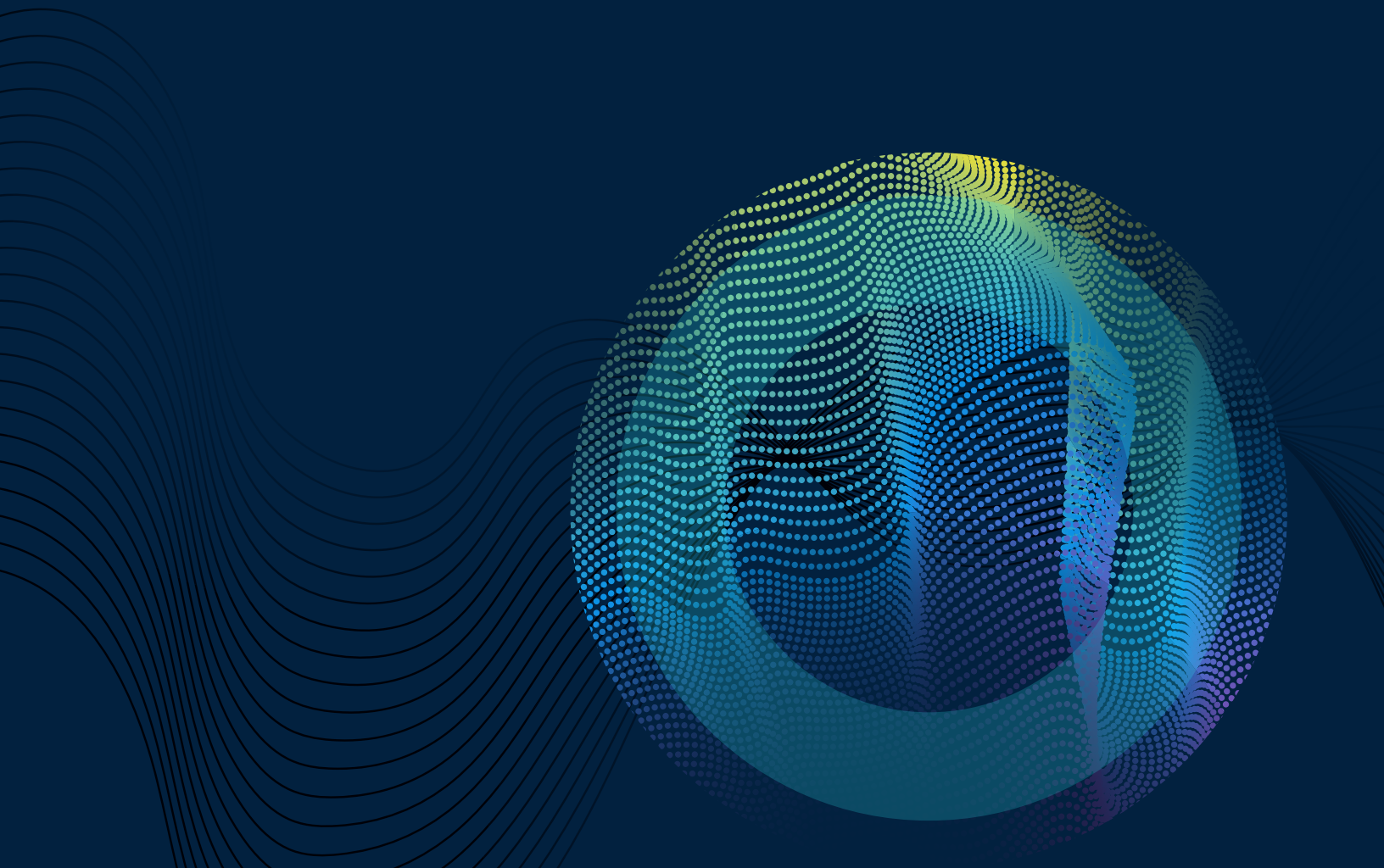


2022 ANNUAL REPORT

BREAKTHROUGH INSTITUTE

A LETTER FROM TED NORDHAUS, EXECUTIVE DIRECTOR

The last several years have witnessed a remarkable period of growth and development for the Breakthrough Institute. Since 2019, our staff and budget have more than doubled. We've moved into a larger and more flexible space near UC Berkeley and, this year, opened a Washington office. We've brought world class researchers to Breakthrough, placed the Breakthrough Journal on newsstands around the world, and launched ambitious new policy initiatives, to reform licensing of advanced reactors at the Nuclear Regulatory Commission and double US federal spending on agricultural R&D over the coming five years.

