Climate Solutions Big Bet: 2018 Annual Report

Spring 2019

Prepared for:

MacArthur Foundation

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In collaboration with:

M+R

Oxford Policy Management

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Introduction

Purpose and Contents of the Report

Since 2016, Grassroots Solutions and M+R Strategic Services (M+R) have partnered with the MacArthur Foundation to evaluate its theory of change and strategy for the Climate Solutions Big Bet. As the evaluation and learning partner, we are responsible for providing feedback about the Foundation's emerging strategy, measuring progress, and offering constructive critiques to inform decisions and refinements made by the Foundation. More specifically, we are tasked with implementing activities that will allow the Foundation to measure impacts and outcomes, track developments in global- and country-specific contexts, frame challenges, and identify opportunities as they arise.

To meet the Foundation's evolving information needs, Grassroots Solutions and M+R, with input from the Climate Solutions team, produce three types of products:

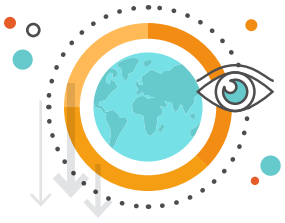
- Annual reports
- Quarterly status updates and technical briefings
- Evaluation management and process deliverables such as work plans

The purpose of each annual report, like other products, is to facilitate learning. This report builds on the 2014-2017 Climate Solutions Big Bet Baseline and Landscape Report. In it we explore findings about progress toward the Foundation's desired impacts and outcomes, changes in the broader landscape that could help or hinder the Foundation's work, and, to the extent possible, the contribution of the Foundation's strategy. Also, we document refinements to the Foundation's theory of change and reflect on its relevance based on what we learned in 2018.

It is important to acknowledge that the 2018 Annual Report represents a snapshot in time. Contexts and conditions continue to rapidly evolve in ways that could affect the Foundation's strategy or inform its decision-making. We explore some key developments from early 2019 in the conclusion. Going forward, we will continue to provide quarterly status updates and technical briefings to help the Foundation stay abreast of trends and identify opportunities as they arise.

We hope the 2018 Annual Report provides useful insights to inform appropriate adjustments to the design and implementation of the Climate Solutions Big Bet. We are always eager for feedback from the Foundation, its grantees, and other collaborators about what would make future reports more useful as learning tools and complementary to other materials available to the Foundation and its grantee partners. The organization of the remainder of this document is as follows: 1) About the Climate Solutions Big Bet; 2) Theory of Change; 3) Evaluation Framework; 4) What We Are Learning: Findings; and 5) Conclusion.

1 | About the Climate Solutions Big Bet



Relevant Background

The world is experiencing the disruptive effects of climate change. The principal cause is the accumulation of atmospheric CO_2 and other heat-trapping substances emitted by the burning of fossil fuels for energy production and the increasing use of land in ways that limit its ability to absorb greenhouse gases. There is scientific consensus that allowing the earth's temperature to rise more than two degrees Celsius above pre-industrial levels will cause significant and ever-increasing negative impacts around the world such as rising seas, severe droughts, and food and water insecurity. Three countries are responsible for a large share of global emissions: the U.S., China, and India. Historically, the U.S. has been the largest emitter. China is currently the world's largest emitter, and India's emissions are projected to surpass China's.

The working theory of change (explored further in Section 2 of this report) is that the U.S., India, and China must lead the world's efforts to address climate change. Each nation will have its own style, approach, advances, setbacks, and goals, though collectively they must ensure a steep decline in current and future greenhouse gas emissions within the next decade. If these three nations exert leadership on climate change, then other nations will be compelled to act, and humanity will be on a path toward ensuring global temperature rise stays well below two degrees Celsius.

In 2018, the Intergovernmental Panel on Climate Change, which is the United Nations body for assessing the science related to climate change, released a special report on the impacts of global warming. The report made headlines and generated significant media coverage. It painted a direr picture of the immediate consequences of climate change than previously thought. Limiting global warming requires "rapid and far-reaching" transitions in land, energy, industry, buildings, transport, and cities. What happens between now and 2030 will be critical to get climate change under control. For example, global net human-caused emissions of CO_2 will need to fall by approximately 45% from 2010 levels by 2030.[1]

In addition, a persistent challenge to advancing and implementing bold climate solutions are savvy and well-resourced opponents. These include a network of think tanks, advocacy organizations, trade associations, and others supported by conservative billionaires and companies. Prior to the launch of the Foundation's Climate Solutions Big Bet, Drexel University sociologist Robert Brulle examined the funding behind the climate denial movement. He found that "91 think tanks and advocacy organizations and trade associations that make up the American climate denial industry pull down just shy of a billion dollars each year, money used to lobby or sway public opinion on climate change and other issues."[2] The findings in this 2018 annual report about progress toward the Foundation's desired

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[1] Source: "Global Warming of 1.5° C." Intergovernmental Panel on Climate Change. October 8, 2018. http://www.ipcc.ch/report/sr15/

[2] Source: "Meet the Money Behind The Climate Denial Movement." Smithsonian.com. December 23, 2013. https://www.smithsonianmag.com/smart-news/meet-the-money-behind-the-climate-denial-movement-180948204/#ZLvQfUOuqtRkJ2y1.99
Read more: https://www.smithsonianmag.com/smart-news/meet-the-money-behind-the-climate-denial-movement-180948204/#EcELyEUw0fKIITFd.99

outcomes and impacts, the contribution of its strategy, and conclusions about implications for the Foundation's theory of change are presented with this background in mind.

Overview of the Climate Solutions Portfolio

To ensure that global temperature rise stays well below two degrees Celsius, the Foundation is supporting and promoting effective leadership and climate solutions. As of January 2019, the Foundation has awarded 131 grants to 71 organizations totaling approximately $261 million dollars. To date, the Foundation has directed 71% ($185 million) of its grantmaking to activities in the U.S., 14% ($37 million) to India, and two percent ($4.6 million) to China. The remaining 13% includes support for efforts to pass and implement the Kigali Amendment to the Montreal Protocol and exploratory grants related to carbon pricing.[3] In 2018, 66% of the Foundation's active grants were focused on the U.S., 18% on India, and two percent on China.[4]

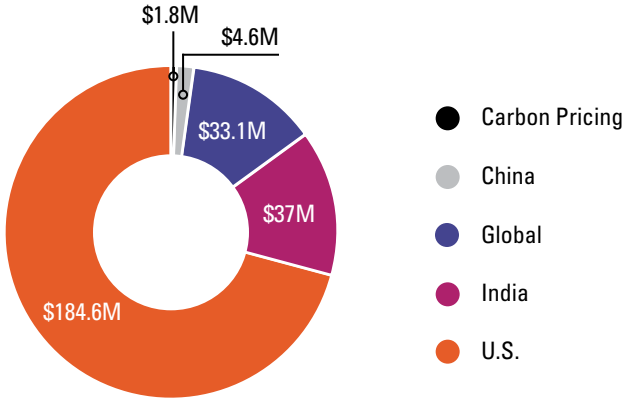


Figure 1: *Climate Solutions Grants: 2014 to 2018, in U.S. dollars*

[3] The Kigali Amendment to the Montreal Protocol will bring about a global phase-down of HfCs. In 2018, the Foundation continued to work with other climate funders as part of the Kigali Cooling Efficiency Program. Together they pledged $52 million to improve the energy efficiency of cooling and refrigeration equipment, lower cooling demand while improving access to cooling technology in developing countries, and to promote market innovations to spur adoption of climate-friendly coolants. The U.S., India, and China are all involved, and it is an illustration of climate leadership. The Kigali Cooling Efficiency Program is the subject of a separate evaluation. The findings from that evaluation will be assessed in concert with other data we are tracking and analyzing.

Creating and expanding markets for carbon is a core component of the Foundation's leadership strategy. The Foundation's position is that carbon pricing plays a crucial role in lowering carbon dioxide emissions and facilitating a global transition toward a low carbon economy. In addition to its grantmaking in each country-specific context, the Foundation has also explored some additional opportunities to enact carbon pricing around the world to advance support for carbon pricing policies.

[4] Source: Climate Solutions_All Previously Awarded Briefs. MacArthur Foundation, January 31, 2019. Active grants include those that started in 2018, ended in 2018, or continued in 2018.

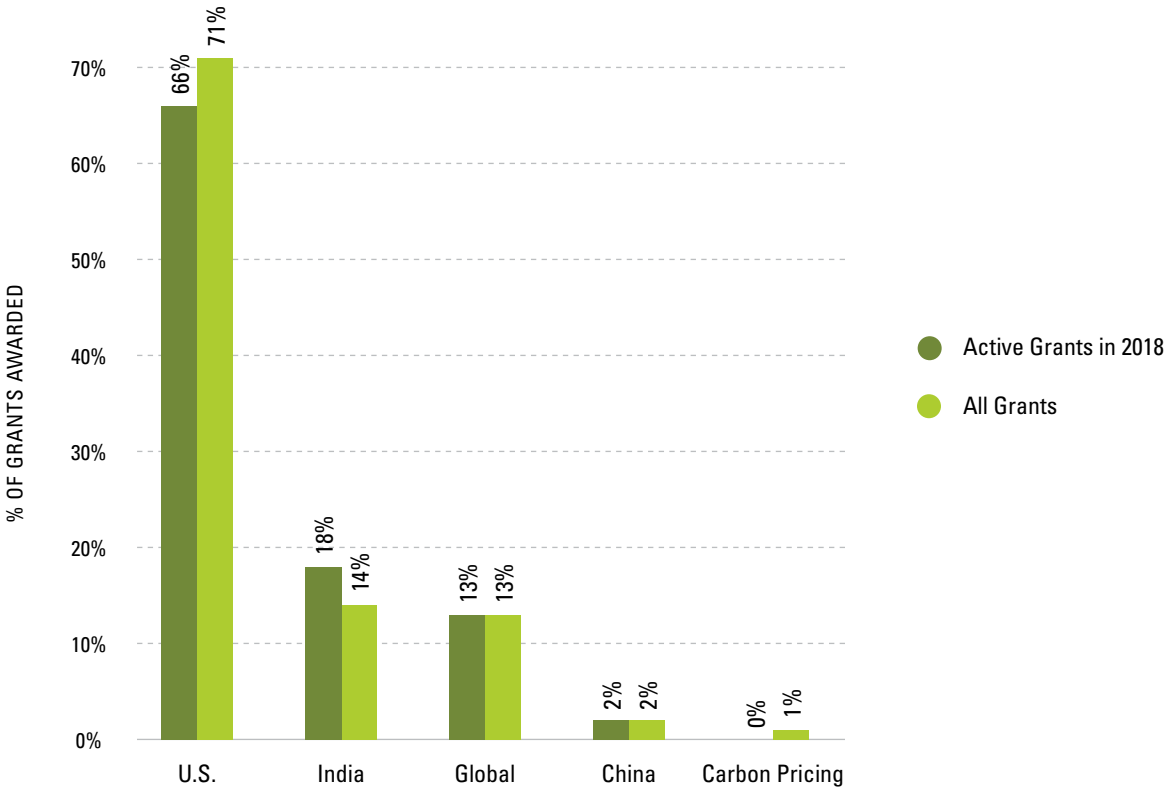


Figure 2: *Climate Solutions Active 2018 Grants Compared to All Grants Since 2014*

Since the launch of the Climate Solutions Big Bet, the Foundation's grants have largely supported efforts to advance climate-friendly policies and regulatory action and alter political discourse. The remainder of the Foundation's grants support activities that broaden the climate solutions coalition and improve partnerships, expand funding opportunities and the climate solutions philanthropic community, and create or expand markets for carbon.[5] The composition of the grant portfolio is shown in the illustrations that follow.

Figure 3: *Climate Solutions Portfolio by Approach - All Grants, in U.S. dollars*

Note: The grants are coded based on the primary approach each grantee is advancing, but several organizations are undertaking a variety of activities to promote climate solutions that could be categorized under multiple approaches.

[5] Source: Climate Solutions_All Previously Awarded Briefs. MacArthur Foundation, January 31, 2019.

Figure 4: *Climate Solutions Portfolio by Approach: Active 2018 Grants, in U.S. dollars*

It is worth noting that the breakdown by approach in each country-specific context varies from the totals shown. Since 2015, most U.S. grants were awarded to organizations focused on altering political discourse ($90 million), followed by $85 million to advance climate-friendly policies and regulatory action, $8.0 million to broaden the climate solutions coalition and improve partnerships, and the remainder to expand funding opportunities and the climate solutions philanthropic community. Beginning in 2016, approximately $25 million of the Foundation's grants in India supported the advancement of climate-friendly policies and regulatory action, followed by $6.3 million to expand funding opportunities and climate solutions in the philanthropic community, $3.3 million to create or expand markets for carbon, $1.2 million to alter political discourse, and $1.2 million to broaden the climate solutions coalition and improve partnerships.

Figure 5: *Climate Solutions U.S. and India Portfolios by Approach - All Grants, in U.S. dollars*

In addition, impact investments are part of the Foundation's approach to expand funding opportunities in the climate solutions philanthropic community, which it hopes will contribute to catalyzing renewable energy production, particularly rooftop solar in India. In 2018, the Foundation also conducted background research on economic, policy, and demographic trends in China; consulted extensively with Chinese experts; and solicited counsel from funders and allies. This culminated in the development of a rationale for supporting activities to promote leadership and advance climate solutions in China. The Board approved initial grants supporting activities to advance climate-friendly policies and regulatory action as well as expand markets for carbon in China beginning in 2019.

2 | Theory of Change

Goal and Pathway to Change

Ensuring that global temperature rise stays well below two degrees Celsius over pre-industrial levels—the science-based threshold to avoid catastrophic climate change—is the overall goal of the Foundation's Climate Solutions Big Bet. The pathway to achieve that goal is based on the premise that if the U.S., India, and China exert global leadership on climate change, then other nations will be compelled to act. Leadership can come from government, the private sector, and civil society. It will be demonstrated through policies, actions, and investments in the U.S., India, and China that:

- Decrease the carbon-intensity of their respective economies
- Reduce greenhouse gas emissions (e.g., CO_2, methane, and HfCs)
- Build political will and public demand for climate solutions

The theory of change accounts for the fact that each nation's leadership will ebb and flow over the next decade as each country faces social, economic, and political pressure to moderate the pace of implementing and sustaining significant greenhouse gas emissions reductions in their respective economies.

Linked to the high-level pathway to achieve the Foundation's goal are theories of change for the U.S., India, and China. The Foundation's U.S. theory of change is that sufficient U.S. leadership will provide credibility and standing to influence and facilitate developing countries to act. To maintain its global climate leadership over the next five years the U.S. must:

- Accelerate its own reductions in greenhouse gases
- Build the political will to advance solutions to climate change
- Promote a less carbon intensive global economy

In India, the Foundation's theory of change is predicated on the country stepping forward as a world climate leader by:

- Reducing greenhouse gas emissions, while also achieving development goals
- Embedding climate change prominently in public discourse
- Pioneering a sustainable, inclusive growth model

In China, the Foundation seeks to ensure that Chinese leadership on climate change is robust, durable, and global. China's handling of its own emissions and how its domestic and foreign policy decisions affect emissions in other developing countries are viewed as critical elements of China's climate leadership. Grassroots Solutions and M+R are working with the Foundation to further clarify the theory of change for China; however, initial implementation of the Foundation's grantmaking in China is predicated on the country demonstrating leadership by:

- Supporting a robust carbon emissions trading market
- Implementing environmental laws and regulations to incentivize a low-carbon economy
- Building bilateral relationships throughout Southeast Asia and information sharing about climate solutions
- Refashioning existing global trade, transportation, and financing institutions and systems and limiting the shift of greenhouse gas emissions to other regions and the world (e.g., through its broadly defined Belt and Road Initiative, China is embarking on a $1 trillion effort to enhance energy, transport, and communications infrastructure spanning at least 60 countries across Asia, Europe, Africa, and Oceania)

Visual representations of the Climate Solutions theories of change are shown on the pages that follow. The visual representation of the China theory of change is in development.

