of all vehicles on the road in California, they are responsible for 23 percent of global warming emissions from vehicles in the state, and an even more disproportionate share of other pollutants.

To reduce air pollution, CARB proposed a truck policy that would require manufacturers to increase the percentage of electric trucks they sell over time—similar to the approach that had already made California the nation's leading adopter of electric passenger vehicles. As the details of CARB's proposal took shape, Jimmy O'Dea, senior vehicles analyst at the Union of Concerned Scientists, followed closely and analyzed its impact.







Left: Senior Vehicles Analyst Jimmy O'Dea speaks to a reporter in Sacramento about the benefits of electric trucks. Right: Western States Outreach Coordinator Joyce Xi (pictured on screen) testifies in favor of a stronger electric truck rule at a California Air Resources Board hearing.

A CRUCIAL ANALYSIS

When O'Dea crunched the numbers, he found that CARB's truck proposal fell far short of what was needed. Using historical sales data, he estimated the proposal would put only 75,000 electric trucks on the road by 2030—just 4 percent of the 1.9 million total trucks in the state.

"To wait another decade and only have 4 percent electric trucks on the road was too little, too late," O'Dea says. "As we shared these results with our partners, there was clear consensus that the policy needed to do much, much more." Believing the state could do better, O'Dea and his fellow UCS Clean Transportation team members started modeling more ambitious standards, with many different timelines and targets. "I looked at the sales numbers of different categories of trucks," he explains, "and calculated how many electric trucks could be sold with strong targets in the categories most suited for electrification. My experience with the state's policy requiring 100 percent of transit bus sales to be electric by 2029 provided a critical reference point for what was possible."

He modeled a standard that would result in 10 percent of all trucks on the road being electric by 2030, then bumped it up to 15 percent. While a 15 percent goal was more than triple the original proposal, O'Dea recognized that it would still be achievable with today's technology. UCS began advocating for the stronger scenario, working in cooperation with a coalition of other groups fighting for clean air.

Setting a more ambitious standard meant not only setting aggressive sales goals, but also expanding the scope of the rule.

The original rule focused on urban delivery trucks that only account for a small percentage of the state's emissions, while setting no targets for larger tractor-trailer (or "semi") trucks, which typically drive more miles and have higher emissions. CARB also deferred sales standards for pickup trucks, which account for half of all trucks in the state, until several years after the initial proposal's start date.

"Our coalition really pushed the state to expand the policy to include all trucks," O'Dea explains. An early campaign victory came when CARB included requirements for electric semi-trucks in its proposal. Nonetheless, its proposed sales targets for all truck categories still weren't ambitious enough.

ATTRACTING THE MEDIA

Quantitative analysis can seem complex and hard to follow for those not in the field. Running the numbers to determine that CARB's original proposal came up short was just one part of the battle. Now the UCS team and coalition needed to build broad support for a stronger rule—and put pressure on decisionmakers to enact it. This is where the media, outreach, and policy experts on the UCS team excel.

To achieve maximum impact, O'Dea's research needed to be distilled into language whose significance anyone could appreciate. Abby Figueroa, the team's communications officer, sifted through O'Dea's analysis to find its most salient data points and compelling arguments. "It's important to figure out early on in a campaign what messages are going to stick and what questions reporters, their editors, and their readers will have,"

To wait another decade and have electric trucks make up only 4 percent of the fleet on the road was too little, too late.

she explains. “You also have to anticipate what pushback there might be and pick themes that will resonate with the people you are trying to sway.”

Developing a sense for what resonates well and having an accurate knack for predicting what reporters will be interested in is a big part of the job for the UCS media team. Figueroa says checking in with reporters regularly, following their reporting, and finding opportunities to help frame their thinking on emerging issues are all critical elements. When it came to O’Dea’s research, she anticipated that those opposing a stronger truck rule would argue in the media and to the CARB commissioners that the rule would be too difficult or expensive for manufacturers to meet, or that the charging infrastructure wasn’t ready and would be too costly. She determined that a public health theme would hold up the best against those arguments. “We talked about the rule in a way that whoever argued against it was arguing for keeping the air polluted and people sick,” she says.

Figueroa reached out to reporters over many months, referring them to O’Dea’s past reports and blogs and letting them know when the rule was moving to the next critical vote. She also prepared O’Dea for radio, TV, and newspaper interviews and visits with editorial boards around the state. The two anticipated what questions might be asked and reviewed key points, which helped keep the conversation concise and compelling. Their work drew multiple news stories on the rule that quoted O’Dea, and eventually the *Los Angeles Times*, the largest newspaper in the state, published an editorial supporting a strengthened truck rule.

