2019 IMPACT REPORT

THE BREAKTHROUGH INSTITUTE

The Breakthrough Institute is a global research center that identifies and promotes technological solutions to environmental and human development challenges.

MESSAGE FROM THE FOUNDER & EXECUTIVE DIRECTOR

This fall marked the 15th anniversary of the publication of *The Death of Environmentalism*, the essay that established the Breakthrough Institute as an important new voice in environmental politics. With the benefit of hindsight, much that seemed radical then seems obvious now. Climate change is not the sort of problem that will be solved in the same way that environmental laws helped to dramatically improve air and water quality. Technology, together with public investment in innovation and infrastructure, is the only way forward. Climate solutions must offer Americans and billions of others around the world better lives and a brighter future if they are going to be deployed at a scale consistent with addressing climate change.

Over the years, the details of that vision have evolved. Today, we focus on nuclear energy, natural gas, carbon capture, biotechnology, and high-productivity intensive agriculture, along with renewable energy, as key technological pathways to a low carbon future. We are less optimistic that stabilizing emissions below 2 degrees (much less 1.5) celsius is a particularly plausible target, but more optimistic that continuing climate mitigation — together with better infrastructure, technology, and institutions for adaptation — might offer human societies opportunities to manage a significantly warmer future well.

What remains at the core of our work is a commitment to continuing human development and prosperity as the key to addressing climate change and other environmental solutions, a rejection of catastrophist framings of environmental problems and zero-sum focused climate solutions, great faith in humanity's innovative spirit, and the belief that we will make far more progress addressing environmental challenges by appealing to our best selves than our worst fears.

Today, Breakthrough is better positioned than it has ever been to help the public, policy-makers, advocates, and philanthropists look beyond the latest outrages in the climate wars toward the things that really matter. Our growing research team, expanding network, new convenings, and new communications capabilities promise to expand our impact and influence as we move into the third decade of the 21st century. What won't change is our vision, our values, and our belief in the power of ideas to change the world.

Ted Nordhaus
Founder & Executive Director

OVERVIEW

OUR VISION

Breakthrough's vision is of a world that is good for both people and nature.

We believe that human prosperity and an ecologically vibrant planet are possible at the same time. Societies are already experiencing peak use of many natural resources; some previously destroyed forests are returning as we use less land to farm more food; our energy sources are becoming denser and cleaner; and pollution — including carbon emissions — is falling in most post-industrial nations.

We believe that ecological vibrancy results from human prosperity, not the other way around. Humanity has made extraordinary progress over the past several centuries. While modernization has had both positive and negative impacts, and the benefits of development have not been equally distributed, on the whole, human beings live longer, freer, healthier, more prosperous, and more secure lives than our ancestors did. This progress has made contemporary environmental consciousness possible.

For these reasons, meeting people's material needs is both an ethical imperative and a precondition for societal concern about nature. Technological innovation, particularly in energy and agriculture, can enable us to meet human needs at the same time as we reduce our reliance on natural resources. And clean energy technologies are key in creating a high-energy planet without overheating the climate.

There is no guarantee that these trends will continue. But by embracing technology and accelerating modernization for all people, we believe that both humanity and nature can thrive for centuries to come.

OUR IMPACT

Breakthrough's work is rooted in a positive, optimistic philosophy called ecomodernism, which embraces modernity in service of leaving more room for nature and expanding human prosperity. Breakthrough advances ecomodernism in three primary ways: research, communications, and network-building. Our research is designed to illuminate pathways to "decouple" the link between human development and environmental destruction. Our digital and print initiatives promote a positive vision of our environmental future grounded in robust and long-standing human development trends. Our network-building work convenes a broad-based, ideologically diverse group of scholars, experts, and policymakers to engage in open-minded debate at two annual conferences, the Breakthrough Dialogue in Sausalito, California, and Ecomodernism in northern Virginia, as well as at workshops and other events.

The following case studies offer examples of how these activities help translate our ideas into action.