A Note about Refinements to the Foundation's Theory of Change

In 2018, Grassroots Solutions and M+R worked closely with the Climate Solutions team to incorporate minor refinements to the Foundation's theory of change. We updated it to reflect China's ascendancy as a climate leader and the approval of the "China Strategy Module" by the Foundation's Board of Directors. Also, carbon pricing is shown as a core approach of the Foundation's strategy that cuts across geographies as opposed to a separate "Strategy Module." As a core approach, the Foundation's support for efforts to create or expand markets for carbon reflect carbon pricing's important role in lowering CO_2 emissions and facilitating a global transition toward a low-carbon economy.[6]

[6] Source: The Critical Role of Carbon Pricing in Addressing Global Climate Change, For Information Paper Prepared for the Board of Directors. MacArthur Foundation, July 2018.

Figure 6: *The Foundation's Theory of Change*

2014

LEADERSHIP

Three nations must lead the world's effort to address climate change; if the U.S., India, and China exert leadership on climate change, then other nations will be compelled to act, and humanity will be on a path toward ensuring global temperature rise stays well below two degrees Celsius

The Foundation has developed theories of change and strategies for the U.S., India, and China which are outlined in documents referred to as leadership-related "modules"

MODULES

APPROACHES

Approaches are defined as a cluster of activities that represents one component of the Foundation's strategy

- Alter political discourse
- Expand funding opportunities and climate solutions philanthropic community
- Create or expand markets for carbon
- Broaden climate solutions coalition and improve partnerships
- Advance climate-friendly policies and regulatory actions

OUTCOMES

- Changed the emissions trajectory in the U.S., India, and China
- Adopted national and international climate change policies and treaties
- Adopted and implemented carbon pricing schemes
- Climate solutions prioritized for elected and community leaders
- Normalized extensive and sustained investments in renewable energy and clean technology
- Adopted and deployed renewable energy and clean technologies

Outcomes are defined as near-term and intermediate changes among target audiences, individuals, communities, organizations, and policies that are the result of the Foundation's strategy combined with other climate solutions stakeholders' efforts

IMPACTS

Impacts are defined as long-term, aspirational changes in a population, community, or system in which the Foundation's strategy operates and to which it contributes

- Transformed economies from high carbon to low carbon
- Broadened and deepened participation globally in climate solutions
- Lowered the trajectory of global greenhouse gas emissions

The MacArthur Foundation's

BIG BET ON CLIMATE SOLUTIONS

Ensure that global temperature rise stays well below two degrees Celsius by supporting and promoting effective leadership and climate solutions

2025 and beyond

EMBRACE REAL-TIME LEARNING AND TRANSPARENCY

Figure 7: *U.S. Theory of Change*

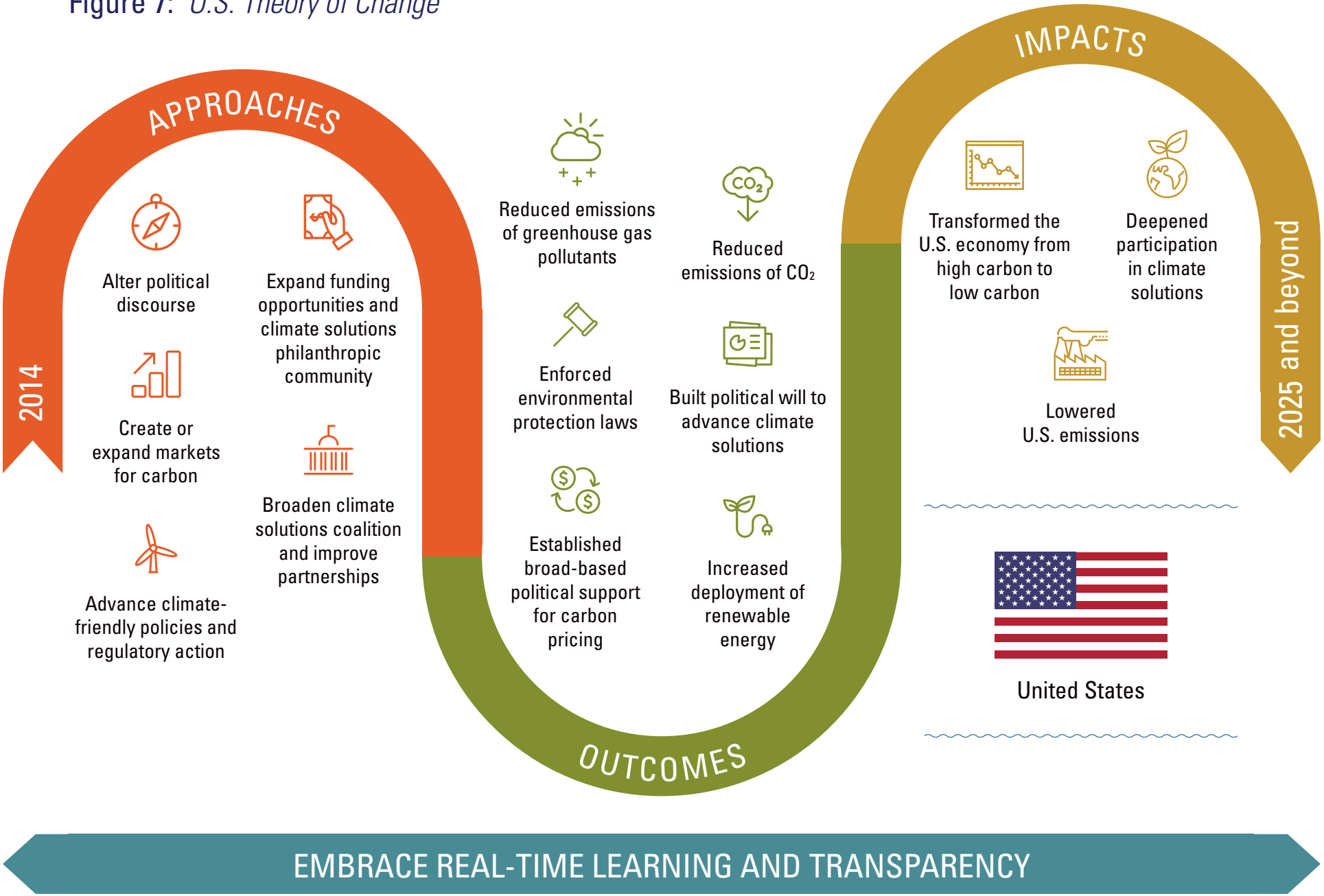
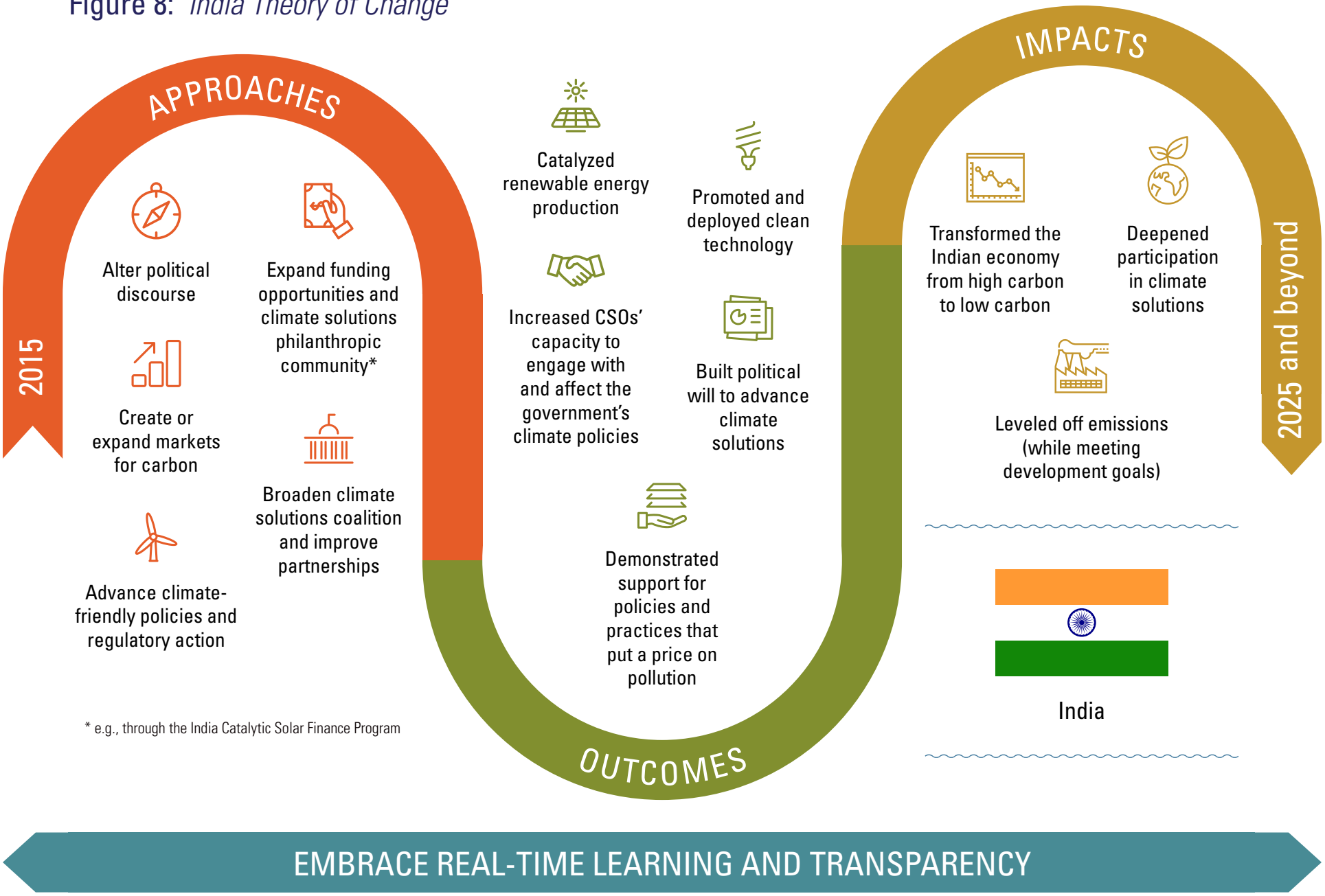


Figure 8: *India Theory of Change*



Relationship Between Approaches, Outcomes, and Impacts

Over the long term, the Foundation hopes that the sum of its efforts—along with the work of many others—will contribute to lowering the trajectory of global greenhouse gas emissions, broadening and deepening participation in climate solutions (i.e., more countries are more active in climate solutions and in more substantive ways), and transforming economies from high carbon to low carbon. To achieve these long-term impacts, the Foundation has identified a variety of near-term and intermediate changes (or outcomes) that demonstrate leadership. These outcomes represent the sought-after results of the Foundation's strategy, including:

- Changes in the emissions trajectory in the U.S., India, and China
- The adoption of national and international climate change policies and treaties
- The adoption and implementation of carbon pricing schemes
- That climate solutions are prioritized for elected and community leaders
- Normalization of extensive and sustained investments in renewable energy and clean technology
- The adoption and deployment of renewable energy and clean technologies

The Foundation supports multiple approaches—clusters of activities that represent components of the Foundation's strategy—to achieve its desired outcomes. They include:

- Altering political discourse
- Creating or expanding markets for carbon
- Advancing climate-friendly policies and regulatory action
- Expanding funding opportunities and the climate solutions philanthropic community
- Broadening the climate solutions coalition and improving partnerships

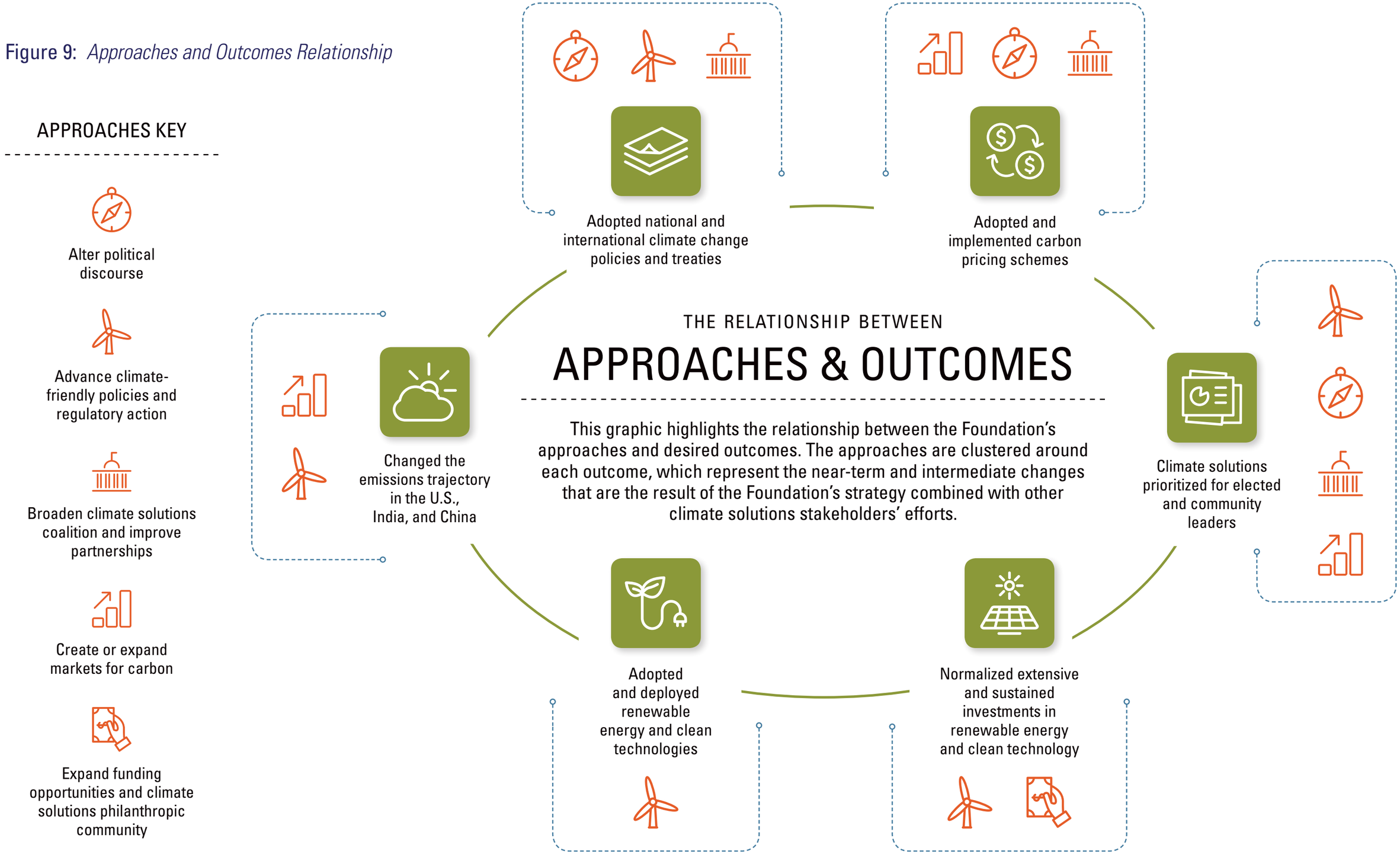
The relationship between the Foundation's various approaches and desired outcomes at the initiative level is shown in the Figure on the following page.[7]

[7] The MacArthur Foundation seeks impact, including policy change, in accordance with identified goals and subject to legal limitations imposed on private foundations by law. Ongoing evaluation by a learning partner is integral to the Foundation's work throughout the strategy life cycle. Periodic deliverables are issued to track progress in advancing climate-friendly policies toward the Foundation's desired outcomes and to assess impact.

Grantees also receive funds from other sources and attribution of results or impact to specific sources of funds is not generally possible. The MacArthur Foundation carefully reviews proposed grants to be sure that grant funds are used only for permitted purposes. No Foundation grant funds were used to influence legislation except as permitted by applicable regulations and the grant agreements. No MacArthur Foundation grant funds were used by grantees to participate in any political campaigns.

As permitted by law, on occasion the MacArthur Foundation made general operating support grants to eligible organizations that were not earmarked for lobbying but that could be used for lawful advocacy purposes as determined by the organization. Also, Foundation funds may have been appropriately used for other lawful advocacy and educational purposes, including nonpartisan analysis and research as permitted under the grant agreement.

Figure 9: *Approaches and Outcomes Relationship*



Country-specific mapping of the relationship between the Foundation's approaches and desired outcomes was also done for the U.S. and India, and each approach has defined characteristics that guide the Foundation's grantmaking. A preliminary map of approaches and outcomes for China is underway. It is worth noting that while the relationship between the Foundation's desired outcomes and longer-term impacts could be direct, there are other channels through which outcomes could shape impacts.

