



BREAKTHROUGH
INSTITUTE

2023 Annual Report

On Conflict and Progress



This year at the Breakthrough Institute brought a fair amount of controversy, even for a place that has never shied away from it. In April, Breakthrough's Ashley Nunes and I published a widely read essay in the *Wall Street Journal's* Week in Review section expressing skepticism that mass adoption of electric vehicles was as close at hand as many environmentalists and progressive Democrats believe. In June, we were the first, and one of the few, pro-nuclear organizations to publicly oppose the confirmation of Jeff Baran, a long-time obstructionist commissioner, to a third five-year term on the Nuclear Regulatory Commission. In July, Alex Trembath and I published a long essay on the risks of technocratic hubris in the wake of the passage of the Inflation Reduction Act. And in August, Breakthrough's Patrick Brown published a widely covered peer-reviewed paper in *Nature* and follow-up essay in *The Free Press* that sparked a global debate about publication bias in the climate science literature.

Each of these episodes was polarizing—even for some of our friends, funders, and allies. Discomforting as this was, we were not surprised: paradoxically, disrupting deeply polarized debates around climate change, clean energy, and food and agriculture is itself polarizing and frequently requires challenging strongly held views about the nature of climate risk, the pace of technological change, and the role of government in addressing the former and driving the latter. Explicitly and unapologetically defending a science-based, non-apocalyptic view of climate risk and the human future, a meliorist view of technology, and a skeptical view that technological change can primarily be achieved via regulatory fiat or that emissions reductions can be driven by behavioral change is not for the faint of heart!

But over the long term, that controversial work has consistently held up, whether it related to the central role that public investment in technology, innovation, and infrastructure would play in climate mitigation efforts; the need for nuclear energy and intensive, technological agriculture; or the limitations of renewable energy and organic farming. Already, the same is proving true of this year's controversies.

Six months after we sounded the alarm, automakers are slashing prices and scaling back their electric vehicle production plans, as demand has softened and inventories have risen. Barely a year into the Inflation Reduction Act, rising costs and regulatory barriers have sidetracked efforts to rapidly scale up clean technology and infrastructure. New projections for global emissions, meanwhile, increasingly show strong divergence from the high emissions and warming scenarios that the most widely cited climate impacts literature in high-profile publications like *Nature* is largely predicated upon. And our willingness to take a controversial stand on the Baran renomination appears to have killed it for the moment and has significantly improved the prospects for significant regulatory reform at the Nuclear Regulatory Commission.

Simply being right, of course, is not enough. With the gap between the Biden administration's climate ambitions and what it can deliver with traditional clean energy subsidies and environmental regulations growing and public sentiment turning sharply against many of its energy policy priorities, there is going to be a need to chart a different course on nuclear, permitting, electric vehicles, and the power sector. With a growing office in Washington, DC, we are now better positioned than ever to offer not only vision and leadership in that endeavor but the policy details as well.

Deconstructing conventional environmental politics must always be in service of reconstructing an alternative framework and agenda. We remain committed to de-escalating the climate culture wars, to championing quiet climate policy that charts a non-millenarian course of action, and to building a new politics of abundance in place of limits-based environmentalism and technocratic progressivism. Doing that will frequently invite controversy and reaction. But we continue to believe that, over the long term, being willing to do so is the key to building a successful ecological politics capable of making a future that is better for people and nature a reality.

An aerial photograph of a white wind turbine with three blades, positioned over a vast, deep blue ocean. The sky is a mix of blue and white, suggesting a bright, slightly overcast day. The turbine's central hub and nacelle are visible, and the blades extend outwards, one towards the top right, one towards the bottom right, and one towards the left. The water's surface shows subtle ripples and a gradient of blue tones.

Climate and Energy

The Breakthrough Institute's Climate and Energy research remains a critical resource for advocates, analysts, and policymakers seeking to parse the ever-more polarized terrain of climate debates. From dispelling myths about climate doom to challenging accepted wisdom about renewable transitions, the Climate and Energy team spent 2023 providing clear analysis on some of the most important questions surrounding climate impacts and energy transitions.

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



RESEARCH: Future Demand for Electricity Generation Materials under Various Climate Mitigation Scenarios

At the start of the year, the Climate and Energy team published a peer-reviewed paper in *Joule*, presenting projections for future metal and mineral demand from clean electricity generation infrastructure over the next 30 years under 75 different IPCC Integrated Assessment Models. The article attracted high-profile reporting, with coverage in the *Washington Post*, ABC News, and many other media outlets, including German, Dutch, and Finnish periodicals. The paper earned acclaim from numerous prominent clean energy researchers and thinkers on social media and even received considerable attention from the general public, with a related post reaching Reddit's front page via the forum */r/science*.