Our work and footprint has grown after the need for ambitious and pragmatic ecomodernist advocacy has become ever clearer. Energy shortages as the global economy rebounded from the COVID-19 pandemic and the Russian invasion of Ukraine have made clear that the world will not break its dependence on fossil fuels with renewable energy sources alone. Food shortages due to the war, rising fertilizer prices, and climate disruptions have similarly highlighted the critical need for continuing improvements in agricultural productivity and technology. Meanwhile, the provision of unprecedented funding for low carbon infrastructure and technology through the Infrastructure Investment and Jobs Act and the Inflation Reduction Act has made clear the uncomfortable truth that deep reductions in US carbon emissions cannot be achieved without far reaching reforms to much of the federal environmental regulatory framework governing infrastructure permitting and construction established during the heyday of the post-war environmental movement in the 1970's.

As we look forward to 2023 and beyond, we believe that Breakthrough is better positioned than ever to deliver on our vision of an ecologically vibrant future that is good for people and nature, even as the nature of many of the challenges we face remain daunting. So I'm very proud to publish this annual report, summarizing all that we've accomplished over the last year, and hope to accomplish in the years to come.

Thanks for joining us on the journey.

Sincerely,
Ted Nordhaus
Executive Director

RESEARCHING OUR ECOMODERN FUTURE

CLIMATE AND ENERGY

Breakthrough's Climate and Energy team remains a leading source of evidence-based research that seeks to challenge both climate catastrophism — the claim that nothing but wholesale and immediate transformation of society can avert climate disaster — and climate denial — the claim that human caused climate change either does not exist or is so manageable that it requires no policy response at all.

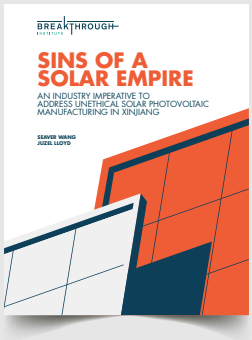
The program is directed by climate scientists Seaver Wang and Patrick Brown, who lead our work on climate impacts and adaptation to climate extremes, the economic, social, and technological requirements for deep decarbonization, the equity implications of energy transitions, and the development of policy frameworks that can deliver solutions that are practical, effective, and just.

Vox FUTURE PERFECT

KEY MOMENT

Ted was named one of *Vox's Future Perfect 50*. Future Perfect executive editor Bryan Walsh wrote that Nordhaus "helped lay the intellectual foundation for a more effective approach to fighting climate change."

Confronting the Solar Manufacturing Industry's Human Rights Problem



In mid-November, Breakthrough published the "Sins of a Solar Empire" report, calling upon the global solar photovoltaics sector to make aggressive efforts to diversify global solar manufacturing away from highly unethical production based in the Xinjiang region in western China.

The report contextualized the evidence for forced labor and environmental injustice in Xinjiang-based solar manufacturing within broader climate and clean energy conversations, critiquing current supply chain sourcing efforts as woefully insufficient and warning against the risks associated with long-term overdependence on clean tech manufacturing in Xinjiang. This report has generated significant attention in the media and in elite climate discourse, including reporting in Bloomberg TV, the *Financial Times* and other leading outlets.

Oil and Gas Assets at Risk

In September, the Climate and Energy team released a report presenting state and county-level projections for future US oil and gas production from 2020-2050, including economic and job impacts, under a number of different global climate policy scenarios. The "Assets at Risk" analysis also highlighted policy gaps and recommendations for facilitating local economic transitions away from dependence on oil and gas revenues and spending.

The report led to a detailed briefing with a lead staffer from Senator Sheldon Whitehouse's office, and also to a presentation of results at a private session hosted by Darcy Partners and attended by representatives from several major oil and gas companies including Chevron, Marathon, and SM Energy.

Human deaths from hot and cold temperatures and implications for climate change

Premature human deaths from extreme temperatures are thought to be one of the most direct and severe impacts of climate change. They are featured heavily in the coverage of heat waves, and they account for a large portion of estimates of the social cost of carbon. Yet much of the coverage of this topic underemphasizes published work that shows decreased deaths from extreme temperatures as the world has gotten warmer.