1. Two outcomes could interact to have a greater effect than the sum of each outcome's individual effect. For instance, adoption of carbon pricing schemes and the prioritization of climate solutions by politicians could interact to have a bigger effect on the transformation of economies than the simple combined effect of each. Were politicians to increasingly prioritize climate solutions around the same time as the adoption of carbon pricing schemes, this could lead company boards to sit down and seriously consider the sustained political will around climate solutions and think about how to adjust company operations to decrease their carbon footprint.
2. Achieving one outcome could shape another outcome. The adoption of carbon pricing schemes could lead to more investment in clean technologies, as the costs of dirty technologies will become greater with carbon pricing schemes, so the financial benefits of clean technologies will increase
3. There could be spillover effects. Were the U.S. to adopt a carbon pricing scheme, this could affect the types of demands U.S. companies make on foreign companies they source products from. For example, there could be U.S. regulations (or business association voluntary agreements) that regulate the carbon footprint of imported products, which could shape emissions in the source country. While the presence of these unique channels might be hard to assess empirically, these are plausible ways in which the effect of the Foundation's approaches could be amplified.

Unknowns and Assumptions

At a high-level, energy and resource issues, changes in the political landscape, climate effects (such as drought and sea-level rise), grantee capacity, and unforeseen obstacles could all affect or undermine the Foundation's theory of change. In the U.S., well-resourced opponents, economic volatility, the political landscape in Congress and in state legislatures, and the outcome of the 2016 presidential election, all continue to create uncertainty. An unknown in India remains the actual, as opposed to perceived, influence of civil society organizations to affect the government's policies. In addition, a variety of assumptions underpin the Foundation's theory of change and country-specific strategies.

Given the outcome of the 2018 U.S. elections, and with the upcoming 2019 Indian elections, Grassroots Solutions and M+R recommend revisiting the Foundation's original assumptions and reflecting on which ones have been validated, refuted, or are no longer relevant. The evaluation and learning activities described in the next section of the report will then be updated, where applicable, to ensure we are as well positioned as possible to continue to test the Foundation's assumptions in a way that informs adaptations to the Foundation's theory of change and strategy.

3 | Evaluation Framework

Elements of the Framework

At the highest level, Grassroots Solutions' and M+R's role as the evaluation and learning partner is to evaluate the Foundation's theory of change and answer two big-picture questions:

- How is the Foundation's strategy contributing to promoting leadership and climate solutions?
- How are the Foundation's strategy and its grantees adapting to work more effectively?

To answer these questions, we have adopted an evaluation and learning framework that comprises four types of activities related to measuring and tracking impacts, outcomes, the landscape, and how the work is progressing. We think of these activities fitting together like puzzle pieces that will help the Foundation to:

1. Better understand the ultimate contribution of its work
2. Measure progress toward the specified results of the Foundation's efforts that demonstrate climate leadership
3. Better understand the contexts in which the Foundation's work is taking place
4. Identify and document what approaches are working well and what approaches need to be adjusted

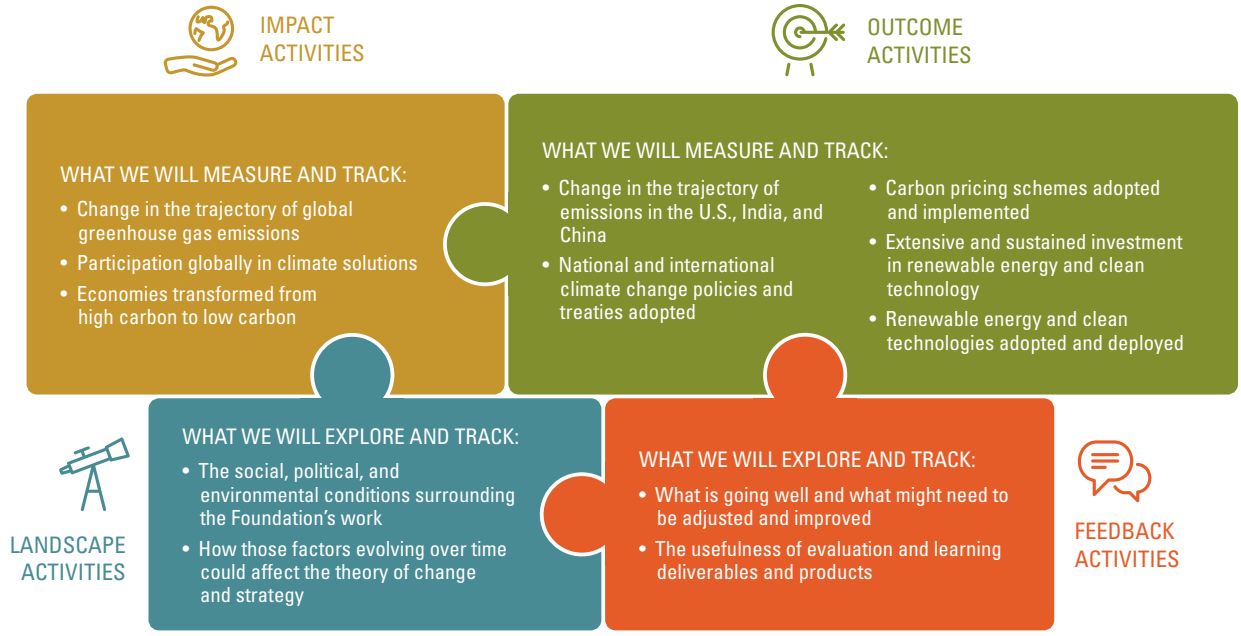


Figure 10: *Evaluation and Learning Framework*

These four types of activities are being applied to evaluation and learning about the overall Climate Solutions initiative and the leadership-focused modules that have been developed for the U.S., India, and China. However, the way that they are applied is flexible and module- or country-specific, reflecting the different results the Foundation seeks and factors like the capacity of civil society organizations, the structure of the political systems, and more. Therefore, what is being measured and the way in which we are tracking progress and assessing the contribution of the Foundation's strategy in the U.S. is not the same as in India or in China.

Measuring Progress Toward Desired Impacts and Outcomes

As noted in the previous section of this report, the Foundation's theory of change details a pathway to ensuring global temperature rise stays below two degrees Celsius that is predicated on the leadership of the U.S., India, and China to achieve three aspirational changes: 1) lower trajectory of global greenhouse gas emissions, 2) broad and deep participation in climate solutions, and 3) economies transformed from high carbon to low carbon. To measure progress toward these long-term impacts, Grassroots Solutions and M+R are tracking:

- Changes in the trajectory of global emissions (CO_2, methane, HfCs, and more) and the trajectories of emissions in the U.S., India, and China
- Growth in the number of countries participating in the Paris Climate Accord and the quality of the commitments various countries make, including the U.S., India, and China
- Changes in the carbon intensity of the economy and global markets

To achieve its long-term impacts, the Foundation has identified a variety of near-term and intermediate changes in the U.S. and India that demonstrate leadership. These outcomes represent the sought-after results of the Foundation's strategy. In the U.S., the Foundation's desired outcomes fit into five categories related to: 1) emissions, 2) political will, 3) policies and treaties, 4) renewable energy and clean technology, and 5) carbon pricing. In India, the Foundation has identified five outcomes that, if achieved, demonstrate leadership. These include: catalyzing renewable energy production, increasing civil society organizations' capacity to engage with and affect the government's climate policies, promoting and deploying clean technology, building political will, and demonstrating support for policies and practices that put a price on pollution.[8]

Associated with the desired outcomes are multiple data points that we are tracking to understand and measure progress (See Appendix A). Baselines have been established for the U.S. (2012) and India (2015). That data was presented to the Foundation in June 2017 and October 2017, respectively. Baselines for China will be completed in 2019. It is worth noting that some measures were updated in 2018. Others will likely be refined, deleted, or added in the coming year to reflect changes since the Climate Solutions Big Bet launched. For example, originally, we were tracking Clean Power Plan implementation; however, the Trump administration's proposed rollback of the Plan, and status of lawsuits, render some of the data points we were tracking out-of-date. We modified what we are tracking to focus on coal plant closures and are examining state-level policies aimed at reducing emissions. In India, impact investments are part of the Foundation's approach to expanding funding opportunities in the climate solutions philanthropic community, which it hopes will contribute to catalyzing renewable energy production. With that in

[8] Although there are specific references to legislation and the passage of policy, no MacArthur Foundation funds are used to lobby. Any Foundation efforts relating to legislation in 2018 were limited to lawful advocacy for educational purposes.

mind, we have made some minor refinements to the data collected and analyzed to meet the Climate Solutions team's evolving information needs.

The tables that follow provide an overview of the impact and outcome measures that have been identified in collaboration with the Foundation for the overall Climate Solutions initiative, the U.S., and India. Linked to these measures are evolving targets that represent the quantity, value, or amount of something that the Foundation wants to happen within a specific timeframe.

Impact Measures

Overall Climate Solutions Initiative

IMPACT: Lowered the trajectory of global greenhouse gas emissions

Indicators of Progress:

- Favorable changes in the trajectory of global CO_2 and greenhouse gas emissions

IMPACT: Broadened and deepened participation globally in climate solutions

Indicators of Progress:

- Increase in the number of countries participating in the Paris Accord (quantity)
- Increase in the number of countries that exceed their goals (quality)

IMPACT: Transformed economies from high carbon to low carbon

Indicators of Progress:

- Positive changes in the carbon intensity of the global economy

U.S.

IMPACT: Lowered U.S. emissions

Indicators of Progress:

- Favorable trajectory of CO_2 and greenhouse gas emissions

IMPACT: Deepened participation in climate solutions

Indicators of Progress:

- The U.S. exceeds its emissions goals

IMPACT: Transformed the U.S. economy from high carbon to low carbon

Indicators of Progress:

- Positive changes in the carbon intensity of the U.S. economy

Impact Measures (cont.)

India

IMPACT: Leveled off emissions (while meeting development goals)

Indicators of Progress:

- Favorable trajectory of CO_2 and greenhouse gas emissions

IMPACT: Deepened participation in climate solutions

Indicators of Progress:

- India exceeds its emissions goals

IMPACT: Transformed the India economy from high carbon to low carbon

Indicators of Progress:

- Positive changes in the carbon intensity of the Indian economy

Outcome Measures

Overall Climate Solutions Initiative

OUTCOME: Changed the emissions trajectory in the U.S., India, and China

Indicators of Progress:

- **U.S.:** Enforcement of environmental protection laws and reductions in emissions of CO_2 and short-lived greenhouse gas pollutants
- **India:** Leveling off of CO_2 and other emissions
- **China:** TBD

OUTCOME: Adopted national and international climate change policies and treaties

Indicators of Progress:

- **India:** Improvements in civil society organizations' capacity to engage with government on climate policy
- **U.S., India, and China:** Climate solutions have become a consistent and high priority for elected and community leaders
- **U.S. and India:** Changes in political discourse around climate change and support for climate solutions

OUTCOME: Adopted and implemented carbon pricing schemes

Indicators of Progress:

- **U.S., India, and China:** Increase in political support for carbon pricing

Outcome Measures (cont.)

OUTCOME: Normalized extensive and sustained investments in renewable energy and clean technology

Indicators of Progress:

- **U.S. and India:** Improvements in conditions for innovation and collaboration between public and private sectors

OUTCOME: Adopted and deployed renewable energy and clean technologies

Indicators of Progress:

- **U.S., India, and China:** Improvements in the renewable energy mix for jurisdictions

OUTCOME: Enforced environmental protection laws

Indicators of Progress:

- Uphold executive powers to address climate mitigation
- The extent to which states reduce their CO_2 emissions, despite repeal of the Clean Power Plan[9]

U.S.

OUTCOME: Reduced emissions of CO_2

Indicators of Progress:

- Coal plant closures and retirements[10]

OUTCOME: Reduced emissions of greenhouse gas pollutants

Indicators of Progress:

- Regulation of emissions of short-lived pollutants
- TBD[11]

OUTCOME: Built political will to advance climate solutions

Indicators of Progress:

- Increased candidate discourse on climate in 2016 presidential election and in midterm 2018 congressional elections

[9] Through most of 2018, we were still tracking changes in the number of states complying with Clean Power Plan and adoption of high-quality plans; however, for the time being, we propose tracking adoption of state-level policies aimed at reducing emissions as an alternative. Going forward, we will work with the Foundation and its grantees to continue to revisit what we are tracking and measuring to assess progress.

[10] Clean Power Plan implementation was cited as an indicator of progress; however, we revised this slightly to more explicitly concentrate on coal plant closures and retirements.

[11] Originally, we were tracking whether new incidences of asthma (nationally and in designated high-risk communities) leveled off; however, we suggest working with the Foundation and its grantees to identify a potentially more relevant way of assessing progress toward the Foundation's desired outcome of reducing CO_2 emissions.

Outcome Measures (cont.)

- Normalization of solutions-oriented media coverage
- Larger and broader base of advocates for climate solutions
- Majority of U.S. federal lawmakers support climate solutions
- Majority of U.S. state lawmakers support climate solutions

OUTCOME: Established broad-based political support for carbon pricing

Indicators of Progress:

- Legislation introduced, debated, passed, and ballot measures proposed and passed, including expansion of existing carbon pricing schemes in line with Foundation priorities

OUTCOME: Increased deployment of renewable energy

Indicators of Progress:

- Federal and state governments encouraged and incentivize development and deployment of solar, wind, and other forms of renewable energy

India

OUTCOME: Catalyzed renewable energy production

Indicators of Progress:

- Creation of renewable energy financing ecosystem[12]
- Central and state governments and private sector prioritize renewable energy adoption and deployment to stabilize the electric grid and broaden electrification of India[13]
- Data about renewable energy accessible to interested stakeholders
- Increasing availability of information on off-grid decentralized renewable energy

OUTCOME: Promoted and deployed clean technology

Indicators of Progress:

- A clear vision and policy platform on clean technology and its role within India's state and central governments is articulated
- Increasing collaboration between clean technology and other sectors of the Indian economy
- Government and private sector promote greater use of energy efficiency measures

[12] In 2018, although the indicators themselves did not change, we decided to track additional data points that can speak to broader contextual changes that relate to the Foundation's impact investments. These include foreign direct investment inflows for rooftop and off-grid solar, the amount of credit disbursed to various sectors, and Indian Renewable Energy Development Agency disbursements (by energy subsectors, by state). Also, we agreed to track annual rooftop photovoltaic installations in India, rooftop installed capacity compared against India's Intended Nationally Determined Contribution goals, cost of debt for renewable energy projects, and costs of electricity from rooftop photovoltaic installations.

[13] Ibid.

Outcome Measures (cont.)

OUTCOME: Increased civil society organizations' capacity to engage with and affect the government's climate policies

Indicators of Progress:

- Central and state government look to civil society organizations as stakeholders and partners in the policymaking processes
- Civil society organizations' recommendations are incorporated into government-proposed national and international climate policies
- Broader base of civil society organizations participate in advocacy efforts around climate solutions

OUTCOME: Built political will to advance climate solutions

Indicators of Progress:

- Central and state governments issue public statements and policies related to climate change and climate solutions
- Public-at-large and segments, including the private sector, weigh in on climate and energy policies

OUTCOME: Demonstrated support for policies/practices that put a price on pollution

Indicators of Progress:

- Increasing multi-stakeholder discussions about emission measurement
- Central and state government signaling a commitment to expand a domestic carbon market
- Increasing institutional (civil society organizations and government) capacity to implement a well-functioning emissions trading system
- Businesses prepare inventories of CO_2 emissions

In 2019, Grassroots Solutions and M+R will work closely with the Foundation to further clarify the near-term and intermediate changes sought by the Foundation in China and associated indicators of progress and measures. In 2018, we met with other climate funders active in China to better understand how to approach evaluation and learning activities in that context effectively. In addition, we conducted an extensive search to identify a potential collaborator with on-the-ground experience to provide input about the Foundation's desired outcomes and China's evaluation design, including how to better understand contextual factors that could help or hinder the Foundation from advancing its theory of change.