As hoped, this published research has helped establish the team's expertise on supply chains for critical minerals in clean technologies, positioning Breakthrough for impactful ongoing and future U.S. federal policy engagement on topics like battery mineral security, mine-permitting reform, and innovation efforts for alternative mineral extraction technologies and material substitution.



NEW HIRE: Peter Cook, Climate and Energy Analyst

Peter came to Breakthrough at the beginning of 2023 from Nyrstar, a leading global supplier of zinc. In his new position, Peter researches mining, critical minerals, industrial materials, and the implications of deep decarbonization scenarios.

Prior to his work experience at several mineral sourcing and processing companies, Peter earned BS and MS degrees in Earth and Environmental Sciences at the University of Michigan, where he studied the transport and uptake of trace metals and environmental contaminants. Peter's work and educational experience has already made him a key contributor to the team's work on critical minerals for decarbonization and has helped solidify Breakthrough as a leading voice on the subject.



RESEARCH: Peer-Reviewed Paper Highlights Abatement Cost Challenges for Electric Vehicles

Earlier this year, Breakthrough's Ashley Nunes co-authored a peer-reviewed paper published in *Sustainable Cities and Society* on abatement cost challenges presented by electric vehicles. The paper scrutinizes ways in which these vehicles can deliver maximum emissions reductions benefits for every dollar of government spending. This approach is timely given growing concerns over the national debt and questions surrounding the long-term viability of green technology subsidies. The paper was covered by numerous outlets including MarketWatch, Jalopnik, and Kelley Blue Book.

Concurrently, findings from the paper were also presented at the annual Environment and Energy Economics conference held by the National Bureau of Economic Research in Cambridge, MA. Scholars at the conference debated the merits of the paper, its contributions, and ways in which our abatement cost model can be improved. These discussions have served as the basis for follow-on work that the Climate and Energy team has subsequently undertaken.

RESEARCH: Peer-Reviewed Article Highlights Fundamental Category Error in Climate Science and Communications

Climate and Energy co-director Patrick Brown published a peer-reviewed article arguing that a genre of studies purporting to blame large portions of extreme weather impacts on climate change is based on a fundamental category error. The article, published in *Climatic Change* and titled “When the Fraction of Attributable Risk Does Not Inform the Impact Associated with Anthropogenic Climate Change,” contends that this error has to do with a miscategorization of weather and climate phenomena as discrete countable events rather than recognizing the reality that those phenomena are on a continuum of intensity. In perhaps the most high-profile instance of this mischaracterization to date, a study that made global headlines inflated, by a factor of five, the economic damages from Hurricane Harvey that could be blamed on climate change.

Patrick’s study was covered by dozens of news outlets and was placed in the 99th percentile in online attention for all studies of a similar age (ranked 531st of 338,022) and ranked 1st of the 38 articles of a similar age in the *Climatic Change* journal. The study also drew the attention of Sen. Shelley Moore Capito’s office, and Patrick was consulted in their preparation for the U.S. Senate Committee on Environment and Public Works hearing on “The Science of Extreme Event Attribution: How Climate Change Is Fueling Severe Weather Events.”

This study is Breakthrough’s most rigorous publication to date exploring how the intensity of extreme events, rather than their frequency, can be the most informative metric for understanding the magnitude of the influence of climate change. We hope that our work in this area will highlight the deficiencies of some others’ studies lacking attribution science and will foster more trust in our enterprise going forward.



Food and Agriculture

Breakthrough's Food and Agriculture program makes the environmental case for large-scale, high-tech, intensive agricultural systems. Developing, disseminating, and implementing advanced agricultural technologies allow modern societies to grow more food on less land, reduce costs for consumers, minimize greenhouse gas emissions associated with food production, and spare more room for wild nature. The Food and Agriculture team promotes and advocates for the technologies and practices—biotechnology advancements like genetically edited seeds, livestock improvements like methane-reducing feed additives, and novel protein alternatives—that can make an ecomodern food future possible.

The Food and Agriculture team significantly expanded its outreach in 2023, presenting to more than 3,000 people at events including the Agriculture Innovation Mission for Climate Summit, VERGE, Economist Impact's Sustainability Week, and four congressional briefings.