In this context, we conducted a literature review on mortality from extreme temperatures with the intent of being more inclusive of research that considers decreased cold deaths over time as it has warmed as well as societal increases in resilience as economic development occurs.

Our literature review found that climate change has likely prevented more premature deaths than it has caused, as deaths associated with cold have decreased more than deaths associated with heat have risen. Even isolating deaths from heat, the literature indicates declines in death rates over time as economic development has historically outpaced the impact of increasing temperatures. This suggests that societies can be highly adaptable to temperature changes, and thus the allocation of public resources to adaptation and economic development more generally may represent a major return on investment.

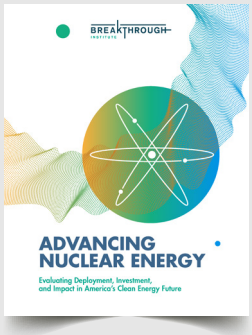
NUCLEAR ENERGY INNOVATION

For the last decade, the Breakthrough Institute has led a sea change in opinion about nuclear energy, in significant part by offering a clear vision for how advanced nuclear reactor technologies might allow the technology to scale and become radically cheaper, while addressing concerns about proliferation and waste disposal.

In the past year, under the leadership of Dr. Adam Stein, our nuclear innovation program has focused on addressing a set of key technical, economic, and regulatory questions that will largely determine the future of advanced nuclear energy, identifying strategies to boost investment in advanced nuclear energy technologies through post-COVID-19 federal recovery and stimulus policies and streamline nuclear licensing and regulatory frameworks to assure the commercialization of new nuclear technologies that are safe, economically viable, and scalable.

This year we also launched the Build Nuclear Now campaign, a grassroots advocacy project to generate support for licensing and commercializing the next generation of nuclear energy technologies.

Advancing Nuclear Energy



Breakthrough's July report on the future role of advanced nuclear reactors in US power sector decarbonization under different project cost improvement scenarios received wide attention and has become the leading paper of record on the topic.

The report was promoted prominently by the Department of Energy Loan Programs Office, nuclear industry groups, and numerous aligned partner NGOs. Notable media hits included *AP News*, *S&P Global, Yahoo Finance, Axios*, and *Utility Dive*. Private communications have revealed that the report is also being circulated within the advanced nuclear reactor industry, such as within GE Hitachi and Lightbridge, and was also shared internally via email within the California Public Utilities Commission Public Advocates' Office.

Quantitative Health Objective and Performance-Based Regulations

This whitepaper addressed significant flaws in the Nuclear Regulatory Commission's proposed new licensing framework for nuclear reactors and shows that the proposed metrics are not viable and not statistically observable in a population, even in the event of an accident. It was instrumental in driving substantial changes in the draft of Part 53 — the congressionally mandated risk-informed licensing process being developed by NRC — and has been cited by Congress.

The Faulty Diablo Canyon Study that Started it All

This report provides analysis of the Friends of the Earth study that was used to justify early retirement for Diablo Canyon Nuclear Power Plant. The report finds that the original study incorrectly characterized the cost of Diablo Canyon and included many factual inaccuracies and misleading assumptions. Our report has been cited widely and was submitted by third-party organizations to the Public Utility Commission as evidence for the need to extend the plant's operating license.

ENERGY AND DEVELOPMENT

Breakthrough's Energy and Development program, directed by former World Bank economist and founding senior fellow at the Center for Global Development Vijaya Ramachandran, is premised on the fact that Africa is home to the vast majority of the world's poor and is the region least responsible for global CO_2 emissions. The continent's more than one billion people are likely to suffer the most from the effects of climate change. Robust energy systems are needed to reduce poverty and promote livelihoods by boosting agricultural productivity, enabling industry, and allowing the continent to fully participate in the global digital economy. Ironically, energy at scale will also be needed for adaptation to climate change, for instance to power industrial and residential cooling, desalination, and production of steel and cement.

KEY MOMENT

This fall, Vijaya Ramachandran gave a TED Talk on the need to prioritize remaining "carbon budgets" in poor countries, which will continue to rely on fossil fuels for climate resilience, future prosperity, and human dignity.