Selection of Measures

In mid-February 2016, Grassroots Solutions and M+R initiated a discovery and evaluation design process. Through that process, Grassroots Solutions, M+R, the Climate Solutions team, and others delved into questions that helped inform refinements to the Climate Solutions theory of change and develop an evaluation framework, including identifying measures and how to go about assessing the contribution of the Foundation's strategy. The process involved determining what questions needed to be answered and then answering those questions collaboratively. Ultimately, the questions that the Foundation, Grassroots Solutions, and M+R explored fell into three categories. A sample is included below.

Questions About the Theory of Change and Learning

- What is the theory of change? Overall? In each country-specific context?
- What specifically is the role that the Foundation will play in advancing that theory of change?
  - › Who is the Foundation seeking to influence or benefit?
  - › What impacts and outcomes are the Foundation seeking to achieve?
  - › When will it achieve the outcomes?
  - › How will it and others make the outcomes happen?
  - › Where and under what circumstances will the Foundation do its work?
- What does the Foundation want to learn about the overall initiative and/or the work in each country-specific context?
- What activities are undertaken by the Foundation to produce the desired effects in each country-specific context?
- What is unique about the Foundation's strategy and contribution?

Questions Related to Progress

- What near-term and intermediate-term outcomes (e.g., policies, environmental shifts, etc.) does the Foundation hope to help bring about?
- What changes in the landscape do we care about and could help or hinder progress?
- What are the indicators we will use to measure changes in the landscape and progress toward the desired outcomes that the Foundation is more directly involved in bringing about?
  - › What are the measures and targets that correspond with the indicators?
  - › Which indicators matter the most?
- What internal effects of learning among the network (e.g., the Foundation and its grantees) do we want?

Other Key Questions

- What are the sources of the data we will use to measure progress?
- What products do we need to create to capture decisions made, pivot points, learning, and progress?
- How will we go about establishing baselines?

For the U.S. and India, we utilized these questions (as well as others) to capture and refine the Foundation's desired impacts and outcomes, as well as indicators of progress, measures, targets, and data sources. A collaborative process also helped us to identify the Foundation's priorities, timeline considerations, and methodologies to assess the contribution of the Foundation's strategy. We will replicate a collaborative process to develop and implement an evaluation design that accounts for the Foundation's investments in China. Also, we will continue to engage with Climate Solutions stakeholders regularly and directly—Foundation staff, grantees in the U.S. and India, and intellectual partners (as appropriate)—to refine other data points tracked and analyzed.

Assessing the Foundation's Contribution

Grassroots Solutions and M+R have adopted or proposed tailored methodologies to assess the contribution of the Foundation's work that are specific to the approaches the Foundation is undertaking to achieve its desired outcomes in each country-specific context. Our goal is to assess the Foundation's contribution as rigorously as possible, recognizing that 1) establishing causal linkages is not the goal and would be virtually impossible, 2) the funding levels for each approach are not the same, and 3) some activities the Foundation is funding are more distinctive than others (i.e., there are fewer funders supporting the same activities). With that in mind, the assessments of some of the Foundation's approaches are intensive and "deep." In other cases, the assessments are lighter touch and "broad."

For example, the Foundation supports multiple approaches in the U.S. and India to achieve its desired outcomes. To assess the contribution of these approaches, we are analyzing a variety of data sources and employing various methodologies. As noted in the previous section of the report, one way the U.S. will demonstrate leadership is by building political will. To promote leadership in this area, the Foundation is supporting efforts to alter political discourse. In this instance, Grassroots Solutions and M+R enlisted Protagonist to help analyze the climate change narrative landscape in the U.S.[14] With Protagonist's help, we are examining who the influencers are, how the narratives are shifting over time, and the ways that the Foundation's grantees appear in the narrative landscape. Protagonist's input into our analysis is supplemented by a review of self-reports from grantees, independently verifiable data, and other information such as opinion polling conducted by the Yale Program on Climate Change Communications and Gallup.

In India, to measure progress and assess the Foundation's contribution, we are working closely with Oxford Policy Management to collect and analyze data at three levels:

1. Grantees' self-reported activities and results (e.g., collected through surveys, interviews, and grant reports)
2. Insights gathered through interviews with government stakeholders, third-party observers, or publications to validate or challenge the grantees' self-reporting
3. Independently verifiable quantitative data, and where not available, qualitative information to fill key gaps[15]

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[14] Narratives articulate a population's underlying beliefs, attitudes, and assumptions. "Narrative Analytics" is a systematic approach to understand, shape, and track narratives by combining the depth of social science with the scale of data science. Synthesizing large robust data sets of social and other online media, Narrative Analytics uses evidence-based strategies to map, track, measure, and shift discourse.

[15] For example, qualitative data collected from discussions with "key informants," including grantees and non-grantees who take part in full-day workshop-style discussions or interviews facilitated by Oxford Policy Management that focus on the Foundation's desired outcomes and discussing in detail some of the political and economic factors surrounding them.

The three levels of data are being applied in multiple ways. For example, one of the Foundation's desired outcomes is that civil society organizations' capacity to engage with and affect the government's climate policies is increased. To achieve that outcome, the Foundation is supporting activities to advance climate-friendly policies and broaden the climate coalition and partnerships with government. One indication of progress is that central and state governments look to civil society organizations as stakeholders and partners in the policymaking processes. To assess the contribution of the Foundation in this area, we are tracking the percentage of grantees and grantee-supported organizations actively participating in government agencies or task forces and their self-reported results. That information is being examined in conjunction with insights gathered from government stakeholders about the value of grantees' participation and broader changes in the capacity of civil society organizations and sector since baselines were established in 2015.[16]

In 2018, we proposed minor refinements and additions to the data collected and analyzed at each of the three levels. Going forward, the changes will hopefully help us gain a better understanding of the contribution of the Foundation's approach to expanding funding opportunities in India and address the following questions about the Foundation's impact investments:

- What can be said about collaboration among the MacArthur Foundation and other funders?
- What is the interplay between the impact investments and grants? Are there spillover effects?
- To what extent have impact investing activities had an accelerant effect? How catalytic were they?

For more detailed information about how the approaches the Foundation supports map to its desired outcomes, and the methodologies we are employing to assess the Foundation's contribution, please see Appendix B.

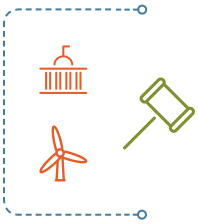
[16] Changes we are tracking include the number of civil society organizations perceived as "major" players on renewable energy or climate at the federal level, the percentage of major civil society organizations considered partners and/or critics of the Government of India, and more.

4 | What We Are Learning

There are 12 findings that emerged from our analysis of the quantitative and qualitative data collected and tracked in 2018. To achieve its long-term impacts, the Foundation has identified a variety of near-term and intermediate outcomes in the U.S. and India that demonstrate leadership. These outcomes represent the sought-after results of the Foundation's strategy shown in the illustrations on pages 8, 9, and 10. Associated with the Foundation's desired outcomes are multiple data points that we are tracking to understand and measure progress. As noted on page 15, impact and outcome measures were identified in collaboration with the Foundation for the overall Climate Solutions initiative, the U.S., and India. Linked to these measures are evolving targets that represent the quantity, value, or amount of something that the Foundation wants to happen within a specific timeframe.

The first 11 findings reflect what we learned about the Foundation's work in the U.S. and India in 2018. They correspond to the Foundation's desired outcomes in each country-specific context, and each finding includes three subsections exploring: 1) progress toward the Foundation's desired outcomes, 2) changes in the broader landscape that could help or hinder the Foundation's work, and 3) the Foundation's contribution (to the extent possible). The last finding explores what we are learning about progress toward the Foundation's desired impacts in each country and at the initiative level, which set up the conclusion and our reflections about what the findings—when examined together—tell us about the relevance of, and implications for, the Foundation's theory of change.

Findings: U.S.



Enforcement of Environmental Protection Laws

1. In 2018, progress to enforce environmental protections was modest and mostly defensive in nature. Lawsuits and other efforts to combat the federal government from further dismantling the previous administration's climate change policies and regulations continued. Although it is too soon to ascertain the results of all those efforts, there were signals that activities supported by the Foundation helped prevent backsliding and contributed to fewer states abandoning their emissions reduction targets.

Progress Toward the Foundation's Desired Outcome

In 2018, marginal gains to enforce environmental protections and regulations—mostly to prevent further backsliding—were made. Assessing progress toward the Foundation's desired outcome is complicated by the fact that states are no longer compelled to comply with the Clean Power Plan.[17] When baselines were established,

[17] The Clean Power Plan was President Obama's signature domestic policy to fight climate change. Its aim was to reduce greenhouse gas emissions from power plants, the single largest source of emissions in the U.S. at the time. As noted in Section 3 of this report, given the stay preventing the Clean Power Plan from advancing and concurrent lawsuits, we will likely revisit what we track and measure in association with this outcome to assess progress and the Foundation's contribution.

24 states had signaled their compliance with the Plan. Within a few years, the Foundation hoped that a minimum of 37 states would comply. To date, despite no federal mandate, 23 states and the District of Columbia have established greenhouse gas emissions reduction targets.[18]

Since 2017, the Environmental Protection Agency has used the regulatory process to repeal and replace the Clean Power Plan. On October 1, 2018, a public hearing was held to replace it with the Affordable Clean Energy Rule.[19] Repeal and replacement of the Clean Power Plan represents one of the many attempts by the Trump administration to roll back Obama-era climate and environmental regulations. There are numerous critiques of the proposed replacement, including that it will not achieve one of its main goals: to save the American coal industry.[20] In addition, in 2018, the Trump administration announced proposed changes to the New Source Performance Standards. The proposed changes include relaxing regulations on greenhouse gas emissions for some coal-fired power plants.

To prevent or mitigate further backsliding on federal climate policy, state governments and climate advocates have filed a variety of lawsuits. So far, the results have been mixed. Some lawsuits from 2017 continued in 2018, such as the so-called "children's climate lawsuit," Juliana v. United States (No. 18-36082 2017). At the time of writing, the Ninth Circuit Court of Appeals had set an expedited hearing of the federal government's petition to appeal the lower court's decisions allowing constitutional climate change claims brought by the plaintiffs.

The State of California v. BLM (Nos. 17-cv-03804-EDL and 17-cv-3885-EDL (N.D. Cal., Oct. 4, 2017)) represents a success—albeit a short-term one. A federal judge found that the Bureau of Land Management's effort to put a one-year hold on the implementation of methane reduction rules established by the Obama administration lacked "adequate evidentiary justification." There was no basis for the Trump administration to unilaterally stop the implementation of the methane rule without going through the proper regulatory process. The Bureau of Land Management declined to appeal the ruling, but that success was short-lived. The Bureau issued notice of new rulemaking to roll back Obama-era methane rules in September 2018.

Finally, the U.S. Supreme Court decided not to take a case brought by climate advocates challenging the Environmental Protection Agency's repeal of regulations limiting HfCs in October 2018.[21] The decision by the Court of Appeals was written by Brett Kavanaugh. Justice Kavanaugh's first day on the U.S. Supreme Court coincided with this denial of writ of certiorari by the Court.

Changes in the Landscape that Affected Progress

Aggressive action by the Trump administration to undo environmental protections continued in 2018, affecting various actors—including the Foundation's grantees and many others—from advancing efforts to enforce existing laws and regulations. The former administrator of the Environmental Protection Agency, Scott Pruitt, resigned due to possible

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[18] Center for Climate and Energy Solutions. "U.S. State Greenhouse Gas Emission Targets." February 2019. https://www.c2es.org/document/greenhouse-gas-emissions-targets/

[19] The Affordable Clean Energy Act would establish guidelines for states to address greenhouse gas emissions from existing coal-fired power plants. https://www.epa.gov/stationary-sources-air-pollution/proposal-affordable-clean-energy-ace-rule

[20] Sabin Center for Climate Change Law. "6 Important Points About the 'Affordable Clean Energy Rule'." August 22, 2018. https://blogs.ei.columbia.edu/2018/08/22/affordable-clean-energy-rule/

[21] Green, Miranda. "Supreme Court declines to hear appeal in greenhouse gas case ruled on by Kavanaugh". October 9, 2018. https://thehill.com/policy/energy-environment/410590-scotus-wont-hear-appeal-of-greenhouse-gas-case-ruled-on-by

ethics violations. Under Pruitt's replacement, a former lobbyist for the coal industry, the Agency continues to shrink and pursue staffing reductions of 47% by the end of President Trump's first term. In the fiscal year 2019 budget, the Environmental Protection Agency's funding for climate change research and voluntary emissions reduction programs was cut substantially. Also, in 2018, the Agency disbanded its Air Pollution Review Panel.

The Department of Energy, Department of the Interior, National Aeronautics and Space Administration, the National Oceanic Atmospheric Administration, Federal Emergency Management Agency, and the Department of Defense are also among the agencies that saw climate and clean energy-related funding eliminated and programs terminated. Lastly, a report released at the beginning of 2018 by the Environmental Data & Governance Initiative found that in the first year of the Trump administration, federal government web content about climate change was systematically removed, reduced, or replaced with terms such as "sustainability" or "resiliency."[22]

Contribution of the Foundation's Work

The foundation's grantees were connected to some defensive successes, and there are indications that the Foundation's work contributed to fewer states abandoning emissions reduction targets. To enforce environmental protection laws, the Foundation funds activities to advance climate-friendly policies and regulatory action and broaden the climate solutions coalition and improve partnerships. In 2018, several of the Foundation's grantees were working to prevent rollbacks of federal regulations by the Trump administration. A few were engaged in lawsuits; others concentrated on defending climate-related rules through the regulatory process. These defensive efforts—and lawsuits, in particular—can take time to produce results.

For example, in 2018, climate advocates defended regulation of methane emissions. Grantees were generally successful in their lawsuits to delay and prevent the Trump administration from rolling back rules in the lower courts. Furthermore, as noted earlier, a federal judge found that the Bureau of Land Management's effort to put a one-year hold on the implementation of methane reduction rules established by the Obama administration lacked "adequate evidentiary justification." At the same time, there are signs that the Trump administration will not wait for the outcomes of lawsuits to proceed with deregulation. Instead, the administration began the rulemaking process to change methane regulations, which could render work that grantees have undertaken so far moot. Beyond lawsuits, the Foundation's grantees are also advancing legal strategies to publicize the fossil fuel industry's internal documentation about the environmental impact of industry practices and create precedent for future climate change lawsuits. We will continue to track these efforts to further assess progress and the Foundation's contribution going forward.

In approximately a dozen states, a few of the Foundation's grantees assisted with the development and enactment of policies to comply with the Clean Power Plan, despite the rollback of the Obama-era policy. One example is Michigan, one of the top-ten emitting states in the country. In Michigan, the Foundation supported a variety of activities, and several of its grantees engaged in efforts to help the state set and achieve its emissions target: a 31% reduction in CO_2 emissions by 2030. In late 2017, government officials announced that what was happening at the federal level would not affect state emissions reduction goals. In addition, in 2018, the state's two largest utilities, DTE Energy and

[22] "Changing the Digital Climate: How Climate Change Web Content is being Censored by the Trump Administration," Environmental Data & Governance Initiative. January 2018. http://100days.envirodatagov.org/changing-digital-climate/

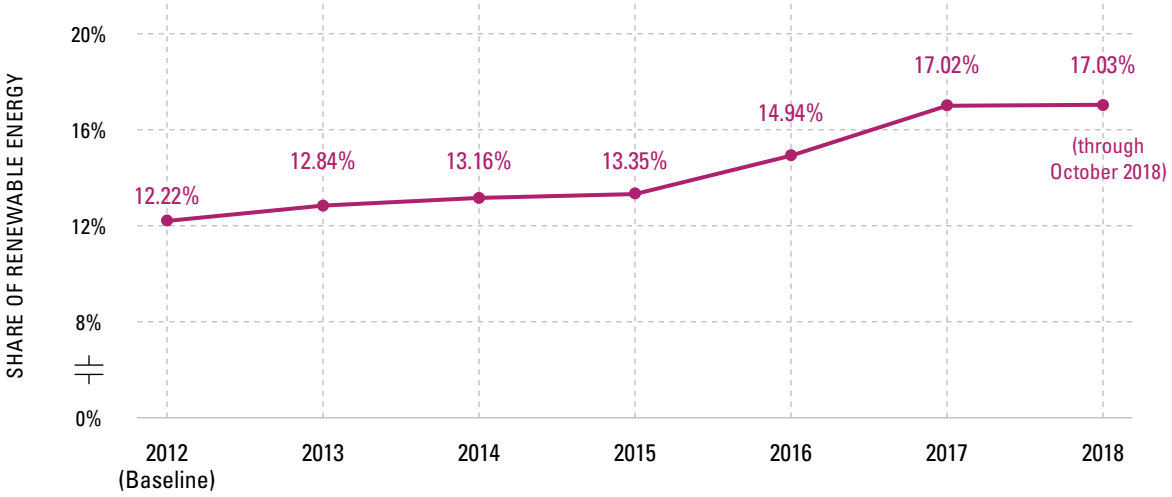
Consumers Energy, announced that they are "accelerating plans to produce cleaner energy in Michigan, targeting at least a fifty percent Clean Energy Goal by 2030."[23]

Deployment of Renewable Energy

2. In 2018, renewable energy deployment in the U.S. continued to grow, and renewables are projected to account for an ever-increasing share of total energy generation. Since 2014, Foundation-supported efforts, especially at the state level, have fostered further adoption and deployment.