WORKING WITH COMMUNITIES AND LEGISLATORS

Because CARB’s decision would have real consequences for people living in California, those most affected by pollution needed to be part of the process. Joyce Xi, the team’s outreach coordinator, consulted with community members, organizational partners, and technical experts to broaden support for a stronger policy, share scientific knowledge, build relationships, and coordinate ways to take action. Successful outreach work requires a good understanding of who needs to be involved in the decisionmaking process, and what their needs are; Xi’s organizing and coalition-building skills are vital. In conversations with coalition partners, she looked for ways that everyone’s interests overlapped and could support one another in advocating for a stronger rule.

“Effective advocacy can play a big role in shaping how rulemaking works,” Xi says. “It’s one thing to present facts, figures, and analysis. It’s another thing to show decisionmaking bodies that a significant percentage of the public will be impacted and cares about the outcome.”

Drawing on Xi’s outreach and the messages O’Dea and Figueroa had developed, it fell to Erin Rodriguez, the team’s policy advocate, to make sure California legislators were aware of the issue and to try to garner their support.

As a former legislative staffer, Rodriguez understands that legislators’ offices are often juggling many issues and, if she wants their attention, she has to make it easy for them. “Information is power, but you need to know what to do with it,” she explains. For her, that often means distilling data into usable, bite-sized pieces. In the case of the CARB rule, Rodriguez recognized that she had to emphasize the benefits of electrifying 15 percent of trucks on the road.

Once she has the legislator’s attention, Rodriguez tries to connect the data to the tangible results they will create. “Tying the 15 percent to health, economic, and environmental benefits—more tangible things that these staffers or legislators care about—made the ‘ask’ a lot easier,” she says. Taking time to meet with legislators, she says, makes it more likely they will be willing to help out when she asks.

Rodriguez’s conversations with state legislators, combined with Xi’s community outreach and Figueroa’s efforts with the media, put external pressure on CARB that was hard to ignore. This powerful combination, repeated across each of our issue areas, is what helps UCS make change and implement solutions that are practical, innovative, and help the people most affected by the problem.

(continued on p. 21)



Avoiding Climate Catastrophe: The Steps We Need to Take Now

INTERVIEW WITH BRENDA EKWURZEL

We've been hearing for some time that we must take radical action by 2030 to avoid the worst consequences of global warming. What's the significance of this date?

BRENDA EKWURZEL: In 2018, the UN Intergovernmental Panel on Climate Change (IPCC) published a special report that calculated the relative chances for staying below 1.5°C [the threshold set by the Paris climate agreement for global temperature increase] given how much heat-trapping gases the world continues to emit, and based on complex interactions and timing. The more the world emits, the IPCC said, the lower the chance of meeting the “guardrail” temperature.

For a decent chance—a 67 percent probability of meeting that 1.5°C average target—we can set the emissions tipping point to a cumulative 420 gigatonnes of equivalent carbon dioxide. For a reasonable chance—50 percent probability—we have 580 gigatonnes left to emit, and for a low chance—33 percent probability—we have 840.

So there's a limited amount of global warming emissions we can release before we hit a 1.5°C global average increase in temperature, after which climate change becomes less manageable?

BRENDA EKWURZEL: Yes. And given the uncertainties associated with permafrost thawing and wetlands releasing carbon, methane, and other non-carbon dioxide emissions, climate feedback responses to all emissions, and historic warming, most climate scientists recommend the most stringent carbon budget as the prudent choice.

So if we set the cumulative emissions budget dial to the prudent choice of 420 gigatonnes—assuming

that global emissions remain steady at their 2017 level of roughly 42 gigatonnes of equivalent carbon dioxide annually—then we would have 10 more years, or until 2030, before the average global temperature would be set to 1.5°C.

So where are we in 2020?

BRENDA EKWURZEL: According to the Global Carbon Project, the fossil fuel sector's global carbon emissions increased in 2019. During the pandemic, there has been a drop in emissions, but that may influence global temperature less than one might have thought. Most scientists who keep track of country emissions say there's an emissions gap between the Paris climate agreement and countries' emissions pledges that will put us closer to a 3°C world than a 2°C world. Governments have to do much more to enact policies in line with the pledges they've made.

The bigger point is, however fast or slow the world burns through the carbon budget for 1.5°C, from that moment onward the world would have

to remove the equivalent of all the global warming emissions released every year to stay below 1.5°C. The higher the cumulative emissions, the quicker we surpass the prudent budget and make it much more difficult to stay below the 1.5°C temperature limit.