Our Food and Agriculture research is directed by Dan Blaustein-Rejto, who has worked in the program since its inception in 2016.



RESEARCH: Livestock Don't Contribute 14.5% of Global Greenhouse Gas Emissions

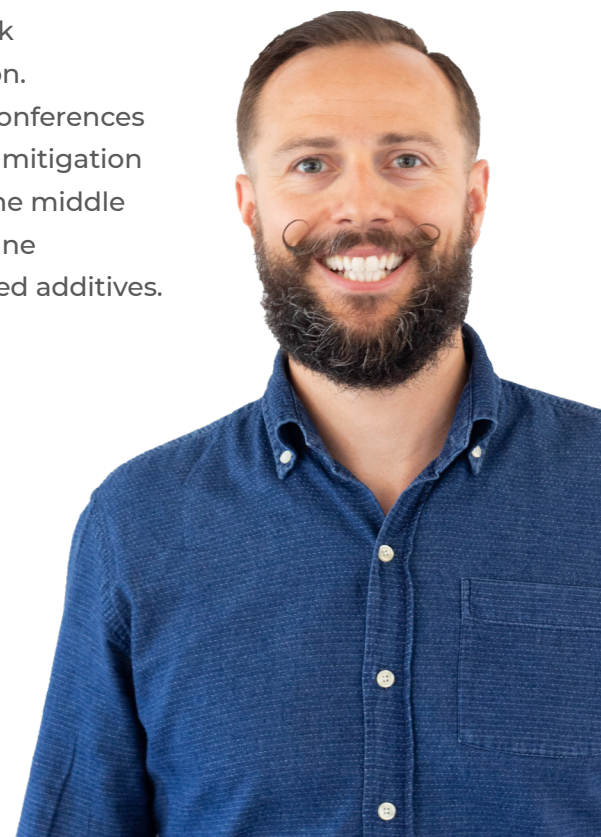
This year we published several analyses on the importance of reducing methane emissions from cattle and the most promising technologies and practices for doing so. In one analysis, we reviewed existing estimates of livestock's contributions to global greenhouse gas emissions. Because estimates range from roughly 11% to 17%, we recommended that organizations acknowledge the uncertainty in livestock's contributions rather than report a single figure of 14.5% as is typically done. After publication of our analysis, numerous outlets and organizations began reporting a range of figures, citing our work; these include *Vox*, *Smithsonian Magazine*, *Newsweek*, and *Financial Times*.



NEW HIRE: Dr. Chris Gambino, Senior Sustainable Livestock Analyst

A Breakthrough Generation Fellow in 2017, Chris rejoined Breakthrough at the beginning of 2023 after serving in various policy analyst and academic roles, including most recently as assistant professor at Delaware Valley University. Chris holds a PhD in Animal Sciences from Washington State University, where he was a National Science Foundation Integrative Graduate Education and Research Traineeship Program fellow.

At Breakthrough's DC office, Chris leads our work on methane mitigation from livestock production. In his first year, he has presented at numerous conferences on Breakthrough's vision for livestock emissions mitigation and has quickly helped place Breakthrough in the middle of important policy discussions related to methane measurement, livestock emissions, and cattle feed additives.





RESEARCH: The €3 Trillion Cost of Saying No: How the EU Risks Falling Behind in the Bioeconomy Revolution

In partnership with Alliance for Science, we published a report that quantifies the cost of the EU's banning gene editing and other new genomic technologies (NGT) in the agriculture and food, human health, and materials, chemicals, and energy sectors. We estimated the total cost would be between €171 and 335 billion annually from 2020 to 2040, totaling up to €3 trillion over a decade. The report recommends that the EU adopt and improve upon the European Commission's proposals to regulate gene editing differently from GMOs. The report was released at a Euractiv event in Brussels attended by representatives from several EU member states. The report received coverage in *Seed World Europe*, *Manufacturing Engineering* magazine, and *iGrow News*, among other outlets.





Nuclear Energy Innovation

For more than a decade, the Breakthrough Institute has been a visionary leader of the still-evolving pro-nuclear civil society coalition.

Under the leadership of Dr. Adam Stein, our Nuclear Energy Innovation program has emphasized the key technical, economic, and regulatory questions that will largely determine the future of advanced nuclear energy. This year, the program focused on identifying consensus strategies to streamline nuclear licensing and regulatory frameworks to ensure the commercialization of new nuclear technologies that are safe, economically viable, and scalable.