Progress Toward the Foundation's Desired Outcome

Despite tepid support from Congress and the Trump administration, the renewable energy industry grew in 2018, and the adoption and deployment of renewable energy is projected to continue increasing. The Foundation is supporting activities aimed at achieving a target of 20% of energy production from renewables by 2020. Based on October 2018 data from the U.S. Energy Information Administration, 17.03% of the country's energy production comes from renewables. Although that is only 0.01% more than 2017, the trajectory is favorable and renewable energy's share of total U.S. energy generation in 2019 is projected to increase by 2.3%.[24] Approximately 19.5% of energy production is expected to come from renewables in 2019. The projected increase reflects additional energy generation capacity from wind.[25] Changes in the renewable share of total U.S. energy generation since baselines were established in 2012 are shown in the illustration below.



Source: *U.S. Energy Information Administration, www.eia.gov*

Figure 11: *Renewable Share of Total U.S. Energy Generation*

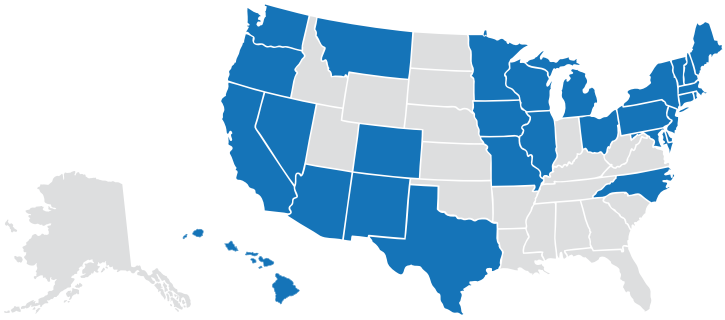
[23] DTE Energy. News Releases. http://newsroom.dteenergy.com/index.php?s=26817&item=137202#sthash.2RArHQ7D.DfKOUAlc.dpbs

[24] Electric Power Monthly. Net Generation by Source. Energy Information Administration. See https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_1_01

[25] Data from the Energy Information Administration is only available through October 2018.

To assess progress, we are also tracking changes in federal funding for renewables and clean energy technology. In 2018, Congress passed a two-year budget that retroactively extended funding for renewable energy technologies at the business and residential levels.[26] Although a seemingly positive development, the Trump administration then went on to propose cuts in federal support for research and development for clean energy technology. The cuts would defund other areas of the federal government integral to further deployment of renewables.[27]

Although renewable energy was not a federal priority, state governments continued to support its development and deployment. Currently, 29 states and the District of Columbia have renewable portfolio standards. In 2018, California, Connecticut, Massachusetts, New Jersey, and New York increased and strengthened their standards, and California joined Hawaii as the second state to establish a 100% clean energy target by 2045.



Participating States[28]

No Current Policies

Source: *Lawrence Berkeley National Lab (November 2018)*

ST	% Renewables by Year
AZ	15% by 2025
CA	60% by 2030
CO	30% by 2020 (IOUs) 20% by 2020 (co-ops) 10% by 2020 (munis)
CT	44% by 2030
DE	25% by 2026
DC	50% by 2032
HI	100% by 2045
IL	25% by 2026
IA	105 MW by 1999
ME	40% by 2017

ST	% Renewables by Year
MD	25% by 2020
MA	41.1% by 2030 (+1%/year)
MI	15% by 2021
MN	26.5% by 2025 Xcel Energy: 31.5% by 2020
MO	15% by 2021
MT	15% by 2015
NV	25% by 2025
NH	25.2% by 2025
NJ	54.1% by 2031
NM	20% by 2020 (IOUs) 10% by 2020 (co-ops)

ST	% Renewables by Year
NY	50% by 2030
NC	12.5% by 2021 (IOUs) 10% by 2018 (co-ops, munis)
OH	12.5% by 2026
OR	50% by 2040 (large IOUs) 5-25% by 2025 (other utilities)
PA	18% by 2021
RI	38.5% by 2035
TX	5,880 MW by 2015
VT	75% by 2032
WA	15% by 2020
WI	10% by 2015

Figure 12: *U.S. Renewable Portfolio Standards, by State*

[26] Source: Bipartisan Budget Act of 2018.

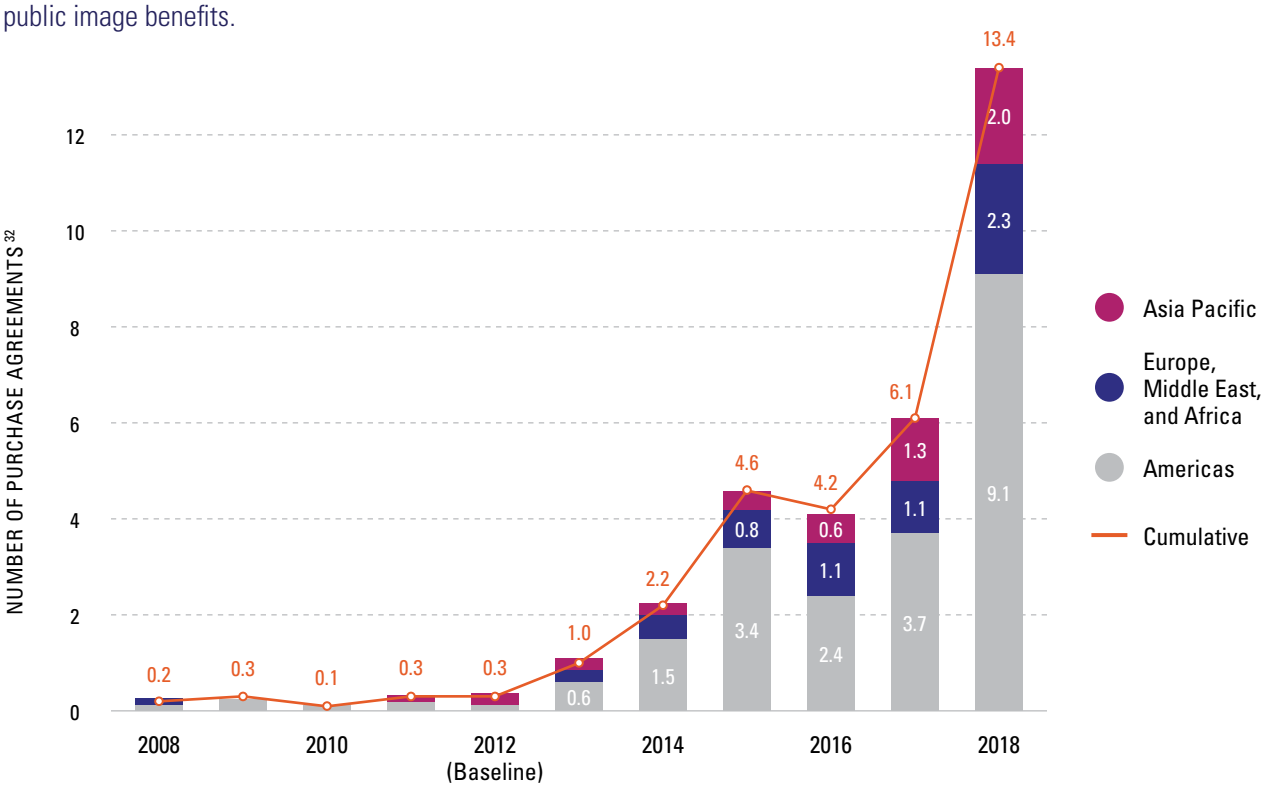
[27] "White House seeks 72 percent cut to clean energy research, underscoring administration's preference for fossil fuels," Washington Post. February 1, 2018. https://www.washingtonpost.com/business/economy/white-house-seeks-72-percent-cut-to-clean-energy-research-underscoring-administrations-preference-for-fossil-fuelsv/2018/01/31/c2c69350-05f3-11e8-b48c-b07fea957bd5_story.html?utm_term=.955be8efd8bf

[28] Target percentages represent the sum total of all Renewable Portfolio Standards resource tiers, as applicable. In addition to the Renewable Portfolio Standards policies shown, voluntary renewable energy goals exist in a number of U.S. states, and both mandatory Renewable Portfolio Standards policies and voluntary goals exist among U.S. territories (American Samoa, Guam, Puerto Rico, U.S. Virgin Islands). http://eta-publications.lbl.gov/sites/default/files/2018_annual_rps_summary_report.pdf

Since 2000, state renewable portfolio standard policies accounted for approximately half of all growth in renewable electricity generation and capacity. Over time, the influence of the standards on deployment of renewables has diminished somewhat. In 2017, they represented 34% of all added renewable energy capacity. However, in the Northeast, Mid-Atlantic, and West, these policies continue to play a central role in supporting the growth of renewable energy.[29]

Changes in the Landscape that Affected Progress

In 2018, the private sector drove much of the demand for, and deployment of, renewable energy. In Deloitte's "2019 Renewable Energy Industry Outlook," the authors found that much of the private sector growth was "voluntary," rather than propelled by policy mandates.[30] In addition, Bloomberg New Energy Finance found that more than 60% of global activity to advance renewable energy came from the private sector, specifically American companies signing power purchase agreements.[31] The private sector's increased interest in the deployment of renewables was caused by a number of factors, including the falling cost of renewables compared to other energy sources coupled with public image benefits.



Source: *Bloomberg New Energy Finance, The Economist*

Figure 13: *Corporate Power-purchasing Agreements by Volume, in Gigawatts*

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[29] Berkeley Lab, Electricity Markets & Policy Group, "U.S. Renewables Portfolio Standards: 2018 Annual Status Report," November 2018. https://emp.lbl.gov/publications/us-renewables-portfolio-standards-1

[30] Deloitte. "2019 renewable energy industry outlook." https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-renewable-energy-outlook-2019.pdf

[31] Bloomberg New Energy Finance, "Corporate Clean Energy Buying Surged to New Record in 2018," January 28, 2019. See https://about.bnef.com/blog/corporate-clean-energy-buying-surged-new-record-2018/

[32] Arrangement to buy clean energy directly from independent suppliers. See https://www.economist.com/graphic-detail/2019/01/29/companies-bought-record-amounts-of-clean-energy-in-2018

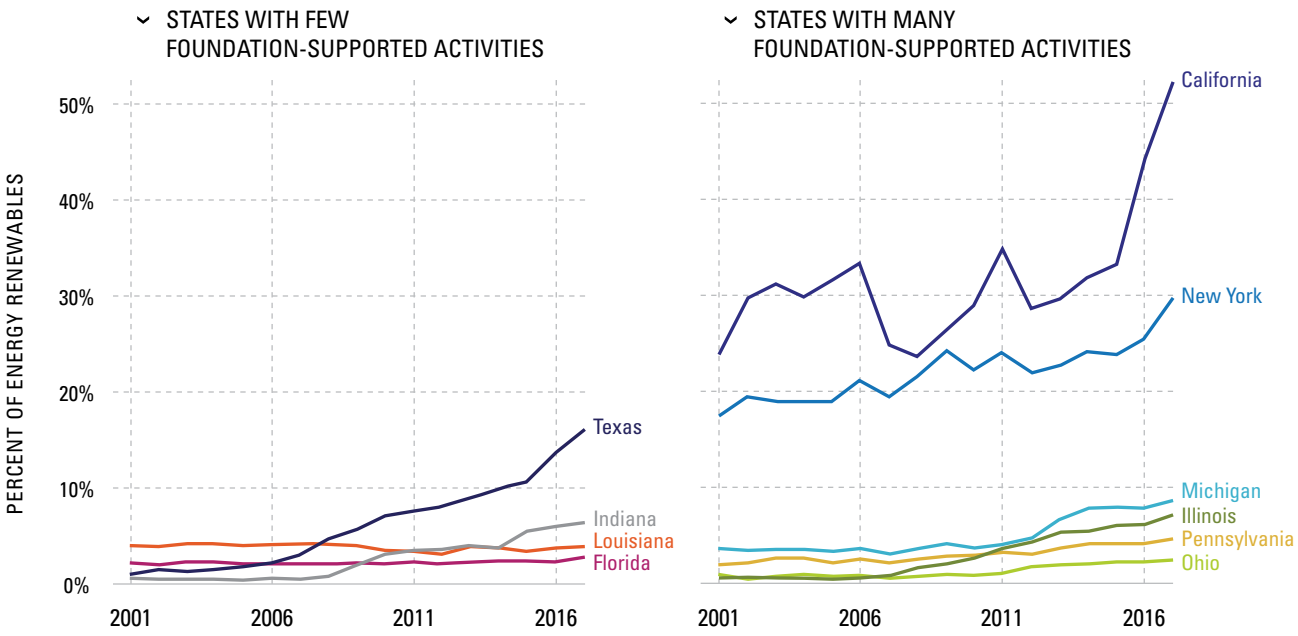
Also, 2018 was a midterm election year. Many congressional and state-level candidates who touted support for climate solutions during their campaigns ultimately won election to office. Changes in the makeup of Congress and state governments could signify more policy support for renewable energy in 2019, especially from newly-elected governors.[33]

Contribution of the Foundation's Work

In 2018, in the Great Lakes, Southwest, and East Coast regions, the Foundation's grantees helped strengthen renewable portfolio standards and worked with public utility commissions to make the deployment of renewables easier. This included working with Republican governors in Michigan and Nevada to inform the adoption of these policies. The Foundation supports multiple approaches to increase the deployment of renewable energy through its grantmaking in the U.S. The approaches include advancing climate-friendly policies and regulatory action and broadening the climate solutions coalition and improving partnerships.

We are currently undertaking a state assessment to better understand changes in the trajectories among 10 states with the highest greenhouse gas emissions, how that connects to progress in increasing deployment of renewable energy (as well as other desired outcomes), and the Foundation's role. What we are learning so far is that in six of the states where the Foundation supported many activities, from 2014 to 2017, the percentage of energy coming from renewables increased, on average, by five percent. In contrast, among four of the top-emitting states where the Foundation supported a relatively small number of grantee activities, the share of renewables increased by only two percent over three years. It is worth noting that correlation is not the same as causation, and Grassroots Solutions is continuing to explore some of the reasons behind these different trajectories. More qualitative data collection and analysis are required to understand other factors at play (e.g., other funders' investments in the same states as well as the private sector's increased demand for renewable energy). We are scheduled to present supplemental findings to the Foundation in July 2019. The two charts on the following page illustrate changes in the state trajectories from our preliminary analysis.

[33] National Geographic, "What do the 2018 midterms say about climate action in the U.S.?" November 9, 2018. https://www.nationalgeographic.com/environment/2018/11/climate-environment-midterm-elections-vote-voters/



Source: *U.S. Energy Information Administration, www.eia.gov*

Figure 14: *Percent of Energy from Renewables by State, 2001-2017*

Broad-Based Political Support for Carbon Pricing

3. Solid progress has been made since baselines were established to nurture and leverage political support for carbon pricing—especially among state-based policymakers—and the Foundation's grantees have contributed positively to the development and adoption of state-level policies.

Progress Toward the Foundation's Desired Outcome

In 2018, efforts to strengthen and mobilize political support for carbon pricing at the state legislative level were more successful than federal or voter-decided efforts. To assess progress in generating political support for carbon pricing and putting a price on pollution, we are tracking legislation introduced, debated, and passed, and ballot measures proposed and passed, including the expansion of existing schemes that align with the Foundation's priorities. When baselines were established in 2012, 10 states had adopted schemes to put a price on carbon. In 2018, no new states adopted schemes; however, four states and the District of Columbia made significant strides to advance pricing schemes (the Foundation's desired target is that 15 states adopt carbon pricing policies by 2020).