What happens if we fail?

BRENDA EKWURZEL: We already see how dangerous our 1°C warmer world is, as climate change has made extreme weather events much more severe. These will only get worse with a 1.5°C increase. According to the IPCC special report on 1.5°C, 70 to 90 percent of warm water coral reefs would likely die, and with a 2°C increase, food availability in southern and northern Africa, the Amazon, central Europe, and the Mediterranean would be further reduced.

Obviously, the United States also would suffer damages: more lives lost from extreme heat, more money spent recovering from coastal property damage, flooded basements in river



BRENDA EKWURZEL is a senior climate scientist and the director of climate science for the UCS Climate and Energy Program. She is a co-author of the fourth National Climate Assessment (NCA4) Volume II, and the UCS guide *Cooler Smarter: Practical Steps for Low-Carbon Living*. In 2016, the American Association for the Advancement of Science named her as a fellow. Listen to our podcast to hear her explain why cold and snowy winters don't negate the scientific consensus on global warming: www.ucsusa.org/resources/jet-stream-winter-machine.

towns, parched cropland, and wildfires. But of course, it's not likely that after our 10-year timer runs out the world will look that different. It's just that what's already difficult today becomes even more difficult.

What are the main actions countries will have to take to maintain a livable planet? Do we have the necessary technology today to get the job done?

BRENDA EKWURZEL: The IPCC special report assessed with very high confidence that the world has the technological and societal know-how to meet the 1.5°C target. But the IPCC also warned that if not managed carefully, some of the strategies employed to accomplish that goal could exacerbate poverty by undercutting access to food, water, and energy for disadvantaged communities around the world.

So what do nations around the world need to do—especially the United States and other countries that are primarily responsible for climate change? UCS has identified five interconnected steps.

First, motors, appliances, infrastructure, industrial processes, and all modes of transportation have to become more efficient. Some sectors of our economy are out front on this, working together to ensure that buildings are renovated to dramatically cut energy consumption and carbon emissions.

Second, we need to decarbonize electricity generation by transitioning from coal and natural gas to low- and no-carbon resources, especially wind, solar, and geothermal. We also have to invest in energy storage, modernize our outmoded transmission grid, and capture and store carbon emissions that the electricity sector continues to release.

Third, we have to electrify just about everything. We need to transform our transportation sector by transitioning to electric cars, buses, trucks, and trains. We have to heat and cool our buildings

FIVE STEPS TO MEET THE 1.5°C EMISSIONS TARGET

- MAKE EVERYTHING MORE ENERGY EFFICIENT
- GENERATE ZERO-CARBON ELECTRICITY
- ELECTRIFY HOMES AND VEHICLES
- REMOVE CARBON FROM THE ATMOSPHERE
- REDUCE NON-CARBON DIOXIDE EMISSIONS

with low- and no-carbon electricity. And nearly all of our industrial processes will have to capture carbon or run on zero-carbon electricity.

Fourth, we will have to suck carbon out of the atmosphere naturally—by planting trillions of trees, for example—and with technology. Right now, we have expensive prototypes that can do that, but it will take some technological breakthroughs to accomplish that goal at the scale we need.

Finally, we will have to dramatically reduce methane and other planet-warming gases besides carbon dioxide. Wetlands, ruminant animals such as cows and sheep, and natural gas leaks all release methane, which traps more heat than carbon dioxide. Nitrous oxide, which is largely a by-product of farming practices and soil management, can trap heat for more than a century.

As a climate scientist who is very aware of how little time we have to preserve a livable planet, how do you maintain hope for the future?

BRENDA EKWURZEL: When I first joined UCS, there was a lot of rhetoric about whether climate change was even happening. We're not debating this anymore as a country, which shows me we can change.

We can still slow the pace of climate change and buy ourselves more time to make better decisions that will cost us less and be more equitable if we're smart about it. I'm not giving up on that. I have a lot of hope that we can make a lot more progress—otherwise I wouldn't be doing this.

The climate change we already face brings extreme weather events, and we need to find better ways to keep people safe from wildfires, heat waves, [or hurricanes during the pandemic. It's critical that we take steps to rebuild the economy in a way that increases our health and resilience in the face of climate change. The five-step program I outlined has huge potential to generate new jobs, improve air quality, and put us on the path to avoid the worst consequences of a warming world. {C}

MAXIMIZE YOUR IMPACT: GIVE A GIFT OF STOCK

By making a gift of stock to UCS, you could earn significant tax savings on capital gains—while standing up for science.