The Nuclear Energy Innovation program also expanded and maintained the Build Nuclear Now campaign, a grassroots advocacy project launched in 2022 to generate support for licensing and commercializing the next generation of nuclear energy.



RESEARCH: Stakeholder Consensus on Part 53 Major Topics

The Nuclear Regulatory Commission (NRC) is working to develop a new licensing framework, known as “Part 53,” for next-generation commercial nuclear reactors, as mandated by the Nuclear Energy Innovation and Modernization Act (NEIMA). Many stakeholders have been disappointed by the draft rule and argue that it fails to be the transformative framework that NEIMA envisioned. The NRC staff have made comments suggesting they receive “diverse” feedback on the rule from stakeholders and that this variety makes it difficult to modify the draft rule text. To overcome this roadblock, Breakthrough hosted two workshops and led seven months of engagement with a broad group of stakeholders to develop consensus on major issues. Our published report communicates the stakeholder consensus and provides recommendations to address major issues in the draft licensing framework.



CONGRESSIONAL TESTIMONY: Breakthrough Executive Director Ted Nordhaus to the U.S. House of Representatives

In July, Ted Nordhaus testified in a House Energy and Commerce Committee hearing entitled “American Nuclear Energy Expansion: Updating Policies for Efficient, Predictable Licensing and Deployment.” Ted’s written testimony summarizes many of the strategic projects of the Nuclear Energy Innovation program, including modernization of the NRC mission, grounding NRC public health standards, developing a modern licensing framework, enabling innovation, modernizing environmental reviews, and more.

A woman in a red patterned sari stands in a field of tall grass at sunset. The sun is low on the horizon, creating a warm, golden glow. The woman is seen from the side, looking towards the sun. The background shows a line of trees under the bright sky.

Energy and Development

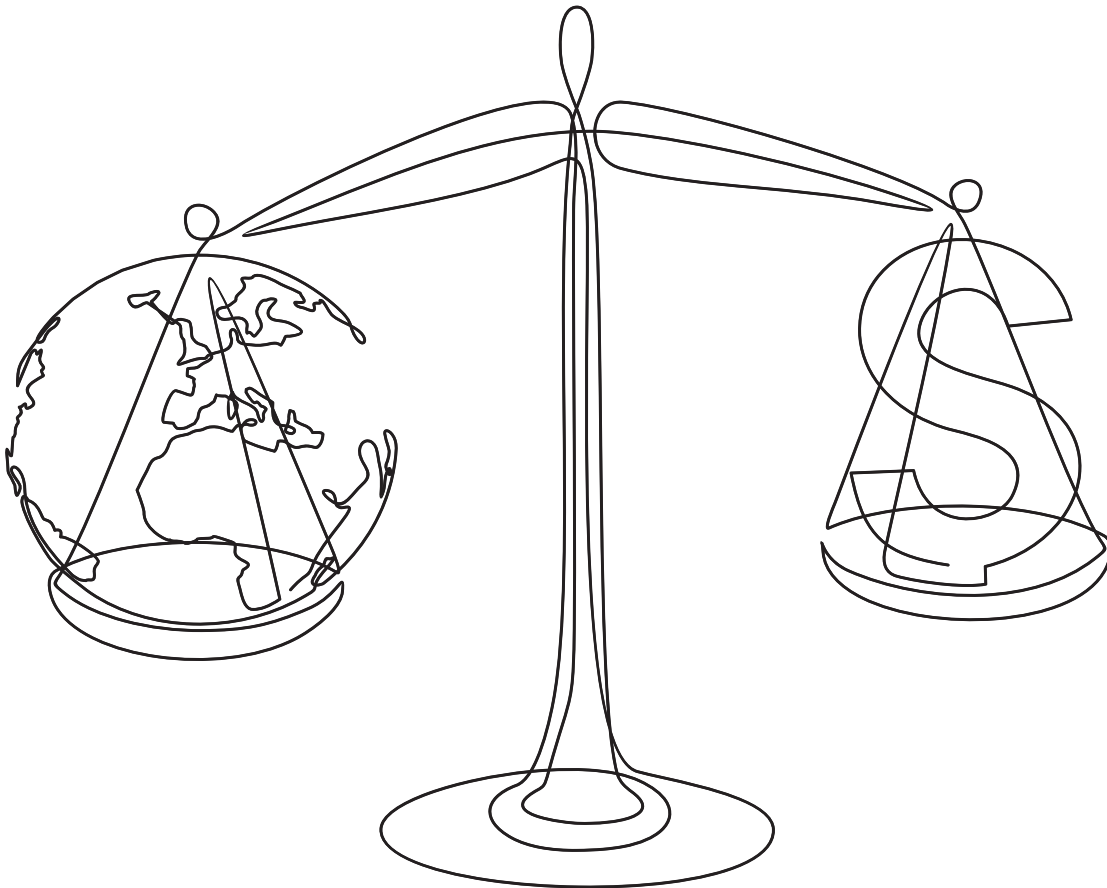
Breakthrough's Energy and Development program, directed by economist Dr. Vijaya Ramachandran, is premised on the fact that poverty remains one of the largest challenges facing humanity and that poorer countries around the world deserve the right to develop, even if it requires more fossil fuels, agricultural chemicals, and greenhouse gas emissions.