BREAKTHROUGH GENERATION: A DECADE OF LEADERSHIP DEVELOPMENT BEGINS TO PAY OFF

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“The Breakthrough Generation Fellowship challenged me to become more critical of my own beliefs and those of my peers, making me a stronger person and thinker going forward.”

-Dina Abdulhadi 2013 Generation Fellow

Breakthrough Institute launched its summer fellowship program in 2008. A decade later, Breakthrough Generation boasts over 100 alumni. Breakthrough summer fellows have gone on to leading graduate programs including MIT, Berkeley, Stanford, Carnegie Mellon, Oxford, and the London School of Economics. Our alumni have also built careers at the US Department of Energy, the UK Department of Energy and Climate Change, the US National Renewable Energy Laboratory, the African Union, the World Economic Forum, the Bill and Melinda Gates Foundation, and Google.

Prominent alumni in the academic and think tank worlds include Jesse Jenkins, now an Assistant Professor of Mechanical and Aerospace Engineering at Princeton University, Eric Kennedy, Assistant Professor of Disaster and Emergency Management at York University, Kartikeya Singh, deputy director and senior fellow of the Wadhwani Chair in U.S.-India Policy Studies and senior fellow in the Energy & National Security Program at the Center for Strategic and International Studies, and Jessica Lovering and Yael Borofsky, scholars at Carnegie Mellon and ETH Zurich respectively and fellows at the Energy for Growth Hub.

Other alumni work in the private sector. Devon Swezey helps lead Google’s Global Energy Market Development and Policy work in Europe. Tyler Norris develops large-scale solar PV projects across the Southeast. Jonathan Crowder is a founding partner at Intelis Capital, a venture capital firm that invests in energy innovation. Sara Mansur is a senior manager for business operations and policy at Lyft.

Breakthrough launched the fellowship with the intention of developing a new generation of leadership that was clear-eyed about the scale of 21st-century environmental problems and willing to question long-standing assumptions about what it would take to address those challenges. Today, a decade later, that investment in the next generation of environmental leadership is beginning to pay off.

100% CLEAN ENERGY

A decade ago, the Breakthrough Institute was the first prominent environmental NGO to publicly embrace nuclear energy as a key climate mitigation technology, and it was among the first to offer a policy framework for valuing the zero-carbon electricity produced by nuclear power plants. Breakthrough was also quick to sound the alarm over the slew of US and European nuclear power plant closures that were slated to occur over the past decade.

Starting in 2010, Breakthrough has consistently made the case that wind, solar, and other renewable energy technologies alone are not capable of powering modern energy economies. Our staff published the first major analyses showing an increase in carbon emissions following nuclear plant closures in Germany and Japan as coal and natural gas, not renewables, filled the gap. Then in 2013, San Diego Gas & Electric announced the surprise closure of the San Onofre nuclear power plant located between Los Angeles and San Diego. As Breakthrough predicted at the time the closure was announced, California's carbon dioxide emissions rose, as the San Onofre plant was replaced largely with natural gas generation, not with renewables and increased energy efficiency, as many environmental advocates of closing the plant predicted.

San Onofre presaged an unfortunate trend in the US and European electricity systems. Multiple nuclear plants closed in the United States over the coming years. Despite growing evidence that nuclear plant closures reliably increased emissions, leading environmental groups continued to support nuclear plant closures, culminating in the 2016 closure of Diablo Canyon, California's last remaining nuclear plant. Breakthrough published several analyses warning that the plant would not, as groups like the Natural Resources Defense Council and the Sierra Club insisted, be replaced with zero-carbon energy sources.

While Breakthrough's work couldn't save Diablo Canyon or a number of other plants around the country slated for closure, there is today much broader recognition among both environmental NGOs and policymakers that closing nuclear plants is antithetical to climate mitigation, which has sparked demand for new policy frameworks to support the existing nuclear fleet in the United States and elsewhere.

In 2016, Breakthrough published *Low Carbon Portfolio Standards*, a report that argued for the expansion of state renewable portfolio standards to include existing nuclear plants and require that closed nuclear plants be replaced entirely with zero-carbon electricity.