Let Them Eat Carbon

The poorest nations are not the culprits of climate change — they are the victims. Early in the year, Vijaya Ramachandran and the University of Chicago Development Innovation Lab's Arthur Baker published a paper which showed that future emissions in the 64 poorest countries in the world are likely to be less than 5 percent of total emissions. This was followed by an essay in *Foreign Policy* where they argued that rich countries' shift in funding to emissions reduction takes money from the poor and makes them less resilient. European governments would be wiser to invest in Africa's natural gas resources, which would benefit Africans who do not have access to energy while also providing a new source of gas for Europe.

The Obvious Climate Strategy Nobody Will Talk About

Ahead of COP27 (the first COP to be held in Africa), Vijaya published an essay with Ted Nordhaus and Patrick Brown in Foreign Policy which argued that economic growth is likely the best way to increase resilience in poor countries. The intended impact is to generate additional resources for Africa's adaptation and additional flexibility for the continent's energy sector over the next decade or two.

FOOD AND AGRICULTURE

Breakthrough's Food and Agriculture program makes the environmental case for large-scale, intensive, high-tech agricultural systems. Developing, disseminating, and implementing advanced agricultural technologies and practices will allow modern societies to grow more food on less land, reduce costs for consumers, minimizing greenhouse gas emissions associated with food systems, and spare more room for wild nature. The program aims to double US federal agricultural research and development (R&D) spending to improve food system productivity and invest in climate-smart agricultural technologies and practices, and to influence US agricultural regulatory and trade policy to improve domestic and global accessibility to agricultural commodities and technologies

Our food and agriculture research is directed by Daniel Blaustein-Rejto, who has worked in the program since its founding in 2016.

Investing in Public R&D for a Competitive and Sustainable US Agriculture

This year, our Food and Agriculture program commissioned a new analysis that estimates the global greenhouse gas benefits of doubling public US agricultural R&D spending, finding that it would reduce global emissions by 213 million metric tons of carbon dioxide-equivalent per year, equal to ⅓ of US agricultural emissions. We published Growing Green, a report highlighting these findings, outlining the environmental benefits of R&D-driven productivity growth, and identifying policy opportunities to bolster federal investment in research with high climate change mitigation potential. The report received coverage by *E&E News*, *Beef Magazine*, and other publications; and led to several requests from Senate and House staffers for policy opportunities to advance the climate benefits of agricultural R&D.

American National Competitiveness and the Future of Meat

We also published several analyses of the environmental benefits of plant-based and other meat alternatives, making the case for robust federal investment in alternative protein innovation. A report that we published in partnership with the Good Food Institute emphasized how federal investment in agricultural protein would generate economic benefits and job growth in the US. The report led to requests from several Senate and House staffers for information on US competitiveness in the alternative protein industry and policy opportunities to support innovation and domestic manufacturing capabilities. Through this work, as well as the work of partners, we have observed a 55% increase in media coverage referring to federal or government research or innovation related to alternative proteins.

Genetically Modified Crops Support Climate Change Mitigation

Breakthrough published a peer-reviewed paper in *Trends in Plant Science* estimating the climate benefits of approving genetically modified crops in the European Union. This piece was cited by 18 academic sources, led to over 20 media mentions of the topic in publications such as *The New Scientist*, and is also referenced in major Wikipedia articles on genetically modified crops and sustainable food systems. This and our other publications on biotechnology contributed to a 39% increase in media mentions of Breakthrough's work on biotechnology and a 23% increase in global media coverage discussing the potential of agricultural biotechnology to contribute to climate change and sustainability goals.

KEY MOMENT

Alex Trembath was invited to give the Keynote address at Lewis and Clark College's annual Environmental Studies Symposium, where he spoke about ecomodernism as an alternative to conventional environmental education.

COMMUNICATING OUR VISION

2022 was the first full year under the direction of Katie Salam, Breakthrough's executive editor and director of communications. Since coming on board, Katie has dramatically increased Breakthrough's editorial output, professionalized our communications strategy and processes, and increased the frequency and circulation of our flagship publication, *The Breakthrough Journal*.

This year, we published four issues of the *Journal*, under the themes "After the Green New Deal," "Climate Geopolitics," "Produce Problems," and "The New Nuclear Explosion." Authors in this year's *Journal* issues included the *Washington Post*'s Tamar Haspel, science journalist Leigh Phillips, the Cicero Institute's Judge Glock, Human Rights Watch's Yaqiu Wang, the Berggruen Institute's Nils Gilman, and New America's Michael Lind.