Vijaya's program is mainly focused on Africa—home to the vast majority of the world's poor and the region least responsible for global greenhouse gas emissions. Africa's more than one billion people are likely to suffer the most from the effects of climate change. Robust energy systems at scale are needed to reduce poverty and promote improved livelihoods by enabling industrial development and allowing the continent to fully participate in the global digital economy, boost agricultural productivity, and become more resilient to climate impacts.



RESEARCH: What Counts as Climate?

This year, Vijaya published a paper titled “What Counts as Climate?” in which she and her coauthors, Breakthrough’s Guido Núñez-Mujica and Scott Morris from the Center for Global Development, argued that the World Bank has developed a climate portfolio that lacks estimates of greenhouse gas emissions reductions and has no standardized reporting on greenhouse gas estimates. Further, hundreds of projects tagged as climate projects—many in poorer countries—appear to have little to do with climate change mitigation or adaptation. The authors were also unable to verify the World Bank’s topline numbers on emissions reductions. The paper was widely covered by the media, including the *Financial Times* and *The Economist*. A week after its publication, the World Bank announced intentions to “[enhance] the way we track climate outcomes that goes beyond measuring the volume of our climate co-benefits to primarily measuring the impact of our financing.”





Policy Advocacy

Just over a year after opening a new Washington, DC, office, Breakthrough's staff have established themselves as essential voices in major ongoing federal policy debates, from nuclear licensing reform to permitting reform and from Farm Bill appropriations to Inflation Reduction Act implementation.

Breakthrough's policy advocacy and analysis are deeply integrated with the organization's broader empirical research and ecomodernist mission. Our policy agenda operationalizes Breakthrough's long-standing vision for environmental progress: making clean energy cheap, growing more food on less land, and decoupling economic growth from ecological impacts.

PERMITTING REFORM

The Inflation Reduction Act and the Infrastructure Investment and Jobs Act promise to reinvigorate the nation's stagnant energy infrastructure sector. However, the National Environmental Policy Act of 1970 and broader regulatory red tape obstruct the infrastructure development process, working directly against the objectives of the two recent acts.

In today's hyperpartisan political environment, any viable solution will have to garner bipartisan support. Fortunately, congressional representatives across the political spectrum have shown interest in revisiting permitting negotiations to address the need for more aggressive reforms.

The chief risk of Congress's recent interest in permitting reform is that it will be short-lived. Even a substantial bipartisan permitting deal would ultimately prove disappointing if it does not generate sustained, long-term legislative and agency-level dedication to removing regulatory technology and infrastructure development hurdles. As a result, Breakthrough has launched a multi-issue permitting agenda, spanning electric power generation and transmission, environmental review for advanced nuclear power plants, expedited forest management to mitigate wildfire risk, and regulatory reforms to expand development of domestic critical minerals production capacity.

Breakthrough has built strong relationships with other NGOs, including the Property and Environment Research Center, R Street Institute, ConservAmerica, Institute for Progress, and Center for Strategic and International Studies. Over the summer, we launched our government affairs agenda on permitting reform, meeting regularly with congressional staff as well as representatives from federal agencies and organized labor.



NEW HIRE: Nikki Chiappa, Federal Infrastructure Policy Manager

Nikki joined Breakthrough this past summer after working as a policy advocate at Advanced Energy United and the Chesapeake Solar and Storage Association. Nikki brings expertise in infrastructure permitting and experience on Capitol Hill, where she interned in Rep. Nancy Pelosi's office. Since arriving at Breakthrough, Nikki has launched the permitting reform policy work, advocating for smarter, streamlined, and necessary regulations for clean energy, transmission, and critical mineral siting and permitting.