IT'S A SMART WAY TO GIVE.

For more information on making a gift of stock, visit www.ucsusa.org/stockgifts or call (800) 666-8276.

THE CASE ELIMIN

A Minuteman II ICBM system is preserved as a National Historic Site near the Badlands National Park in South Dakota. Hundreds of Minuteman III missiles remain active in silos across the Great Plains.

A landscape photograph of a missile silo in the Great Plains under a cloudy sky. The silo is a small, light-colored structure with a conical top, situated in a flat, open field. In the background, there are rolling hills and a line of power poles. The sky is filled with large, grey clouds, with some light breaking through near the horizon.

FOR KILLING ICBMs

Costly, outmoded, and unnecessary as a deterrent, land-based nuclear missiles make us less safe.

BY ELLIOTT NEGIN

Four hundred Minuteman missiles, each armed with a thermonuclear warhead, are sitting silently at attention in silos across Colorado, Montana, Nebraska, North Dakota, and Wyoming. The third leg of the US nuclear triad, which includes submarines and bombers, these intercontinental ballistic missiles (ICBMs) are kept on high alert at all times so the Pentagon can launch them when it detects an incoming nuclear attack before they can be destroyed. But because it would take only 30 minutes for a Russian long-range missile to reach the Great Plains, a US president would have no more than 10 minutes to decide whether to fire US ICBMs in response—without any definitive assurance that the attack warning was accurate. In response, Russia would likely launch *its* nuclear weapons.

That is an unacceptably risky practice.

In their final project for the Union of Concerned Scientists after serving as Global Security Program co-directors since 2002, physicists David Wright and Lisbeth Gronlund make a compelling case for eliminating US ICBMs. Their report, *Rethinking Land-Based Nuclear Missiles*, co-authored with William Hartung, director of the Center for International Policy's Arms and Security Program, concludes that ICBMs are not only dangerous, but also superfluous. The two other legs of the nuclear triad are more than enough to dissuade any nation from attacking the United States.

“There is no technological rationale for maintaining ICBMs,” Wright says. “Sixty years ago, ICBMs were more accurate and powerful than submarine-launched ballistic missiles, and communications links with subs were unreliable. Today, sub-launched missiles are as accurate as ICBMs if not more so, and the Navy has secure submarine communication links, making ICBMs unnecessary.

“Perhaps even more important, US nuclear submarines are virtually undetectable at sea, while ICBMs are sitting ducks,” he adds. “Because they’re so vulnerable, the Pentagon keeps them on ‘hair-trigger’ alert, and that could provoke a nuclear war by mistake.”

A mistaken nuclear launch is a very real possibility, says Gronlund. “There have been a number of close calls over the last 50 years when human or technological errors prompted both the United States and the Soviet Union to prepare to launch their nuclear weapons,” she points out. “Some of these false warnings went far up the chain of command, and we are fortunate that none of them led to a nuclear war.”

OUTSIZED OUTLAYS

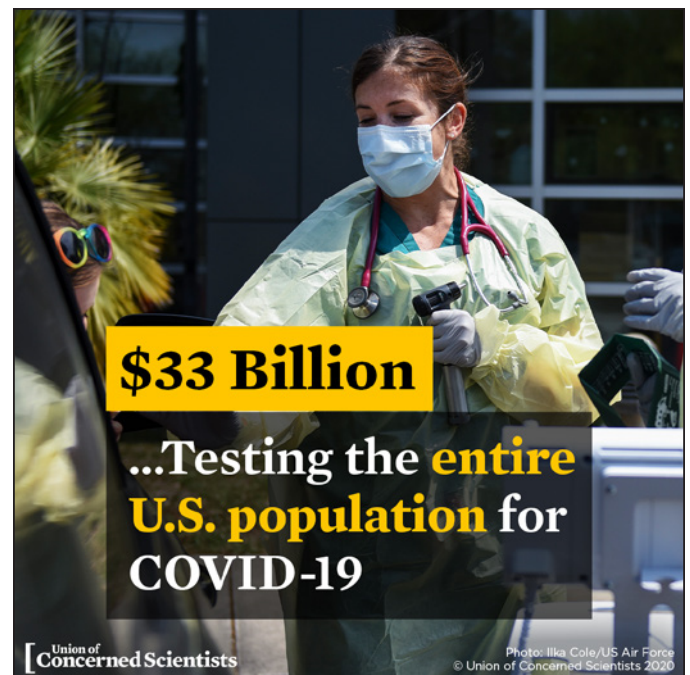
As their report (online at www.ucsusa.org/resources/rethinking-icbms) reveals, the main motives for continuing to deploy ICBMs have little to do with national security. The Air Force wants to retain them for bureaucratic and budgetary reasons. Federal lawmakers want to keep ICBM-related jobs in their states. And defense contractors relish the prospect of building a fleet of new ICBMs—what the Pentagon is calling the Ground Based Strategic Deterrent—at an estimated cost of \$100 billion.