Others followed suit. That same year, Third Way published, "We Need a Mix," a four-minute video advocating a clean energy mix that goes beyond renewables. The following year the Environmental Defense Fund made a case for the continued operation of existing nuclear power plants — a marked departure from the organization's previously unfriendly position on nuclear. In Illinois and New York, both EDF and NRDC supported measures to keep nuclear plants in those states operating. And in 2018 the Union for Concerned Scientists, long a leading antinuclear voice, released an influential report recognizing the importance of nuclear plants for US climate mitigation efforts.

Also in 2018, Google released a white paper detailing its goals to power 100% of its operations with clean energy — including, potentially, carbon capture and nuclear power — on a 24/7, grid-wide basis. And perhaps more significantly, the utility company Xcel Energy, which services eight states with over 17 gigawatts of capacity, pledged to reach 100% clean energy, including nuclear and CCS, by 2050.

Following up on its 2016 report, Breakthrough released *Clean Energy Standards* in 2018, a new report jointly authored with Third Way arguing for the expansion of state-level renewable portfolio standards to include all non-renewable carbon-free technology.

State policymakers followed suit. In 2018, California's SB 100 and New Mexico's Energy Transition Act mandated 100% clean energy, inclusive of nuclear energy and carbon capture, by 2045, while Massachusetts supplemented its renewables mandate with a clean energy standard. Similar mandates were also enacted through executive orders in New Jersey and New York. The following year, the state of Washington approved its own 100% clean energy standard, and states like Minnesota and Illinois have begun to consider adopting similar legislation.

These moves by both key environmental stakeholders and US policymakers have helped put the 100% renewables framework — which has put renewables advocacy at odds with deep decarbonization — firmly in our rearview and have helped to move forward a more pragmatic decarbonization agenda.

SUSTAINABLE INTENSIFICATION

Breakthrough's conservation program was founded on critiques of conventional conservation practice. Notwithstanding local success stories, we observed that protected areas and payments for ecosystem services had failed to reverse global trends in biodiversity loss and land use change. Through our work, it became apparent that much of the conservation discourse was underemphasizing the single largest driver of ecosystem devastation globally: farming and agriculture.

After more than three years of research, Breakthrough released *Nature Unbound: Decoupling for Conservation*, a report that proposed one of the first comprehensive alternatives to traditional conservation approaches. At the core of this work was the simple notion that through intensification, or innovating to produce more food on less land, biodiversity could be preserved while feeding a growing population.

This simple idea made big waves.

In the months that followed, major media outlets, including *Scientific American*, *The Guardian*, *Wired UK*, and *Project Syndicate*, all referenced "decoupling for conservation" in their publications. In the years since, the report has been heavily cited in several articles in peer-reviewed journals, such as *Bioscience*, *Science Direct*, and *SAGE Journals*.

So-called "sustainable intensification" was already a niche concept in conservation circles before Breakthrough arrived on the scene. But the concept was employed largely by practitioners and theorists who sought to break with the model of "industrial agriculture" that had driven intensification and decoupling in agriculture to date. In response, we spun a food and agriculture program out of our conservation program to build out this new model of sustainable intensification. As Linus Blomqvist, Brealthrough's former director of food and ag-

riculture argued at the Consultative Group for International Agricultural Research in 2015, the program sought to "refine industrial farming without abandoning it."

Through writing like this and the convening of key conservation thinkers at our annual Breakthrough Dialogue, we saw our influence grow over time. Ultimately, our thinking was incorporated into a disruptive new vision for global conservation, Nature Needs Half, with the goal of preserving and interconnecting 50% of the planet by 2030. In 2016, representatives from the Nature Needs Half movement authored *An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm*, which recognized intensification, along with urbanization and land-use planning, as an important strategy for successful conservation efforts. The following year, Nature Needs Half began to formally organize itself around decoupling to achieve its goal.

The footprint of our work can also be seen vividly in a 2018 paper called *From Bottleneck to Breakthrough: Urbanization and the Future of Biodiversity*. Authored by Eric Sanderson, the senior conservation ecologist at the Wildlife Conservation Society, and colleagues, the paper asserts that global demographic and economic trends driven by urbanization have created an opportunity to decouple human development from growing conservation impacts. Urbanization, agricultural intensification, and energy transitions — the three key principles that underpin ecomodernism — could drive significant conservation gains this century, according to the paper.