Nikki holds a BA in Communications, Legal Institutions, Economics, and Government and an MPA in Environmental Policy, both from American University.

FARM BILL AND AGRICULTURAL R&D ADVOCACY

2023 was a challenging year for food and farming policy. The 2018 Farm Bill expired on September 30 of this year, and negotiations over its replacement are set to continue well into 2024, pausing any significant progress in agricultural policy for the time being.

Breakthrough's federal policy manager for Food and Agriculture, Emily Bass, was busy nonetheless. Breakthrough submitted five FY24 appropriations requests aimed at supporting agricultural R&D and innovation, organized or participated in five congressional briefings, provided public comment on three agency-level policies, and publicly endorsed three policy proposals for the upcoming Farm Bill.

As part of our support for agricultural R&D and innovation, Breakthrough led a comprehensive effort to build stakeholder and congressional support for the Foundation for Food and Agriculture Research (FFAR), which dedicates a greater portion of its budget to climate mitigation and adaptation than other major federal agriculture R&D programs. This effort included developing a community sign-on letter with 130 signatories, including major agricultural and food companies and organizations such as General Mills, PepsiCo, and the National Corn Growers Association. The letter called on Congress to more than double funding for FFAR in the upcoming Farm Bill. We echoed

this call in multiple congressional briefings and webinars. We also organized a highly successful fly-in in which seven leading university researchers who have received FFAR grants, as well as representatives from companies that have provided matching funds for FFAR research, traveled to Washington, DC, to share their support of FFAR with their senators and representatives. Over the course of two days, FFAR advocates met with both Democrats and Republicans on the House and Senate Agriculture Committees. Our work contributed to key politicians making FFAR funding one of their Farm Bill priorities, including Senate Agriculture, Nutrition, and Forestry Committee Chair Debbie Stabenow's continued vocal support for FFAR.

As is the case for all food and farm policy groups, Breakthrough eagerly awaits 2024 and the chance to continue pushing for R&D and innovation in the next Farm Bill and beyond.



Breakthrough Journal



For over a decade, the *Breakthrough Journal* has been the intellectual clearinghouse for ecomodernist philosophy, politics, and debate. Its early issues featured most of the signatories who would go on to co-author *An Ecomodernist Manifesto* in 2015. Particularly influential articles have upended broader debates about conservation practice, climate risk, ecological decoupling, and the role of the state.

This summer, we published the 19th issue of the *Breakthrough Journal*, which turned out to be something of a milestone in the publication's history. This most recent issue included more articles and essays by current Breakthrough Institute staff than any