Given that these powerful forces make it likely that the ICBM fleet will remain in place for the time being, the report recommends that the Air Force take them off high alert immediately to eliminate the option of firing them in response to an attack warning without waiting for confirmation. It also argues against the current plan to build new missiles, recommending instead that the Air Force extend the life of the current ones—at a much lower cost.

The Air Force’s own assessments support that option. Between 2002 and 2012, the Air Force spent some \$7 billion to upgrade Minuteman ICBMs to the point where an Air Force ICBM program analyst said they “are basically new missiles except for the shell.” Five years later, when commenting on a successful ICBM missile flight test, the Air Force Global Strike Command Public Affairs office reassuringly stated: “Through continuous upgrades, including new production versions, improved targeting systems, and enhanced accuracy, today’s Minuteman system remains state of the art and is capable of meeting all modern challenges.”

LOOKING AHEAD

The UCS ICBM report is part of a larger, ongoing effort to reduce and ultimately eliminate nuclear arsenals. In 2017, UCS Global Security Program Campaign Manager Sean Meyer and his team partnered with Physicians for Social Responsibility members to launch Back from the Brink: The Call to Prevent Nuclear War, a national grassroots campaign to reform US nuclear policy. Thus far, some 340 organizations, six state legislative branches, and 47 counties and municipalities have



UCS created a series of memes in June (including these shown above) to bring attention to the many ways our tax money could be better spent. They were viewed more than 66,000 times across our social media platforms.

endorsed the campaign's call for the US government to declare it will: never use nuclear weapons first; revoke the president's sole authority to launch nuclear weapons; take ICBMs off high-alert status; abandon plans to replace the entire nuclear triad; and pursue a multilateral, verifiable agreement with nuclear-armed nations to eliminate their arsenals.

The United States far outspends every other member of the nuclear club. Its outlay of \$35.4 billion in fiscal year 2019, for instance, accounted for nearly half of the \$72.9 billion the nine nuclear-armed countries collectively spent on nuclear weapons that year, three times more than the \$10.4 billion China spent, and four times more than the \$8.5 billion Russia spent.

There is no legitimate security justification for maintaining the outsized US arsenal. A single US nuclear-armed submarine, for instance, is capable of carrying warheads that are collectively nearly 10 times more powerful than all the bombs dropped during World War II, including the two atomic bombs. One full salvo from a single sub could wipe out two dozen cities—and the Navy has a fleet of 12 at sea.

Regardless, both houses of Congress rubber-stamped the Trump administration's fiscal year 2021 request for \$44.5 billion for nuclear weapons—a 19 percent increase over last year's allocation—as well as its proposed \$740.5 billion military budget.

Still, there were some glimmers that priorities may be starting to shift.

There is no technological rationale for maintaining ICBMs. Today's sub-launched missiles are as accurate as ICBMs, and the Navy has secure submarine communication links, making ICBMs unnecessary.

One military budget bill amendment in the House of Representatives, for instance, proposed to cut by two-thirds the \$1.5 billion earmarked for new ICBM research and development and transfer that money to pandemic preparedness efforts. It died in committee, but the fight is far from over, and the UCS report will provide much-needed ammunition.

California Representative Ro Khanna, who sponsored the amendment to cut ICBM spending, vowed to press on. "I want to thank UCS for this report, which I expect will become an invaluable resource as Congress considers the question of whether the United States should spend \$100 billion to develop and deploy a suite of new nuclear-armed ICBMs," he said. "This is a misguided investment, and I plan to push alternative strategies in Congress to ensure American security without wasting our tax dollars."



David Combs (right), Midwest outreach coordinator in the UCS Global Security Program, cohosted an event in Evanston, Illinois, last December to raise awareness about US nuclear weapons policy and our *Back from the Brink* resolution. Attendees were invited to voice their support for the resolution at an upcoming city council meeting; the council unanimously approved it shortly thereafter.

Besides Khanna's amendment, there were other signs that Congress might eventually rein in Pentagon spending. In mid-July, the 95-member Congressional Progressive Caucus called for an amendment to trim the proposed military budget by 10 percent—\$74 billion—and repurpose that money to fund health care, housing, and education initiatives in marginalized communities. The amendment lost, but received 93 votes in the House and 24 in the Senate, a level of support that was implausible not that long ago.