That same winter, the World Resources Institute, a longstanding and powerful voice among conservation NGOs, published *Creating a Sustainable Food Future*, the comprehensive results of a six-year study of different approaches to agricultural sustainability. The paper concludes that agricultural intensification is the principle lever with which to simultaneously close what it calls the food gap, the land use gap, and the greenhouse gas emissions gap.

This report is notable for two reasons. First, it is a prime example of a large environmental NGO recognizing the potential for intensive, high yield agriculture to shrink the human land footprint and make room for nature. Second, *Creating a Sustainable Food Future* echoes many of the ideas Breakthrough laid out in *Decoupling for Conservation*, a noteworthy signal that our ideas are gaining purchase amongst powerful stakeholders in environmental conservation.

Growing recognition among both scholars and conservation NGOs that agricultural intensification holds that key to conservation success in the 21st century has set the stage for a major reset of US agriculture policy. Over the next few years, Breakthrough will be focused on engaging key stakeholders in the environmental NGO and agricultural communities to promote policies that better align the interests of farmers, livestock producers, and agricultural processors with conservation and environmental objectives.

Improving agricultural R&D, expanding US agricultural exports, raising the environmental efficiency of beef production, and developing plant-based and cell-based meat alternatives all hold great promise, offering the opportunity to direct the remarkable productivity and technological capabilities of the US agriculture sector towards improving global environmental outcomes while opening up new markets for US farmers.

EXPANDING OUR IMPACT

"There's nothing quite like the feeling of finding an intellectual home. Research published by Breakthrough spurred me to write my most recent book, and the Dialogue brings together a fascinating and truly diverse group of thinkers and doers, all of whom care deeply about taking care of our planet. I'm proud to call myself an ecomodernist."

- Andrew McAfee

CITIES AND URBANISM

For the first time in human history, over half the human population lives in cities. Where once over 90% of the human population lived in rural agrarian poverty, by the end of this century the vast majority of humanity will live in urban environments. Cities bring economic opportunity, innovation, women's empowerment, dense housing, and efficient transportation. They concentrate wealth and economic activity and require dense energy, intensive agriculture, and extensive national and global supply chains to function. Well-planned and administered cities can be engines of social and economic mobility and sites for transformative innovation. Poorly planned cities can breed poverty, inequality, violence, and anomie.

One way or another, the human future will unfold in the world's cities, which hold the key to both human well-being and a vibrant, wild, and biodiverse natural world. Managing the transition to an urban planet well is inseparable from efforts to address global poverty, climate change, and biodiversity loss. Food and energy systems that are not compatible with an urban future cannot offer real solutions to those challenges, and cities that grow but don't thrive can't support the technological and economic transformations that food and energy systems will need to undergo in order to address the great environmental challenges that human societies face in the 21st century.

For this reason, Breakthrough has begun scoping an urbanization program. The focus of that program will be to understand how and why cities work, the ways that they both produce and depend upon sprawling food and energy systems, and the opportunities to better align urbanization processes with broader social, economic, and technological transformations that good stewardship of the environment for the 21st century and beyond will require.

FEDERAL AGRICULTURE INNOVATION POLICY

When associated land-use change is accounted for, global agriculture accounts for approximately one-quarter of anthropogenic greenhouse emissions. Alarmingly, agriculture's share of global emissions is expected to grow with rising food demand around the world. For this reason, Breakthrough has, in recent years, focused on sustainable intensification as the critical pathway to mitigate emissions while also meeting the growing demand for food. High-tech, large-scale, efficient agriculture represents, in our view, the only plausible path to reconcile these two issues.

US agricultural policy, in particular, presents several opportunities for improvement. There remains a significant gap in public sector funding for nascent agricultural R&D. Crop insurance and other programs that currently support farming optimize for output over efficiency. Biotech and other agricultural innovations face a variety of regulatory hurdles to broad adoption.