As we move into 2023, our goals are to continue to improve the quality, reach, and authority of Breakthrough's communications. We plan on building and launching a new website, increasing our output of issue-focused newsletters, and publishing even more often in external media.

NEW WASHINGTON, DC OPERATION

After several years of planning, Breakthrough this year opened an office in Washington, DC. We have long sought ways to amplify our research and policy frameworks by showing up more consistently in federal policy discussions. Particularly with the development of ambitious new policy frameworks for nuclear licensing reform, agricultural research and development, and environmental permitting, we have increasingly felt a need to establish a permanent presence in Washington. Dr. Ashley Nunes, an experienced policy veteran with a deep network in the Washington policy community, will lead Breakthrough's federal energy and climate policy work.

CONVENING THE ECOMODERNIST COMMUNITY

BREAKTHROUGH DIALOGUE 2022 — PROGRESS PROBLEMS

153
IN PERSON ATTENDEES

262
VIRTUAL ATTENDEES

In June, we hosted our annual Dialogue under the theme "Progress Problems," in recognition of the growing "progress movement" and the uneven progress, typified by the response to the COVID-19 pandemic, that has characterized human society throughout history. The event included panel discussions on "supply-side progressivism," climate risk, industrial food systems, and the growing progress movement.

FEATURED SPEAKERS INCLUDED

Ezra Klein
Columnist, *New York Times*

Virginia Postrel
Visiting Fellow, Smith Institute for Political Economy & Philosophy, Chapman University

David Wallace-Wells
Writer and Columnist, *New York Times*

Yascha Mounk
Professor, Johns Hopkins University

Juliette Kayyem
Homeland Security Project Faculty Director, Security and Global Health Project, Harvard Kennedy School

ECOMODERNISM 2022 – DEREGULATING ABUNDANCE

140
IN PERSON ATTENDEES

205
VIRTUAL ATTENDEES

This October, we hosted our annual Ecomodernism event under the theme "Deregulating Abundance," our way of adding to the conversation about the so-called "abundance agenda" by emphasizing the manner in which environmental regulation often stands in the way of the infrastructure and innovation required for deep decarbonization. The event included panels on US federal energy policy, the "yes-in-my-backyard" movement, international trade and development finance policy, briefings on major Breakthrough policy agendas, and interviews with *The Atlantic*'s Derek Thompson and recent Congressional candidate Suraj Patel.

FEATURED SPEAKERS INCLUDED

Jerusalem Demsas
Staff Writer,
The Atlantic

Matthew Yglesias
Editor,
Slow Boring

Suraj Patel
White House Alumnus,
Former Congressional candidate

Derek Thompson
Columnist,
The Atlantic

Jenny Schuetz
Senior Fellow,
Brookings Metro

TALENT SPOTLIGHT

Breakthrough is currently a staff of 22 and will grow to a staff of 26 in the new year. This continuing concentration of talent at Breakthrough has enabled us to accelerate our existing programs and launch new programs.

This past June, **Dr. Patrick Brown** joined Breakthrough as co-director of the Climate and Energy team. Dr. Brown has published articles in *Nature*, *PNAS*, and *Nature Climate Change*, and his research has also been highlighted in media outlets such as *CNN*, the *Washington Post*, *Newsweek*, *BBC* radio, *New York Magazine*, and *The Guardian*. He holds a PhD from Duke University in Earth and Climate Sciences and continues to serve as an adjunct faculty in the Energy Policy and Climate Program at Johns Hopkins University.

One of the first key hires in our DC office is **Dr. Ashley Nunes**, who joined us inNovember as a Federal Policy Director for Climate and Energy. Dr. Nunes brings deep expertise in transportation systems and policy and will be building out and leading Breakthrough's energy and climate policy agenda. His work and commentary has appeared in the *Financial Times*, *the Washington Post, The Atlantic, Foreign Affairs*, *the BBC*, the *New York Times, Bloomberg, the Economist*, and *the Guardian*, among others.