In 2018, efforts to nurture and leverage political support for carbon pricing at the state legislative level were more successful than federal or voter-decided efforts. State policymakers, especially governors, played a pivotal role in the gains made. For example, three states (Maine, New Jersey, and Virginia) took steps to codify their participation in the Regional Greenhouse Gas Initiative, the first mandatory market-based program in the U.S. to reduce greenhouse gas emissions from the power sector. New Jersey's newly elected governor, Phil Murphy, signed an executive order directing the state's Department of Environmental Protection to begin the rulemaking process for the state to rejoin

the Regional Greenhouse Gas Initiative. That process kicked off on December 17, 2018 and the comment period was open until February 25, 2019.

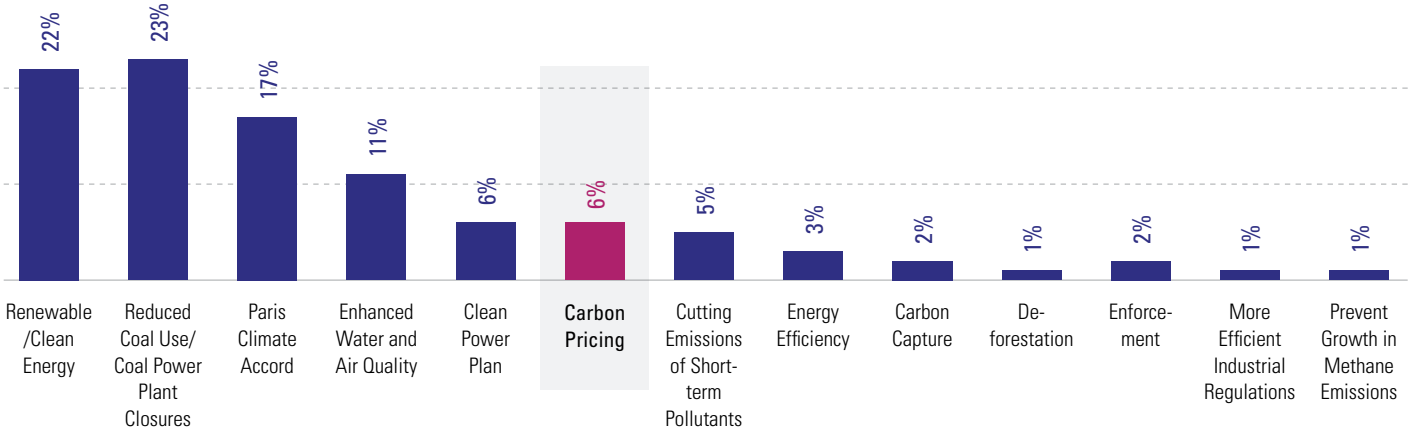
In Maine, the legislature extended the state's membership in the Regional Greenhouse Gas Initiative through 2030. In Virginia, Governor Ralph Northam directed the state's Department of Environmental Quality to begin the rulemaking process to also join the Regional Greenhouse Gas Initiative. Lastly, Governor Jerry Brown of California signed legislation to continue and strengthen California's cap-and-trade program.

Another success was the establishment of the Transportation and Climate Initiative, a regional collaboration that seeks to develop the clean energy economy and reduce oil dependence and greenhouse gas emissions from the transportation sector. The coalition originally included 11 Northeast and Mid-Atlantic states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont) and the District of Columbia. Through the Initiative, the coalition seeks to reduce greenhouse gas emissions from cars and trucks in a similar way that the Regional Greenhouse Gas Initiative does for electricity. In 2018, Virginia announced support for the Transportation and Climate Initiative Declaration of Intent and formally joined the collaboration.

It is worth noting that some high-profile efforts were not successful. In Washington state, efforts to adopt a carbon emissions fee through legislation and a ballot measure both failed. Even with substantial support for action on climate change, Washington Initiative 1631 was defeated in November 2018 by a 56.3% to 43.7% margin. This was the second time Washington voters opposed a carbon pricing scheme; the first time was in 2016. Also, in 2018, the U.S. House of Representatives passed a non-binding resolution denouncing a federal carbon tax with 229 votes for and 180 against.

Changes in the Landscape that Affected Progress

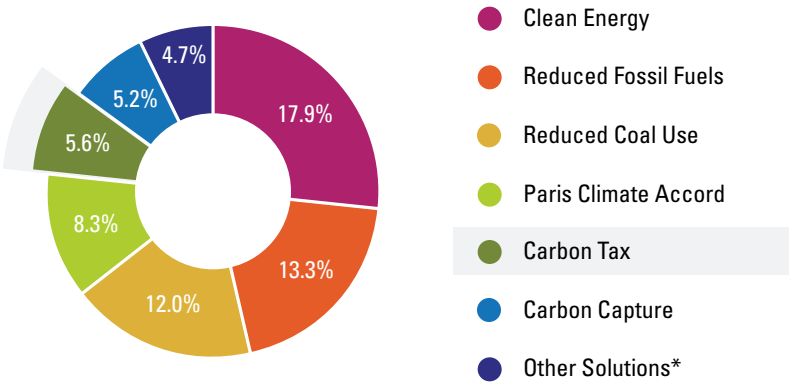
There were a variety of interwoven factors and obstacles that accounted for the defeats in 2018. One factor may be the way the American public views carbon pricing. For example, we see that carbon pricing does not drive favorable public conversation about climate change compared to other solutions such as renewable energy or power plant closures (see the Figure below). In 2018, it accounted for only six percent of favorable public conversation about climate change.



Source: *Protagonist*

Figure 15: *Climate Change Solutions Driving Favorable Public Conversation in 2018*

Carbon tax's appearance in solutions-focused media coverage was similarly low compared to coverage of clean energy and reduced coal use. Following the release of the Intergovernmental Panel on Climate Change's report, only 5.6% of the media coverage analyzed mentioned a carbon tax.



Source: *Protagonist*

Figure 16: *Percentage of Media Coverage of Intergovernmental Panel on Climate Change (IPCC) that Includes Solutions*

** Includes methane reductions, energy efficiency, battery storage, and more efficient industrial regulations.*

Contribution of the Foundation's Work

Activities supported by the Foundation had a particularly positive effect in a few targeted states. To date, the Foundation has provided funding for three approaches to establish broad-based political support for putting a price on carbon. In 2018, six grantees were involved in efforts to alter political discourse and advance climate-friendly policies and regulatory action in ways that would broaden support for carbon pricing at the state level.

Three of the six grantees supported successful efforts to expand participation in the Regional Greenhouse Gas Initiative and the Transportation and Climate Initiative in New Jersey and Virginia. In addition, these grantees were involved in activities aimed at implementing more aggressive regulations tied to the reauthorization of the Regional Greenhouse Gas Initiative by individual member states. At the time of writing, not all grant reports were available. Some of the Foundation's grantees may also have been involved in the successful efforts in Maine.

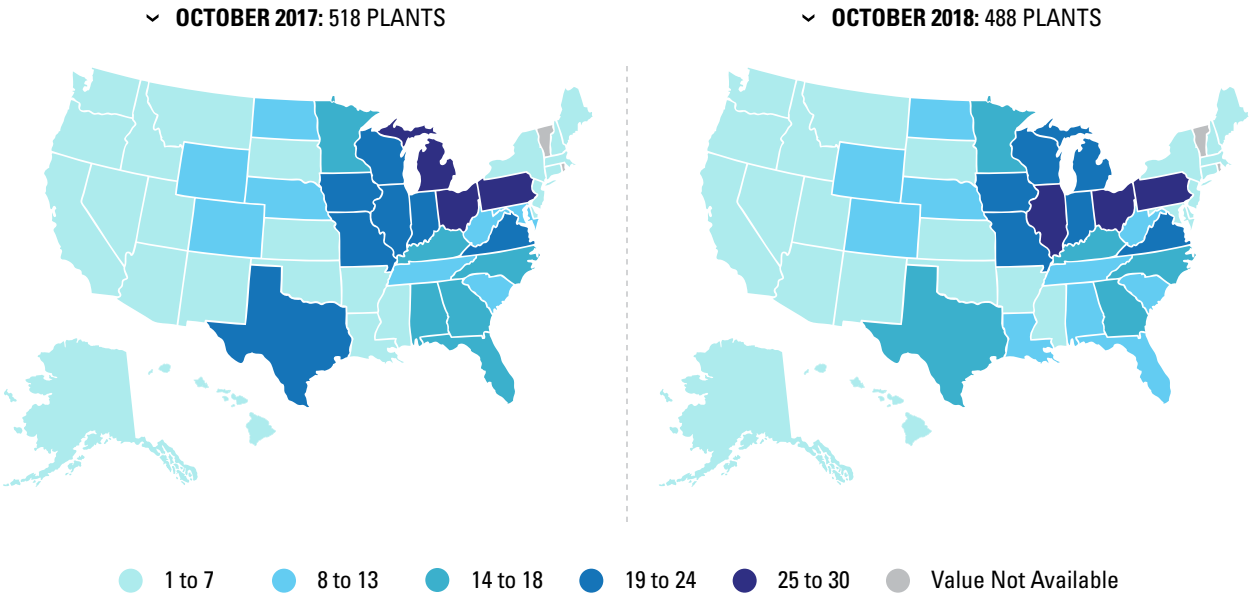
Other Foundation grantees were heavily involved in work to increase federal support among conservatives for climate solutions, including carbon pricing. However, their efforts were less successful than those at the state level. Some grantees worked with Republican members of the bipartisan Climate Solutions Caucus to oppose a resolution that condemned carbon tax schemes. Unfortunately, the resolution passed and only four conservative members opposed it. Although a disappointing result, it is worth noting that the Climate Solutions Caucus was the primary (if not the only) forum where meaningful bipartisan discussions about climate solutions were taking place among congressional policymakers in 2018. Also, the Foundation's investments in grantees involved in working with Republican members helped to strengthen their volunteer and organizational capacity.

Reduced Emissions of CO_2

4. Coal continued to decline as the fuel of choice for energy generation in the U.S., and there are indications that the Foundation's approaches have had a positive effect. At the same time, the long-term downward trend in overall CO_2 emissions showed signs of reversing in 2018.

Progress Toward the Foundation's Desired Outcome

In 2018, progress to reduce CO_2 emissions stemming from energy generated by coal remained steady. Since the inception of the Foundation's climate work in the U.S., 48.78 gigawatts of net summer generating capacity from coal has been retired,[34] and the country is on track to meet the Foundation's desired 2020 target: the retirement of 62-67 gigawatts of net summer capacity of coal-generated electricity. Based on the most up-to-date information available from the U.S. Energy Information Administration, as of October 2018, there were 488 active coal-fired power plants compared to 518 in October 2017.[35] That reduction equated to 11,215.3 megawatts of net summer capacity of coal-generated electricity retired. Also, from January through October 2018, 956,651 thousand megawatt hours were generated by coal. That amounted to 51,742 thousand fewer megawatt hours than was generated during the same time period in 2017.



Source: *U.S. Energy Information Administration, www.eia.gov*

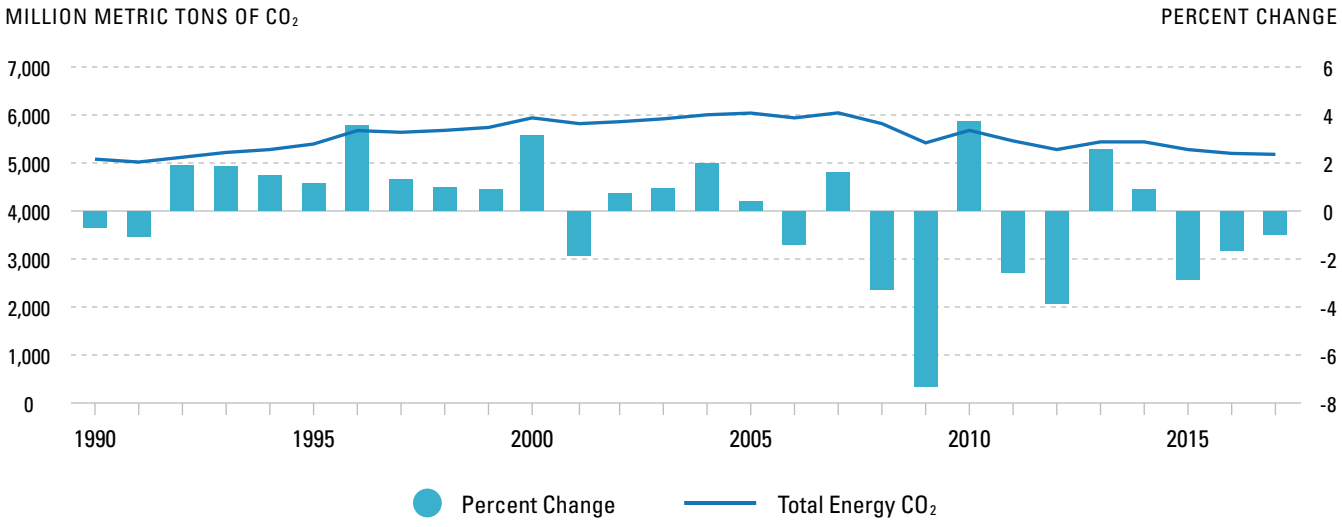
Figure 17: *Number of Power Plants for Coal in the U.S. by State,* October 2017 and October 2018*

** Data about active coal-fired plants fluctuate seasonally. While it might appear that coal plants were added in a particular state, they are not new, but in use again.*

[34] At the time of writing, the most up-to-date information available from the U.S. Energy Information Administration was available through October 2018.

[35] Annualized numbers for 2018 will be available in the early spring of 2019. By comparing the same time periods in 2017 and 2018, we sought to take into consideration seasonal fluctuations in electricity demand.

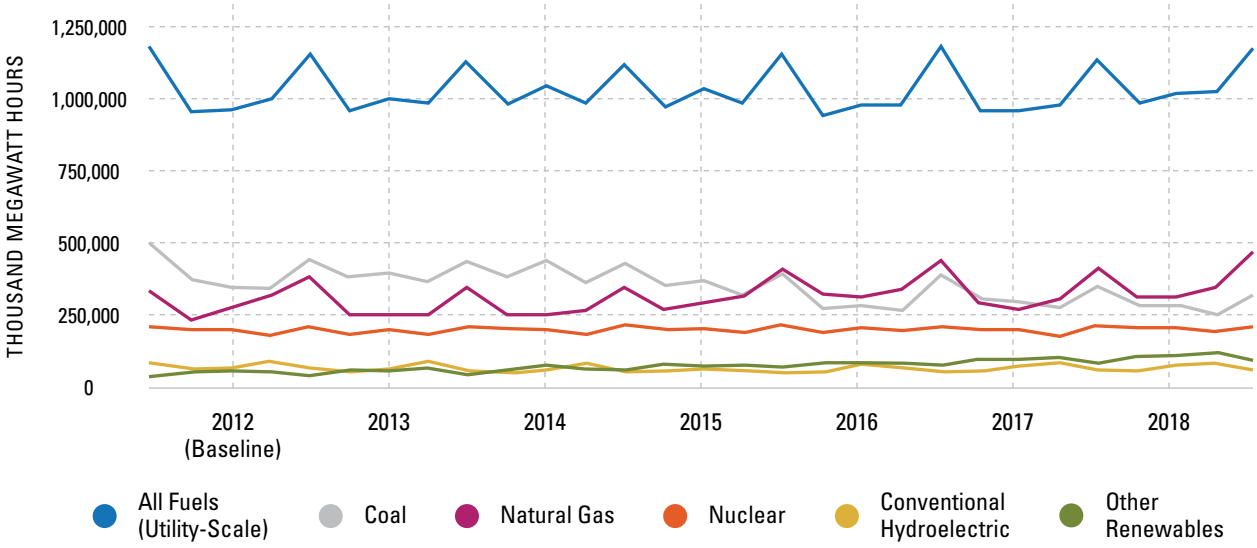
However, the U.S.'s long-term trend of reducing CO_2 emissions from energy generation showed signs of reversing. While total CO_2 emissions in 2017 decreased, emissions growth was 20 million metric tons above the prior decade (2006-2016) trend. The U.S. Energy Information Administration attributed the difference to transportation-related CO_2 emissions, increased economic productivity, and more home heating days related to colder weather. In its 2018 projections, the U.S. Energy Information Administration estimated a 1.9% increase in CO_2 emissions from energy generation, representing a reversal of the year-over-year decrease in energy-related CO_2 emissions in the U.S. since 2014.