To leverage these opportunities, Breakthrough's agriculture program will focus on better specifying the federal agenda for sustainable intensification and building relationships among key agricultural stakeholders, including farmers, food processors, labor advocates, and pragmatic environmental NGOs. Our work will focus on building the empirical case for sustainable intensification; identifying and promoting domestic agricultural policy opportunities to reduce greenhouse emissions; and assembling a coalition of like-minded NGOs to help broaden our research and influence.

ECOMODERNISM

The Breakthrough Dialogue is widely recognized as one of our most important contributions to the ecomodernist movement. Every year, we bring together a mix of new and familiar faces — each an expert in their own right — with the promise of discussion that seeks to address the wicked problems of our time. And every year, participants walk away with unique insights and new relationships that expand both their networks and Breakthrough's.

Our east coast Dialogue, Ecomodernism, was created with the goal of expanding the scope of our programming while also increasing its accessibility to a wider audience. Like the Breakthrough Dialogue, Ecomodernism brings together professionals from diverse disciplinary and ideological backgrounds in a space designed to foster discussion and debate. But what makes Ecomodernism distinct is its policy-based focus on the major questions that concern the broader Breakthrough and ecomodernist community.

Our inaugural convening in 2017 asked attendees to consider what role democracy should play in everything from climate change to conservation. Ecomodernism 2018 attempted to model what constructive debate might look like in our increasingly polarized politics — challenging speakers to accurately articu-

late the positions they disagree with and note the weaknesses in their own arguments. Ecomodernism's speakers and honorees have included Ariane de Bremond, Eli Lehrer, Amanda Staudt, Kate Marvel, Kim-Mai Cutler, and US Senator Lisa Murkowski.

As we enter Ecomodernism's fourth year, Breakthrough is excited to host a set of conversations about environmental policy at this critical juncture approaching the 2020 election debate. As climate politics have become even more polarized in recent years, potential climate policy frameworks have actually proliferated, principally though not exclusively on the progressive left. The existence of the annual Ecomodernism event will better allow us to spotlight and leverage our long-standing position in US climate politics.