With federal budget belt-tightening likely on the horizon, UCS is looking ahead to next year to see where it can best exert pressure. "We know this is going to be a long-term effort," says Stephen Young, Washington representative for the Global Security Program, adding that different approaches will be based on the results of the upcoming November election.

"If Joe Biden is elected, we will press his transition team and administration to reject the idea of spending \$100 billion on new ICBMs and just refurbish the fleet we have," Young says. "Although Biden has been a centrist on foreign policy, with the world grappling with a pandemic, a global recession, and climate change, a President Biden would have a unique opportunity to take bold steps to reframe the US approach to security.

"If President Trump is re-elected," Young continues, "we will make the same case to Congress that we would have made to the Biden administration. Congress has the power of the purse, and the current trillion-dollar plan to replace the entire nuclear triad would require annual spending on nuclear weapons to nearly double over the next four years. Given the challenging economic situation we find ourselves in, postponing—or, better yet, killing—a costly program to build an unnecessary new ICBM fleet would seem to be the most reasonable choice." {C}

Changing Activism for Changing Times

By Pamela Worth



In February 2020—before the pandemic necessitated shutdowns and virtual events—Science Network Manager Shreya Durvasula moderated a panel at MIT for early-career scientists. More recently she joined in an online environmental justice forum (inset) organized post-COVID with a grant from the Union of Concerned Scientists Science for Public Good Fund.

Over the past four years, we have witnessed unprecedented attacks on the science behind the issues we care about—climate change, public health and safety, sustainable agriculture, and clean transportation and energy. Many of our members have felt discouraged about the lack of progress at the federal level. But at the Union of Concerned Scientists, we knew we had the tools to help prepare scientists and science enthusiasts to fight back. So while we have continued to defend science at the federal level, we also invested resources to help scientists and science advocates to tackle local issues while sharpening their policy and activism skills.

“When things aren’t moving on the national level, it’s easy to get frustrated,” says Shreya Durvasula, UCS Science Network manager. “My team has worked with UCS supporters for years to help connect them with opportunities to move the needle locally on science-related issues. We ramped up this work in 2016 and 2017, so that any of our supporters interested in making a difference could have an easy entry into more local activism.”

The UCS Science Network comprises more than 23,000 scientists, engineers, economists, public health specialists, and other experts, many of

whom are eager to use their expertise in service to their communities. To provide more opportunities to do so, UCS launched community-based teams in some states where groups of residents and interested scientists could work together to address local challenges, mentored by UCS staff members. To channel the energy of the many young scientists energized by the 2016 elections, in 2018 we created Science Rising, a network of organizations and individuals fighting to protect the role of science in our democracy by increasing STEM voter participation. And we shared our resources: expanding the

trainings we conduct on media literacy, political engagement, and community-scientist partnerships; and providing financial support for community initiatives through the Science for Public Good Fund.

When UCS relaunched Science Rising at the start of 2020, along with a new round of funding for locally based projects called Science for Public Good Fund grants, we—like everyone else—didn't anticipate the year to come. The COVID-19 pandemic has forced our science activists to change their plans on the fly, and they've adapted with grace and a renewed sense of service to their communities.

"I've been so inspired by our supporters and partners who are staying in the fight for environmental justice in their communities at a time when a lot of us feel overwhelmed," says Durvasula. "They've managed to take their activism entirely online, and make it effective."

SCIENCE ACTIVISM GOES ONLINE

A group of early-career scientists based in St. Paul and Minneapolis, Minnesota, has been meeting and organizing around environmental and social justice issues including a proposed pipeline that would transport tar sands oil across the headwaters of the Mississippi River, violating numerous treaties with the Indigenous people in that region. Before COVID-19 sent Minnesota into lockdown, these graduate students used their funding from the UCS Science for Public Good Fund to host an event for dozens of participants where Indigenous activists concerned about the safety of their water discussed how oil and gas development relates to Indigenous sovereignty and violence against Indigenous women, and their perspective on stopping the proposed pipeline. The funding for the event went directly to the Indigenous speakers.

The organizers had intended to follow this event with in-person gatherings to share information about the permitting process for the pipeline. Instead, they quickly shifted their activism online, creating a way for experts in the area to submit their

comments on the pipeline. The original organizers and their new recruits are still carrying on the fight, writing op-eds that have been published in major Minnesota news outlets, and creating fact sheets for affected communities with information about the pipeline. UCS is working with both the scientists and their Indigenous partners to help them as they continue to adapt their plans.