Source: *Energy Information Administration, August 2018 Monthly Energy Review, www.eia.org*

Figure 18: *Energy-related CO_2 Emissions, 1990-2017, in Million Metric Tons of CO_2*

Furthermore, coal is being replaced with carbon-emitting fuels such as natural gas. That, combined with increases from transportation and other sources, could negate reductions in CO_2 emissions from the retirement of coal-fired generating units. To date, most of the U.S.'s energy generation comes from natural gas followed by coal, renewables, and nuclear. Other sources make up the rest of the country's energy generation needs.

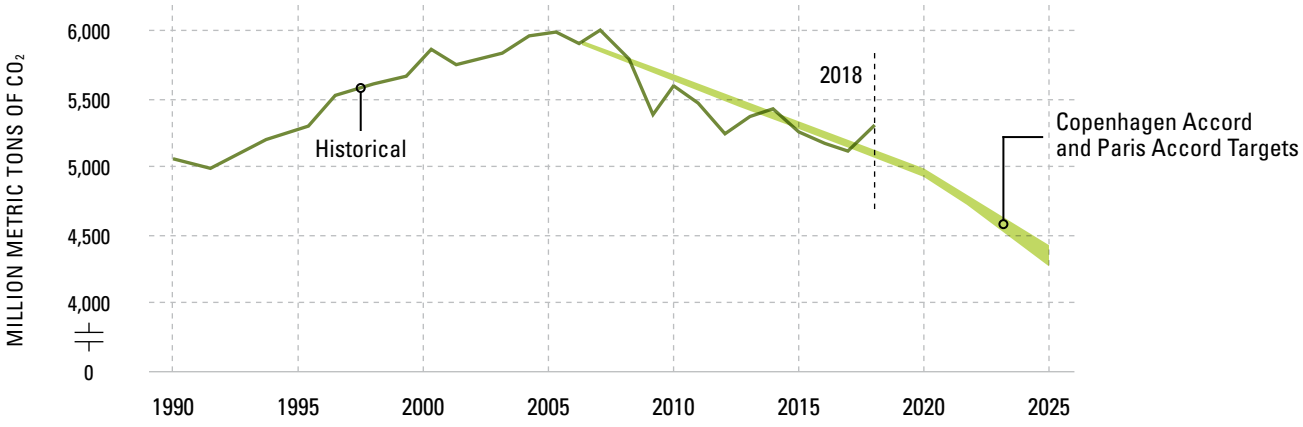


Source: *U.S. Energy Information Administration, www.eia.gov*

Figure 19: *U.S. Net Generation by Fuel Source, in Thousand Megawatt Hours*

Changes in the Landscape that Affected Progress

If the past is predictive of the future, the rate of emissions reductions is not enough to meet the benchmarks laid out by scientific experts. The Rhodium Group recently released a report analyzing 2018 emissions projections and actual emissions data from the U.S. Energy Information Administration. The authors then compared those figures to past progress to reduce emissions and the U.S.'s Nationally Determined Contribution. The graph below shows the historical emissions trajectory with the targets outlined in the Paris Accord.[36]



Source: *Rhodium U.S. Climate Service, https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/*

Figure 20: *U.S. Energy-related CO_2 Emissions, in Million Metric Tons*

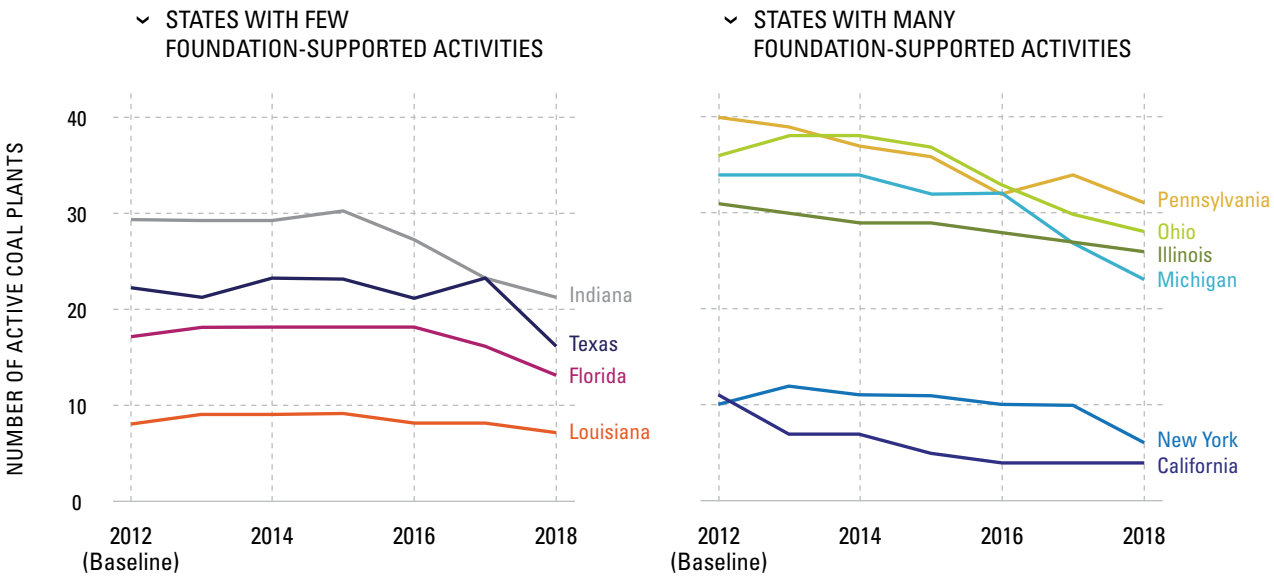
[36] "Preliminary U.S. Emissions Estimates for 2018," January 2019. https://rhg.com/research/preliminary-us-emissions-estimates-for-2018/

Contribution of the Foundation's Work

We see evidence that the Foundation's approaches have produced favorable results. From late 2014 through 2018, the Foundation's grantees have undertaken efforts to engage a wide variety of constituencies, regulators, and utilities to identify, mitigate, or close some of the country's most polluting coal-fired electricity-generating units. To achieve its desired outcomes, the Foundation is currently supporting multiple organizations that are 1) advancing climate-friendly policies and regulatory action and 2) broadening the climate solutions coalition and improving partnerships. In conjunction with market forces, grantees' efforts have influenced the closure of more than 50% of U.S. coal-fired power plants. These plants accounted for more than 36% of U.S. coal-fired generating capacity; their closure significantly reduced CO_2 emissions from the energy sector. The Foundation's grantees have also helped to address CO_2 emissions from the transportation sector, by promoting renewable energy and carbon pricing, and by supporting lawsuits, which were explored in the previous Findings.

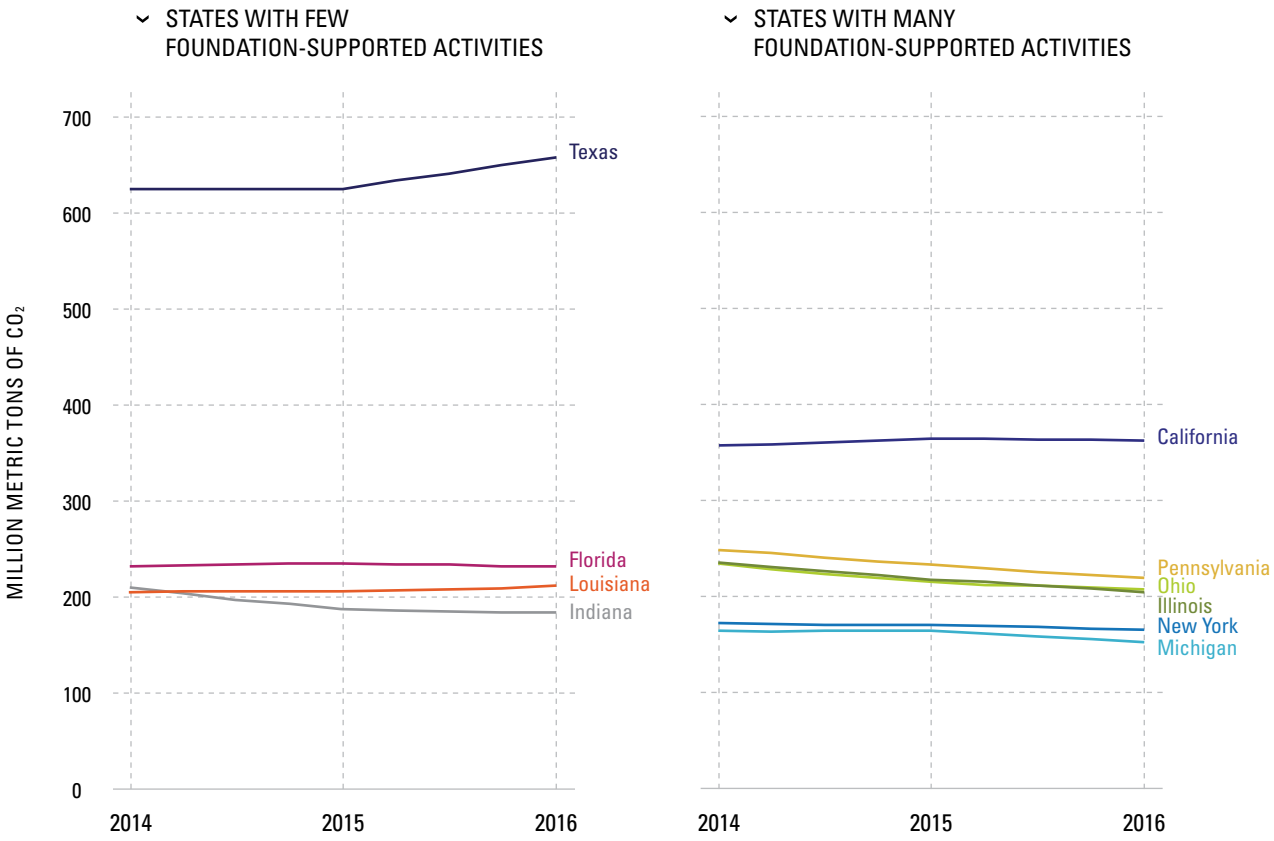
As noted in Finding 2, we are currently undertaking a state assessment to better understand changes in the trajectories among 10 states with the highest greenhouse gas emissions, how that connects to progress in reducing emissions (as well as other desired outcomes), and the Foundation's role. What we are learning so far is that among the 10 states analyzed, those with many Foundation-supported activities saw, on average, a closure of 6.3 coal plants between 2014 and 2018. States with fewer Foundation-supported activities saw a drop of only 5.5 coal plants. Therefore, coal plant closures were more frequent in states with more Foundation-supported activities. In addition, we plotted the trajectories of CO_2 emissions from 2014-2016 in the 10 states examined. Since the launch of the Climate Solutions Big Bet, states with many Foundation-supported activities saw a decrease in CO_2 emissions by an average of 17 million tons. States with fewer Foundation-supported activities saw increases in their emissions by 3 million tons.

It is important to note that correlation is not the same as causation, and Grassroots Solutions is continuing to explore some of the reasons behind these different trajectories. More qualitative data collection and analysis are required to understand the factors at play (e.g., other funders' investments in the same states as well as market forces). We are scheduled to present supplemental findings to the Foundation in July 2019. The charts that follow illustrate changes in the number of coal plants and CO_2 emissions in the 10 states with the highest overall emissions.



Source: *U.S. Energy Information Administration, www.eia.gov*

Figure 21: *Number of Active Coal Plants by State, 2012-2018 (data for 2018 is through November)*



Source: *U.S. Energy Information Administration, www.eia.gov*

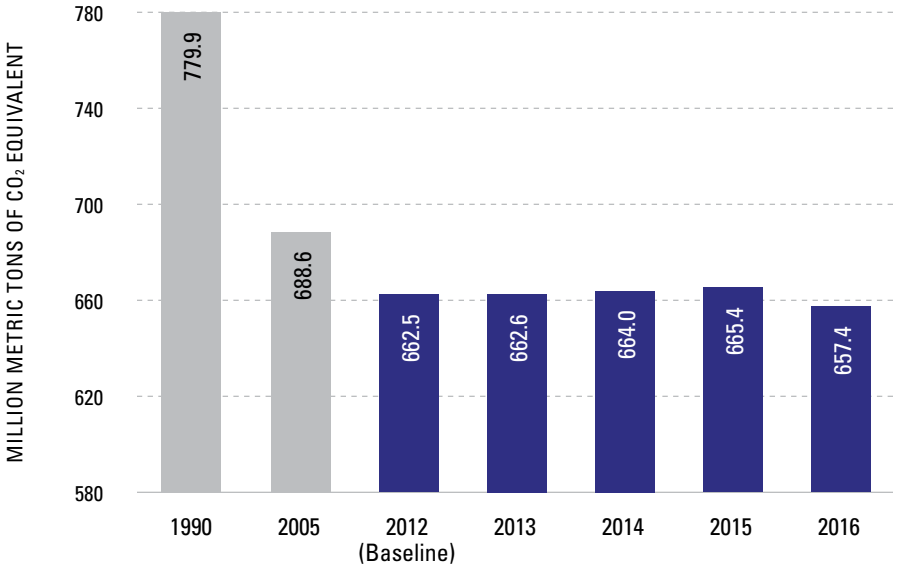
Figure 22: *CO_2 Emissions by State, 2014-2016*

Reduced Emissions of Greenhouse Gas Pollutants

5. Despite setbacks at the federal level to enforce environmental protections and reduce emissions of greenhouse gas pollutants, some strides were made in 2018 to advance regulations at the state level. Climate advocates—including the Foundation's grantees—contributed to proactive victories in targeted states to address methane leaks caused by the oil and gas industry and defend Obama-era methane rules.

Progress Toward the Foundation's Desired Outcome

In 2018, progress to reduce emissions of greenhouse gas pollutants besides CO_2 was mixed. To assess progress toward the Foundation's desired outcome, we are tracking changes in the trajectories of gases, such as methane and HfCs, and regulation of emissions from short-lived pollutants. Since baselines were established in 2012, methane emissions have decreased by one percent. Although that percentage may seem low, it is meaningful considering the large increases in natural gas extraction that have taken place since 2005.[37] In contrast, emissions of HfCs have increased.[38] The data available from the U.S. Environmental Protection Agency through 2016 show that methane emissions equaled 657.4 million metric tons of CO_2 equivalent and emissions from HfCs totaled 162.3 million metric tons of CO_2 equivalent.[39]



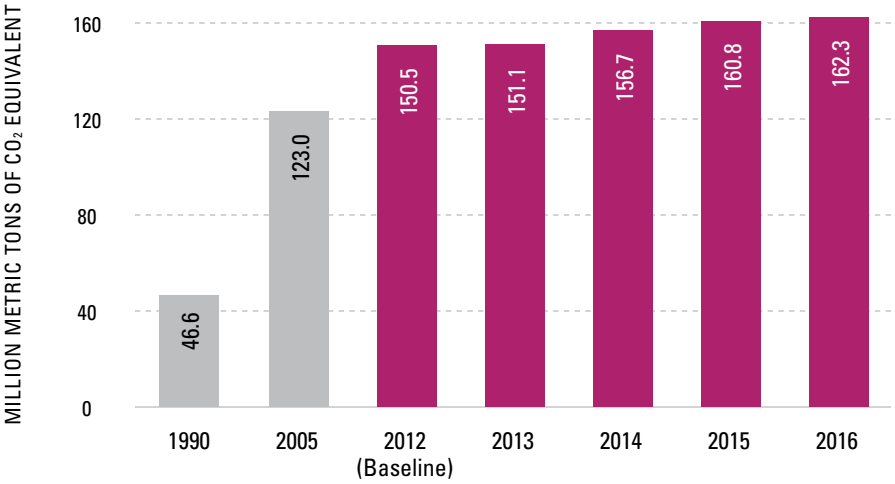
Source: *Environmental Protection Agency, www.epa.gov*

Figure 23: *U.S. Methane Emissions Trends, in Million Metric Tons of CO_2 Equivalent*

[37] The U.S. Energy Information Administration. U.S. Natural Gas Marketed Production. https://www.eia.gov/dnav/ng/hist/n9050us2a.htm. 1990 and 2005 data are included to show a longer-term trajectory and the U.S. Environmental Protection Agency's and Paris Accord's emissions baselines, respectively.