DIVERSITY AND INCLUSION

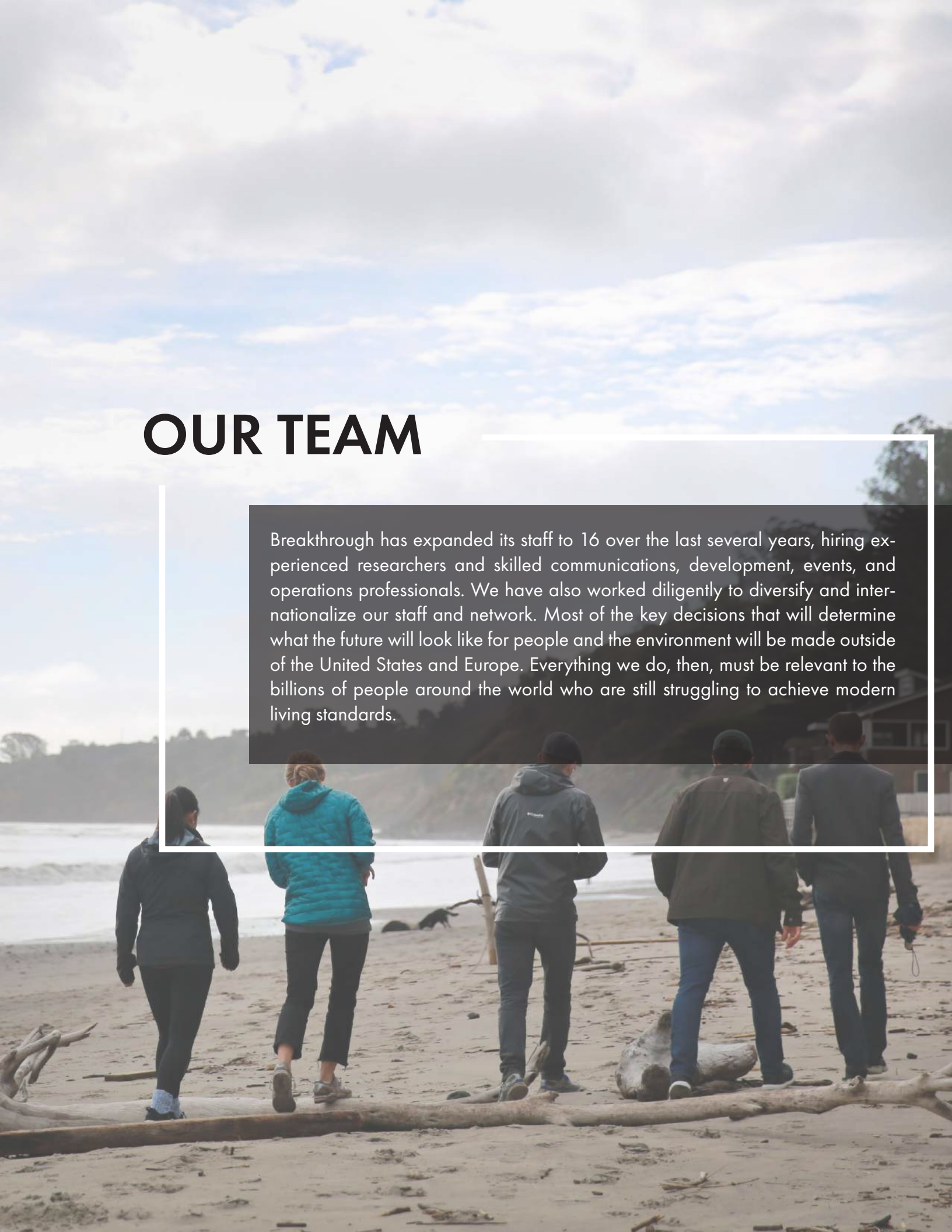
Breakthrough focuses on strategies that can improve access to affordable food and energy, stimulate global economic growth, and emphasize democratic accountability. We have found considerable enthusiasm for our ideas in our years-long effort to "internationalize" our work, principally by welcoming new scholars and advocates from China, India, sub-Saharan Africa, and Latin America.

These efforts have helped to expand our network and the impact of our work. In the coming year and beyond, Breakthrough plans to further diversify our network by developing a new set of diversity, equity, and inclusion initiatives. These initiatives will target our staff, fellows, and event participants with a particular focus on appealing to domestic US communities of color.

Some of this work includes expanding our network to communities, organizations, and professionals dedicated to improving outcomes for low-income and disadvantaged communities. It also simply includes expanding our network in a broader sense, to increase our impact in the world, and to engage with a wider and more diverse set of voices and perspectives.

OUR TEAM

Breakthrough has expanded its staff to 16 over the last several years, hiring experienced researchers and skilled communications, development, events, and operations professionals. We have also worked diligently to diversify and internationalize our staff and network. Most of the key decisions that will determine what the future will look like for people and the environment will be made outside of the United States and Europe. Everything we do, then, must be relevant to the billions of people around the world who are still struggling to achieve modern living standards.



FOUNDER & EXECUTIVE STAFF

Ted Nordhaus is a leading global thinker on energy, environment, climate, human development, and politics. He is the founder and executive director of the Breakthrough Institute and a co-author of *An Ecomodernist Manifesto*. He was among the first to emphasize the imperative to "make clean energy cheap" in the *Harvard Law* and *Policy Review*. He received *TIME* Magazine's 2008 Heroes of the Environment Award. Over the last decade, he has helped lead a paradigm shift in climate, energy, and environmental policy.

Alex Trembath is Deputy Director at Breakthrough. He is the lead or coauthor of several Breakthrough publications, including *Coal Killer*, *Beyond Boom and Bust*, and *Our High-Energy Planet*. He is also co-director of Breakthrough Generation, the Breakthrough Institute's annual summer policy fellowship. He is a Breakthrough Generation Fellow (2011).