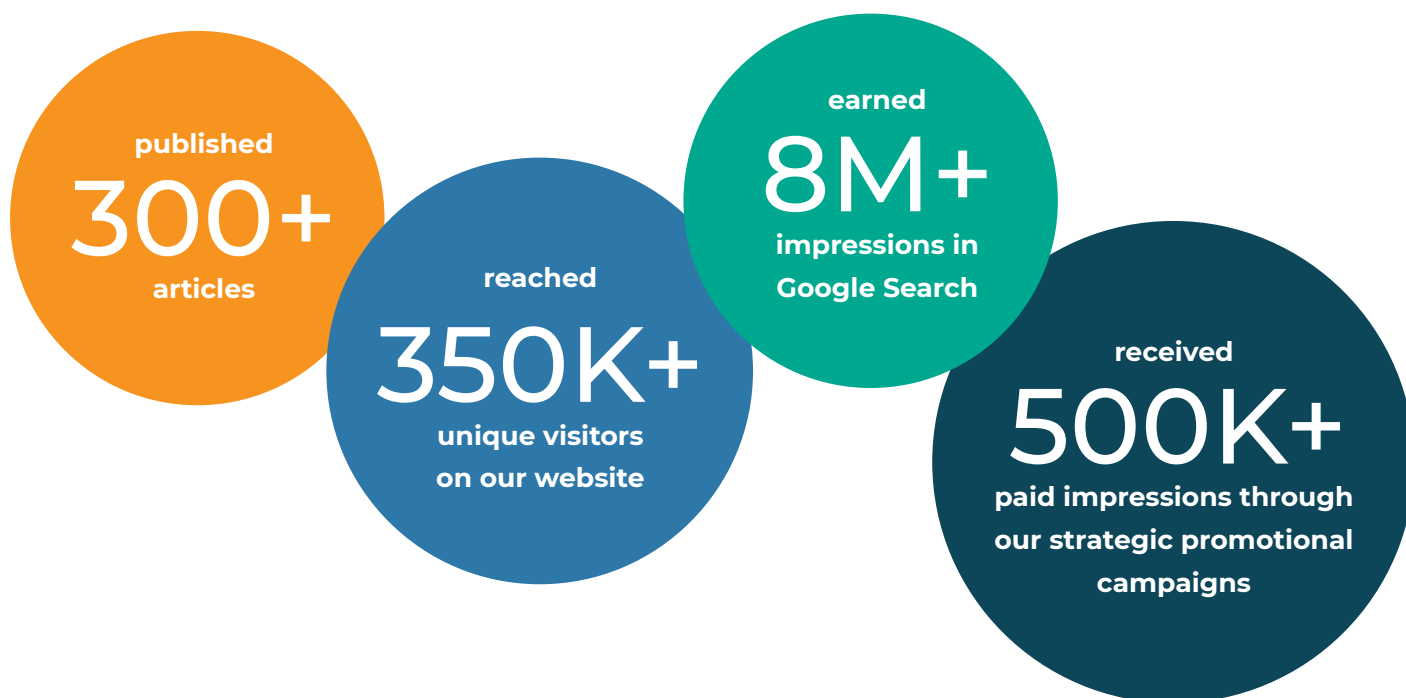
previous issue. That's in keeping with a multiyear trend under the editorial leadership of Kathryn Salam, who joined Breakthrough's executive team in early 2021 and has reinvigorated all of Breakthrough's strategic communications since then. It also speaks to the growth, and unprecedented talent, of our research staff.

Moving forward, we plan on better capitalizing on Breakthrough's editorial leadership and talent. *The Journal* will be a digital-first publication, regularly publishing the views and analysis of Breakthrough staff, while still accepting and inviting perspectives from external scholars, journalists, and other thought leaders. Major essays and articles will be compiled into regular print editions.

Communications

The Breakthrough Institute gives people new ways of thinking about the relationship between technology and the environment, opening up pragmatic pathways to improve environmental and human development outcomes. This requires both sophisticated research and expert strategic communications, including daily analysis and commentary, long-form writing published on our website and externally, excellent media relations, and frequent public speaking.

Through autumn 2023, Breakthrough has...



More than 8,000 other domains link to Breakthrough content, and this year, we received more than 7,500 media mentions. Our research and analysis are frequently cited in the *New York Times*, the *Washington Post*, the *Wall Street Journal*, *The Atlantic*, *City Journal*, the *National Review*, *Issues in Science & Technology*, *The New Atlantis*, and other leading newspapers and magazines.

EVENTS

Breakthrough Dialogue

152
in person attendees
73
virtual attendees



In June, more than 150 participants gathered for the 2023 Breakthrough Dialogue on the theme “The Metabolic Rift,” a concept derived from Karl Marx’s description of the rupture of the “metabolic interaction between man and the Earth.” As industrial-scale agriculture is a canonical example of the metabolic rift, the Breakthrough Institute honored Dr. Pamela Ronald with this year’s Paradigm Award for the work she has done to extend human societies’ agricultural capabilities. Breakthrough also hosted panels and breakout sessions featuring speakers such as Ralph Leonard, Kelsey Piper, Oliver Morton, Mark Lynas, Leigh Phillips, Erle Ellis, and Shannon Osaka.

Featured Speakers



Erle Ellis



Ralph Leonard



Mark Lynas



Oliver Morton



Shannon Osaka



Leigh Phillips



Kelsey Piper

EVENTS

Ecomodernism

118
in person attendees



In 2017, we launched an event that has become the annual East Coast gathering of the ecomodernist community. The event is designed to place ecomodernist ideas in the context of ongoing policy debates and attract policy advisors, experts, and influencers from the Washington, DC, area. This gathering has become even more important to our network-building efforts now that we have a DC office. In early October, we hosted Ecomodernism 2023 on the theme “Slouching Towards Industrial Policy,” which considered recent victories of the “new green industrial policy” as well as pitfalls and gaps in policy implementation that our research teams have identified.