Another Science for Public Good Fund recipient has had to change its plans entirely. In southeastern Virginia, a canal running past homes and other residences contains water contaminated with animal waste, yard and industrial runoff, storm water drainage, and trash. Although fish and bird populations have declined around the canal, it has not been officially designated as unsafe, making this an environmental justice issue for the predominantly low-income residents most affected by the contamination. The Eco District Hampton Roads Project planned to use its funding to help clean up the canal and, in the process, create a resident corps of amateur scientists to contribute to the area's protection in the future.

Instead, the grantees organized a statewide online environmental justice forum they called "Environmental and Racial Justice: Here and Now in the Era

of COVID-19." They used their grant money to secure an online platform, run digital promotions, and provide honoraria for event speakers. The more than 100 participants included influential stakeholders from all across Virginia—far beyond the original scope of the group's planned work.

Via Science Rising, UCS also provided a grant to March for Science New York City, which used its funding to host a "STEM the Vote: Policy Panels Series" on Zoom. Attempting to increase voter engagement in New York City—in a state that ranks 41st for voter turnout—the group focused its efforts on communities with historically low turnout rates, and emphasized the need to elect people committed to science-based policies.

The weekly panel series ran for eight weeks over the summer, providing nonpartisan discussion on topics chosen based on voters' top priorities for the 2020 election. Reporting back to UCS, March for Science New York City says it was able to reach more people online than it did hosting in-person events in Manhattan.

To learn more about organizing and activism with UCS, visit www.ucsusa.org/take-action and www.sciencerising.org {C}

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In Gratitude

(continued from p. 2)

And even in the darkest hour, when it felt like it was “all hands on deck” just to defend what was already in place, we went on offense, winning a string of clean energy victories across the states and launching big initiatives like the Transportation Climate Initiative in the Northeast and grid modernization in the West and Midwest.

This summer, with change sweeping across the country, we were powerfully reminded that UCS had not fully lived up to its ideals by providing a welcoming and nurturing workplace to our staff of color. While this learning was painful, I am proud that UCS recognized the problem and embraced the challenge of becoming an anti-racist organization, a goal that is both long overdue and one that every organization should share and devote itself to.

What is next for me? As a former government official, watching the destruction of our democratic institutions and loss of scientific capacity at the federal level over the last four years has been deeply troubling. I feel called to return to public

service and use my governmental and legal expertise to help rebuild and revitalize government so it can move forward quickly and effectively to address the immense challenges that lie ahead.

And for the organization? Over the next few months, the UCS board of directors, in conjunction with our senior staff, will establish a transition and interim management plan as the search for a new president gets under way. I can assure you that the organization’s vital mission—to use the power of science for a healthy planet and a safer and more equitable world—will continue, though there will, no doubt, be changes to the work as UCS adapts to a changing moral and political landscape.

So, dear supporters, I leave you with a wide range of emotions here. I feel great pride in all we have accomplished at UCS during my tenure, and deep gratitude to each of you for your kind words, encouragement, active engagement, and support. I hope and trust that you will continue supporting this inspiring organization and the vital work it undertakes each day. {C}

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Highlights of a UCS Victory

(continued from p. 11)

IT TAKES A VILLAGE

When CARB opened the public comment period for its truck rule in October 2019, Figueroa, O’Dea, Rodriguez, and Xi were ready.

Rodriguez wrote a letter asking CARB to make a stronger rule and circulated it among legislators, many of whom signed on to show their support. Her efforts to engage and inform legislators had paid off. Meanwhile, Figueroa’s efforts to raise visibility in the media combined with Xi’s direct outreach led more than 5,000 people to submit comments. Showcasing the solid scientific rationale behind the stronger rule, Xi also circulated a letter of support signed by more than 100 scientists including prominent public health and air pollution experts. “We use as many tools in our toolbox as we can,” Xi explains.

When CARB met to discuss the rule in December, O’Dea presented his analysis, and the board considered the stronger proposal for the first time. Public comments lasted more than five hours, as 106 people showed up to testify, including community members bearing the brunt of truck emissions all over the state. “There were opposition comments,” Xi notes, “but those of us supporting the stronger rule showed up in greater numbers.” She presented the expert letter, thousands of supporter comments, and several petitions the coalition had gathered.