PROGRAM DIRECTORS

Zeke Hausfather leads Breakthrough's climate and energy programs. He is a climate scientist and energy systems analyst whose research focuses on observational temperature records, climate models, and mitigation technologies. Zeke has worked as a research scientist with Berkeley Earth, was the senior climate analyst at Project Drawdown, and the US analyst for Carbon Brief.

Dan Blaustein-Rejto leads Breakthrough's food and agriculture programs. He analyzes the economics and potential of sustainable agriculture policies and practices. Dan has conducted research with the Environmental Defense Fund, International Center for Tropical Agriculture, and Farmers Market Coalition.

Grace Choi leads Breakthrough's operations program. She has worked in the nonprofit and corporate sectors advising executives and fortune 500 leaders on how to make better business decisions.

Thia Bonadies leads Breakthrough's events program. She has dedicated her career to using the art of storytelling as a tool for community building and has over 10 years of experience in project management.

Kenton de Kirby leads Breakthrough's content program. He is a social scientist with a diverse intellectual background. He has published widely on issues related to education, neuropsychology, culture, linguistics, politics, and the environment.

BOARD OF DIRECTORS

Rachel Pritzker is president and founder of the Pritzker Innovation Fund, which supports the development and advancement of paradigm-shifting ideas to address the world's most wicked problems. She is chair of the board of the Breakthrough Institute and is a board member and co-chair of the Energy Program at Third Way. Rachel also serves on the board of the Center for Global Development and is a co-author of An Ecomodernist Manifesto.

Stewart Brand is co-founder and president of The Long Now Foundation and co-founder of Global Business Network. He created and edited the *Whole Earth Catalog* (National Book Award), and co-founded the Hackers Conference and The WELL. His books include *The Clock of the Long Now*, *How Buildings Learn*, and *The Media Lab*. His most recent book is *Whole Earth Discipline*. He graduated in biology from Stanford University and also served as an infantry officer.

Bill Budinger is a founder of Rodel, Inc., where he served for 33 years as chairman and chief executive officer. Bill is an inventor and holds more than three dozen patents. Bill is also a founder of the Rodel Foundations, which seek to advance K-12 public education.

Reihan Salam is the executive editor of National Review and a National Review Institute policy fellow. He is a contributing editor at *The Atlantic* and *National Affairs*, a member of the board of the Breakthrough Institute, and an adviser to the Niskanen Center. With Ross Douthat, Salam is the co-author of *Grand New Party: How Republicans Can Win the Working Class and Save the American Dream*.

Ray Rothrock is partner emeritus of the venture firm Venrock. Once a nuclear engineer, Ray is now an investment expert in the fields of energy, information technology infrastructure, and cybersecurity. He was a co-executive producer of the documentary film Pandora's Promise. Presently he is CEO of RedSeal, a cybersecurity analytics company.

Tom Riley is the treasurer & secretary of the Breakthrough Institute Board. In his professional life, Tom is the head of finance for the Seattle Sounders FC, a franchise of Major League Soccer. Prior to that, he ran his own management and financial consulting firm. In 2000, Tom was elected the volunteer President of the Board of the Seattle Audubon Society, and he was the youngest president in the organization's 100-year history. He served on the Board until 2011.

Tisha Schuller is principal and founder of Adamantine Energy, which works to create consensus and build and engage pragmatic solutions for energy's thorniest challenges. Previously, she was an independent consultant to private clients from Fortune 500 energy companies to non-profit environmental organizations. She also served as president and CEO of the Colorado Oil & Gas Association.

Matt Winkler is a biologist and has founded three biotechnology companies. He is currently chairman of Asuragen, a molecular diagnostics product company focused on cancer and neurodevelopmental diseases. Matt is the author of more than 30 publications and has 19 issued patents. He has been active in pro-GMO issues since 2000.

Ross Koningstein has worked on Google's RE<C program and on its data center efficiency and has an interest in economically disruptive clean energy. He was previously Google's first director of engineering and one of the inventors of Google's CPC AdWords.