Featured Speakers



Jane Flegal



Josh Freed



Jael Holzman



Jennifer Pahika



Katherine Wolfram



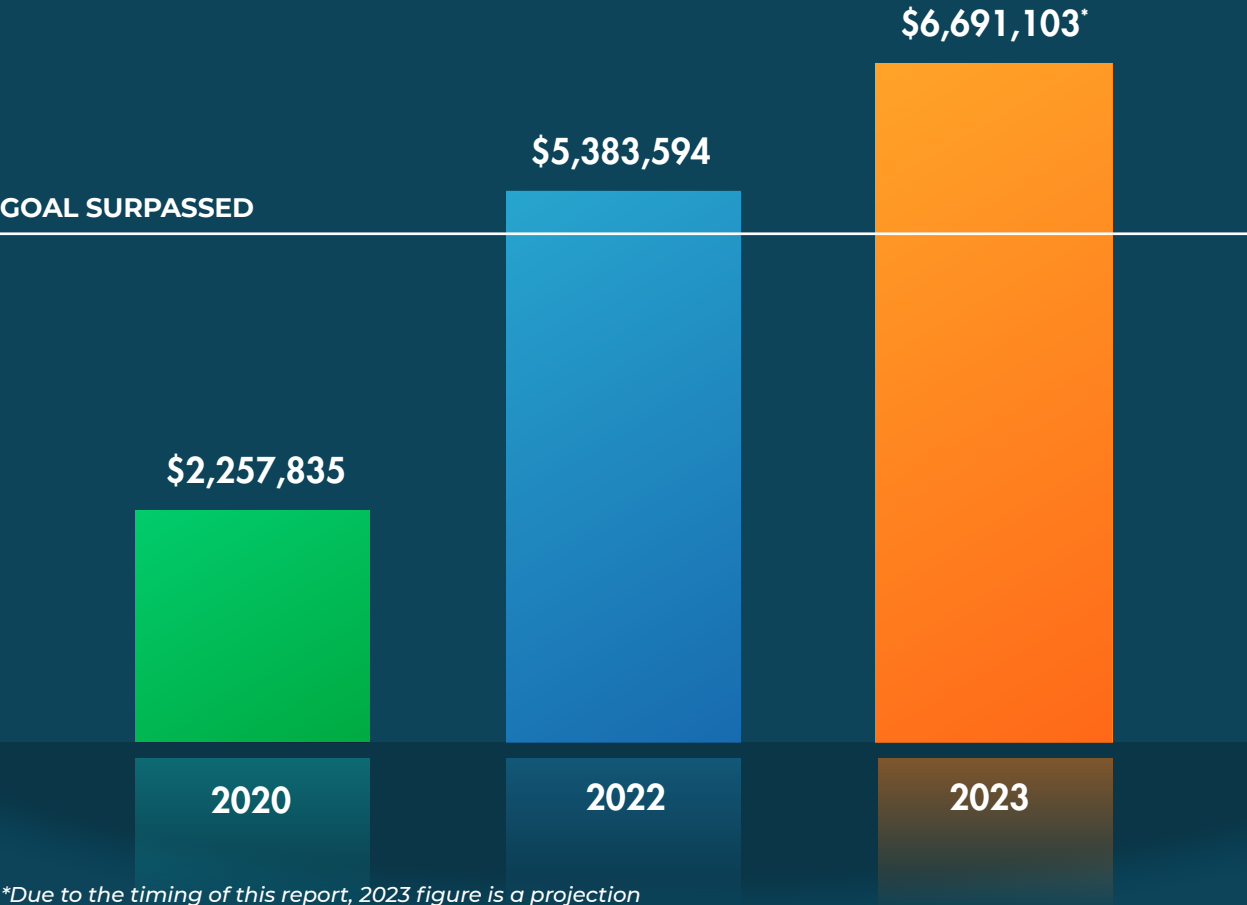
Matt Yglesias



Mathew Zeitlin

Funding

The Breakthrough Institute's 2020 strategic plan, Built to Last, established a goal of doubling the organization's budget to \$5 million during the course of the three-year plan. This was the level of funding we identified as needed to achieve Breakthrough's near-term objectives and help us begin to build an enduring institution for the long term. We are pleased to report that Breakthrough surpassed that milestone in 2022 and continued our budget growth in 2023.



Our Supporters

As an honest broker dedicated to the public interest, the Breakthrough Institute accepts charitable contributions only 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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Pamela Gannon and David Douglas Fund
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