All of this made an impact on the board, which recommended that its staff pursue a stronger policy. Four months later, CARB’s new proposal met the coalition goal that 15 percent of trucks on the road become electric, but not until 2035. The coalition originally advocated for 2030. Despite this five-year delay, the new proposal will put twice the number of electric trucks on the road as the original would have. “You don’t often see a state agency double the stringency of a proposal,” O’Dea says.

When CARB’s new proposal entered the public comment period in April, the UCS team and coalition once again showed up with rousing support. Rodriguez presented a letter signed by legislators, and Xi presented a petition signed by more than 3,000 individuals, along with the testimony of dozens of scientists. On June 25, CARB unanimously voted the rule into existence.

The team was elated, having notched a win in the ongoing work to clean up California’s transportation sector. Several years of analysis was followed by a long, hard 18 months of advocacy to bring to life the world’s first and most extensive sales standard for electric trucks.

Although the rule won’t officially take effect until 2024, it produced nearly immediate results. Just two weeks after its passage, 15 states and the District of Columbia announced their intention to pursue policies supporting the electrification of

Abby Figueroa helps attract attention—from media and state policymakers—to UCS analyses in her role as communications officer.

trucks. Then in August, CARB passed additional rules that will limit emissions from fossil fuel-powered trucks and ships idling in ports—further incentives to electrify the freight industry.

O’Dea welcomes these developments, but also recognizes the long road ahead. “The new policy is a significant step—a necessary one to move us into a cleaner, safer future,” he says. “But 15 percent electric trucks on the road still leaves 85 percent that we need to clean up.” After a week of vacation, he plans to dive back into work, looking for the next opportunity to make change. {C}



Northern Wildfires Are Accelerating Climate Changes

By Carly Phillips



Boreal forests, also known as taiga, comprise much of the land in Alaska, Canada, Russia, and Scandinavian countries such as Finland. In an average boreal forest, you can find spruce, larch, birch,

and pine trees, bogs and wetlands, salmon, grizzly bears, wolverines, and moose—and the occasional researcher like me, singing loudly to scare off bears as I collect soil samples. I've spent weeks hiking the uneven forest floors, aware that beneath my feet lie massive stores of carbon that, if burned, could not only devastate these habitats, but also release staggering amounts of heat-trapping gases, accelerating climate change.

Wildfires, most often started by lightning strikes, are a natural occurrence in boreal forests. But as these forests warm—twice as fast as other ecosystems—snowmelt occurs earlier in the spring, allowing more time for trees, soils, and dead vegetation to dry out, and climate change makes storms with lightning more frequent. More frequent ignitions paired with drier forests can mean larger, more damaging, and more frequent fires.

When wildfires burn boreal forests, more carbon is released into the atmosphere than wildfires at lower latitudes, partly because of long-term carbon buildup in the soil. As trees and plants remove carbon dioxide from the atmosphere, they transfer some of this carbon below ground (as roots, leaf litter, and other plant secretions). In ecosystems where cold temperatures slow down decomposition, carbon accumulates decade after decade in the frozen soil.

Alaska's 2004 wildfire season—the worst on record in terms of total area burned—released as much heat-trapping



Boreal forests are the world's largest land biome (ecological zone). They are warming twice as fast as other ecosystems as our climate changes.

emissions as the state of Florida did from burning fossil fuels over the course of that entire year. My team's research shows that boreal forest fires, if left to burn unchecked, could release nearly 5 percent of the world's remaining allowable carbon emissions if we are to keep global temperature increase below 1.5°C (see Inquiry, p. 12, for more on the 1.5°C threshold).

My research seeks to answer whether we can reduce these emissions with fire management (e.g., suppression, thinning forests, prescribed burning) in boreal forests, as part of a multi-pronged approach to cutting global warming emissions overall. Because we already know how to fight wildfires, fire management can be more viable, and cost-effective, than other strategies for reducing emissions.

For example, in Alaska, we found that increased spending on fire manage-

ment could decrease fire sizes on average, and that the cost per ton of avoided carbon emissions would be lower than other proposed climate mitigation strategies. By tripling the fire management budget in Alaska, we could curb future fire emissions and protect the vast stores of carbon in these ecosystems.

A strong commitment to applying time-tested methods in boreal forests can keep our efforts to mitigate global climate change from going up in smoke. {C}

Carly Phillips was formerly the UCS Kendall Fellow for Protecting Carbon in Alaska's Boreal Forests, and a postdoctoral fellow at the Woodwell Climate Research Center. She is currently a researcher-in-residence studying wildfire and carbon at the Pacific Institute for Climate Solutions. Read more about her research at <http://act.ucsusa.org/boreal-wildfires>.



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