OUR SUPPORTERS

Breakthrough cultivates relationships with a growing number and type of funders, including individuals and institutional philanthropists interested in our multiple issue areas and programs. As an honest broker that is dedicated to the public interest, we only accept charitable contributions from any person or institution without a financial interest in our work.

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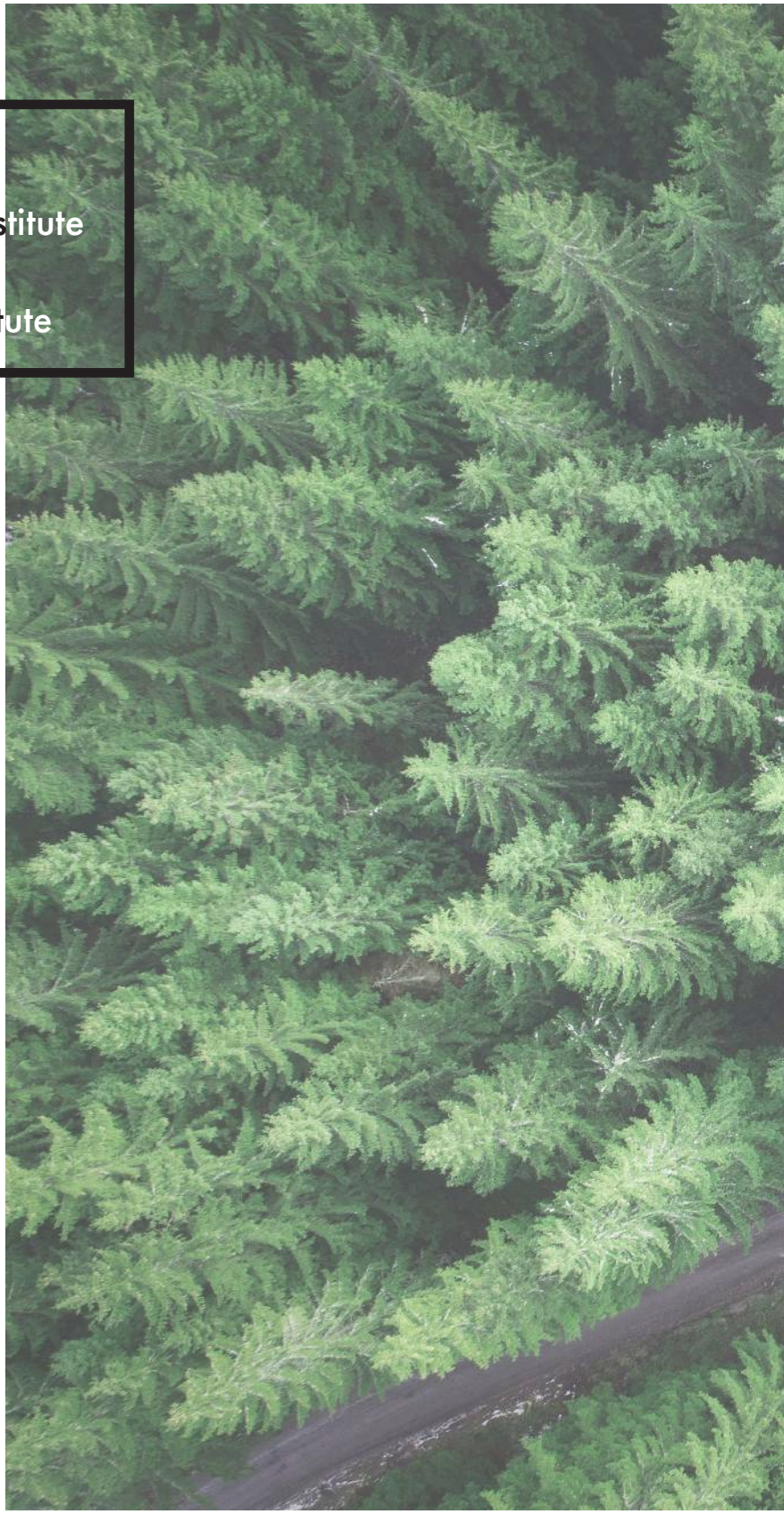

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