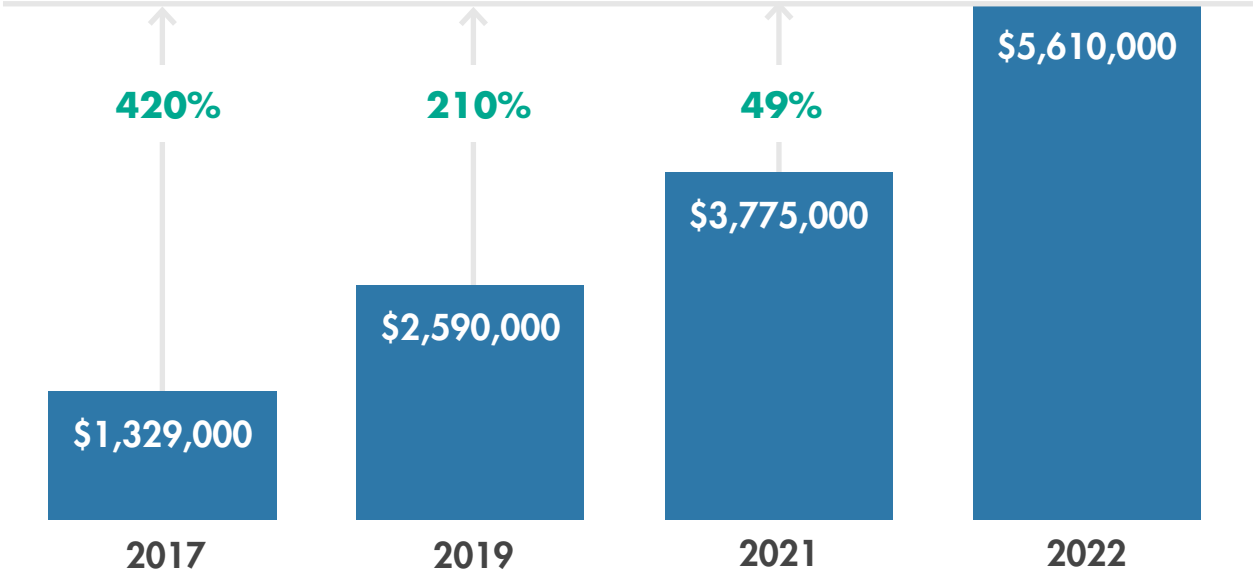
Dr. Charlyne Smith also joined Breakthrough this fall as a senior nuclear analyst. *The New York Times* recently covered Dr. Smith's appearance at the 27th annual Conference of the Parties (COP27) in Sharm al Shaikh, where she made the case for nuclear power as a key solution to climate change. Originally from St. Catherine, Jamaica, Dr. Smith moved to the United States in 2012 to pursue a career in science and technology focusing on energy solutions for current and future generations. Dr. Smith holds bachelor's degrees in Chemistry and Mathematics, as well as a master's and a PhD in Nuclear Engineering. In 2021 she made history as the first black woman to obtain a PhD in Nuclear Engineering from the University of Florida and was awarded the Prime Minister's National Youth Award for Excellence in Academics from the Office of the Prime Minister of Jamaica in 2022. Prior to joining Breakthrough, Dr. Smith was a Distinguished Glenn T. Seaborg Post-Doctoral fellow at the Idaho National Laboratory.

Finally, we are pleased to welcome longtime senior fellow and advisor **Dr. Jennifer Bernstein**, who joined us in November as Breakthrough's Academic Liaison. Dr. Bernstein will work to bridge the gap between our research and academia, primarily through curriculum development for students and engagement with faculty. Her academic and popular writing has been widely published in publications such as the *Journal of Environmental Studies and Sciences*, *Lessons in Conservation, Nature Climate Change*, *the Washington Post*, and *the San Francisco Chronicle*.

FUNDING

Thanks to the generosity of our incredible community of supporters, Breakthrough continued our steady growth this year, enabling us to hire senior talent, conduct more original research than ever before, run two major convenings, open a new office in Washington, DC, and execute a robust campaign to help ensure the U.S. can license and build next generation nuclear reactors.

FINANCIAL GROWTH



OUR 2022 BUDGET REPRESENTS MORE THAN:
49% GROWTH SINCE 2021,
210% GROWTH SINCE 2019, AND
420% GROWTH SINCE 2017.

OUR SUPPORTERS

As an honest broker that is dedicated to the public interest, Breakthrough only accepts charitable contributions from people and institutions without a financial interest in our work. Thank you to the major donors who have given Breakthrough at least $5,000 over the past year:

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Jeffrey Miller
Ray Rothrock
Kent Walker and Diana Walsh
Matt Winkler

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