[38] U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Sinks 1990-2016: Executive Summary. April 2018. https://www.epa.gov/sites/production/files/2018-01/documents/2018_executive_summary.pdf

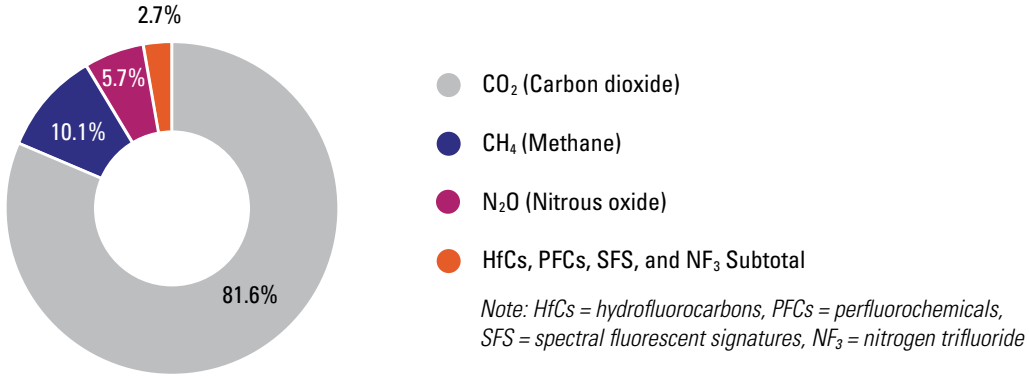
[39] A study released in the journal Science found that U.S. emissions of methane could be 60% higher than the Environmental Protection Agency's current estimates. The study reflects analysis of collected data from over 700 natural gas extraction, production, transmission, and storage sites. Researchers found that most of the emissions came from leaks, equipment failures, and other "abnormal" operating conditions, totaling 13 million megatons of methane leaking into the atmosphere each year. The authors reported a 2.3% leak rate for every cubic foot of natural gas pulled out of the ground each year compared to the Environmental Protection Agency's estimate of 1.4%.



Source: *Environmental Protection Agency, www.epa.gov*

Figure 24: *U.S. HfC Emissions Trends, in Million Metric Tons of CO_2 Equivalent*

Although methane and HfCs make up a relatively small proportion of total greenhouse gas emissions, they matter because of their "Global Warming Potential."[40] The breakdown of greenhouse gas emissions by each type of gas is shown in the pie chart below.



Source: *Environmental Protection Agency, www.epa.gov*

Figure 25: *2016 U.S. Greenhouse Gas Emissions by Gas Type, based on Million Metric Tons of CO_2 Equivalent*

[40] The Global Warming Potential of a greenhouse gas is the efficiency of that gas compared to carbon dioxide to trap atmospheric heat. This is a unit of measurement that the International Panel on Climate Change developed to compare the ability of different greenhouse gases to trap heat relative to other gases. Methane is 25 times more effective at trapping heat than carbon dioxide.

In 2018, a federal court vacated the Environmental Protection Agency's Significant New Alternatives Policy Rules 20 and 21 under the Clean Air Act. The two rules together phase out the use of ozone-depleting substances in certain applications by certain dates. In response, 11 state attorneys general brought a lawsuit challenging the Environmental Protection Agency's authority to rescind the rules without going through a formal process.[41] In addition, California's Air Resources Board and New York Governor Andrew Cuomo directed each state's Department of Environmental Conservation to adopt the Significant New Alternatives Policy rules rescinded by the Environmental Protection Agency.

In the absence of regulatory pressure coming from the federal government, states also examined or adopted regulations of methane emissions from the oil and natural gas industries, as well as other sectors of their economies, on their own. There are now four states—California, Colorado, Pennsylvania, and Wyoming—that regulate methane emissions by the oil and gas industry. Pennsylvania and Wyoming enacted new policies in 2018, while California and Colorado policymakers and regulators committed to enforcing existing methane regulations and kept the door open to enhancing those regulations.

Changes in the Landscape that Affected Progress

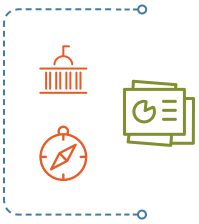
As noted in Finding 1, opposition to environmental protections at the federal level presents a significant barrier to emissions reductions. The Trump administration continues aggressive action to undo existing protections and regulations which affected various actors—including the Foundation's grantees and many others—from advancing efforts to enact regulations of emissions at the federal level (or enforce existing laws and regulations). The Environmental Protection Agency continues to shrink and pursue staffing reductions. The Department of Energy, Department of the Interior, National Aeronautics and Space Administration, the National Oceanic Atmospheric Administration, Federal Emergency Management Agency, and the Department of Defense are also among the agencies that saw climate and clean energy-related funding eliminated and programs terminated. In this context, rules to curb emissions of short-lived pollutants such as methane and HfCs were on the chopping block. In 2018, the Trump administration proposed new rules to roll back Obama-era new source rules for methane. This was after it lost a lawsuit seeking to enjoin the implementation of the rules before they went into effect.

Contribution of the Foundation's Work

The Foundation contributed to some significant, proactive victories in targeted states to address methane emissions. To reduce emissions of greenhouse gas pollutants, the Foundation funds activities to advance climate-friendly policies and broaden the climate solutions coalition. Its grantees have helped states to adopt their own methane emissions policies in the absence of federal regulations. The Foundation has supported five grantees with a presence in 15 states, including Pennsylvania and Wyoming. In 2018, those two states adopted comprehensive rules addressing methane emissions leaks by the oil and gas industry. Also, the Foundation is supporting research to help better document and understand the true scale of methane emissions leaks by the oil and gas industry. The research is similar to the study published in Science mentioned in the footnote on page 39, which has spurred states to act on methane emissions leaks.

[41] The 11 attorneys general included: New York, California, Delaware, Illinois, Massachusetts, Minnesota, New Jersey, Oregon, Vermont, Washington, and the District of Columbia.

As mentioned in Finding 1, the Foundation's grantees were generally successful in their lawsuits to delay and prevent the Trump administration from rolling back rules in the lower courts. A federal judge sided with grantees and other climate advocates and found that the Bureau of Land Management's effort to put a one-year hold on the implementation of methane reduction rules established by the Obama administration lacked "adequate evidentiary justification." In addition, one grantee was involved in an unsuccessful legal effort to block the repeal of the Significant New Alternatives Rules 20 and 21. As an insurance policy, the same grantee also worked with Governor Cuomo's administration and California's Air Resources Board to enact state-level equivalents to the Significant New Alternatives Rules.



Building Political Will

6. In 2018, discourse among candidates and policymakers on climate change increased significantly and was favorable, but overall volume remained low. Positive momentum was driven by the center-left (and the Foundation's work contributed to that momentum); however, discourse was not solutions-focused and did not reflect a clear call to action.

Progress Toward the Foundation's Desired Outcome

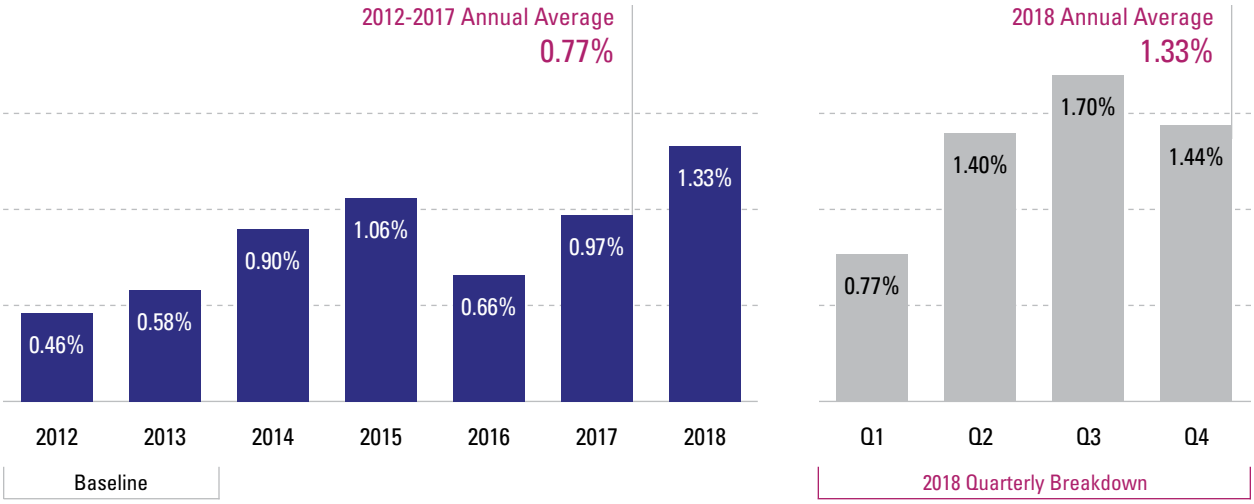
To assess progress in building political will to advance climate solutions, Grassroots Solutions and M+R, with assistance from Protagonist, are tracking changes in 1) candidate and policymaker discourse, 2) the solutions orientation of media coverage, and 3) the base of climate advocates.

Candidate and Policymaker Discourse

Since baselines were established in 2012 and 2013, climate change discourse among candidates and policymakers has grown steadily and it is increasingly favorable. At the same time, progress has been incremental and overall volume remains small. In 2018, candidate and policymaker discourse on climate change averaged 1.33% compared to 0.97% in 2017. By way of comparison, other narrative analyses conducted by Protagonist in 2018 showed that issues such as healthcare and immigration accounted for approximately 4% and 5.5% of the policymaker discourse, respectively.

The 2018 annual average was three times larger than it was prior to the launch of the Climate Solutions Big Bet, and it was 30% to 50% higher than in 2014 and 2016 (when previous midterm and presidential elections took place).[42] Candidate and policymaker discourse on climate change reached its highest point in the third quarter of 2018, and it remained relatively high in the fourth quarter. Spikes in candidate and policymaker discourse in 2018 coincided with Earth Day, Scott Pruitt's resignation, the release of the Intergovernmental Panel on Climate Change's report (and policymakers responding to the urgency for action), and Representative Alexandria Ocasio-Cortez's endorsement of the "Green New Deal."

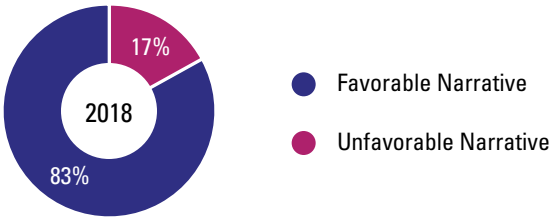
[42] Source: Protagonist Narrative Analytics for the MacArthur Foundation: Tracking Updates for September 15, 2018 – December 31, 2018.



Source: *Protagonist*

Figure 26: *Percent of Total Candidate and Policymaker Discourse on Climate Change, 2012-2018*

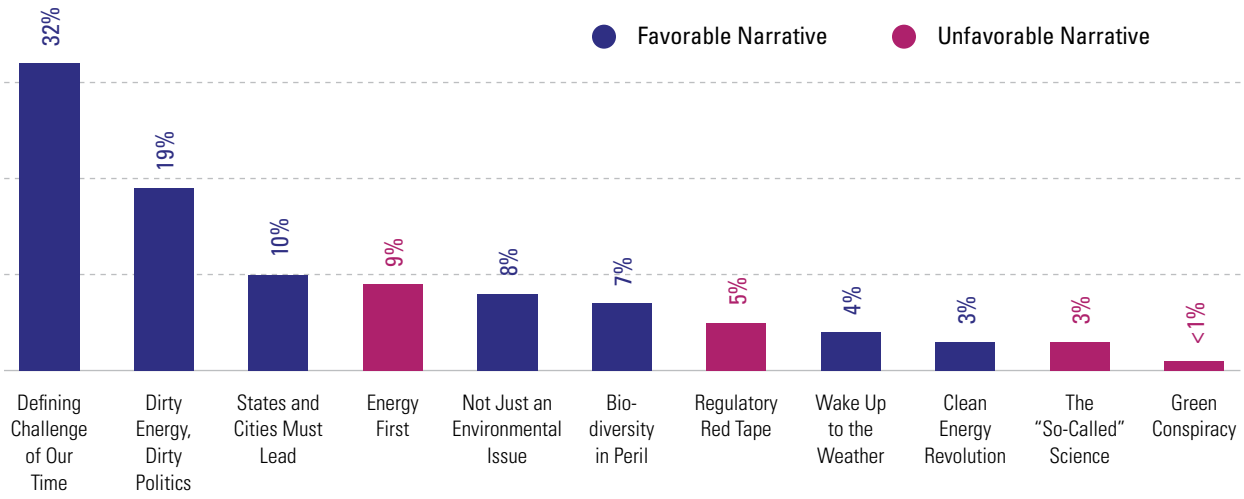
Since 2017, favorable commentary among candidates and policymakers has comprised more than 70% of the candidate and policymaker discourse. In 2018, the annual average of favorable commentary in the policymaker discourse increased to 83%. Two out of seven favorable narratives identified by Protagonist—"Defining Challenge of Our Time" and "Dirty Energy, Dirty Politics"—featured most prominently.[43] Those two narratives accounted for 51% of candidate and policymaker discourse and were propelled largely by Democrats and the center-left as opposed to Republicans or the center-right. Although favorable, neither narrative is solutions-focused. Also, since 2016, outright denial of climate change and disputes over the climate science have been low volume. The "So-Called Science" and "Green Conspiracy" narratives comprised less than 4% of the climate change discourse among candidates and policymakers in 2018.



Source: *Protagonist*

Figure 27: *Candidate and Policymaker Discourse on Climate Change in 2018, Total Favorable/Unfavorable Narrative Distribution*

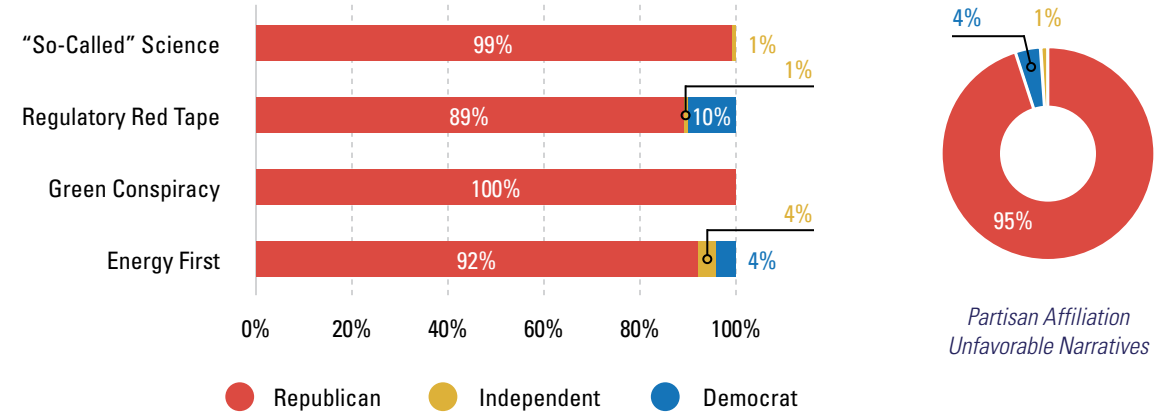
[43] Protagonist identified 11 narratives that comprise the "narrative landscape" tracked from 2012 to 2018; seven are favorable and four are unfavorable. Some are considerably more solutions-focused than others. The abridged description of "Defining Challenge of Our Time" is that "we cannot afford to wait; the science is settled, and we must take urgent action to shift from the dangerous path we are on." The abridged description of "Dirty Energy, Dirty Politics" is that "Big Energy is actively promoting and profiting from climate denial at a great cost to our planet and future." See Appendix C for an overview of the U.S. Narrative Landscape.



Source: *Protagonist*

Figure 28: *Narrative Impact in the Candidate and Policymaker Discourse on Climate Change in 2018*

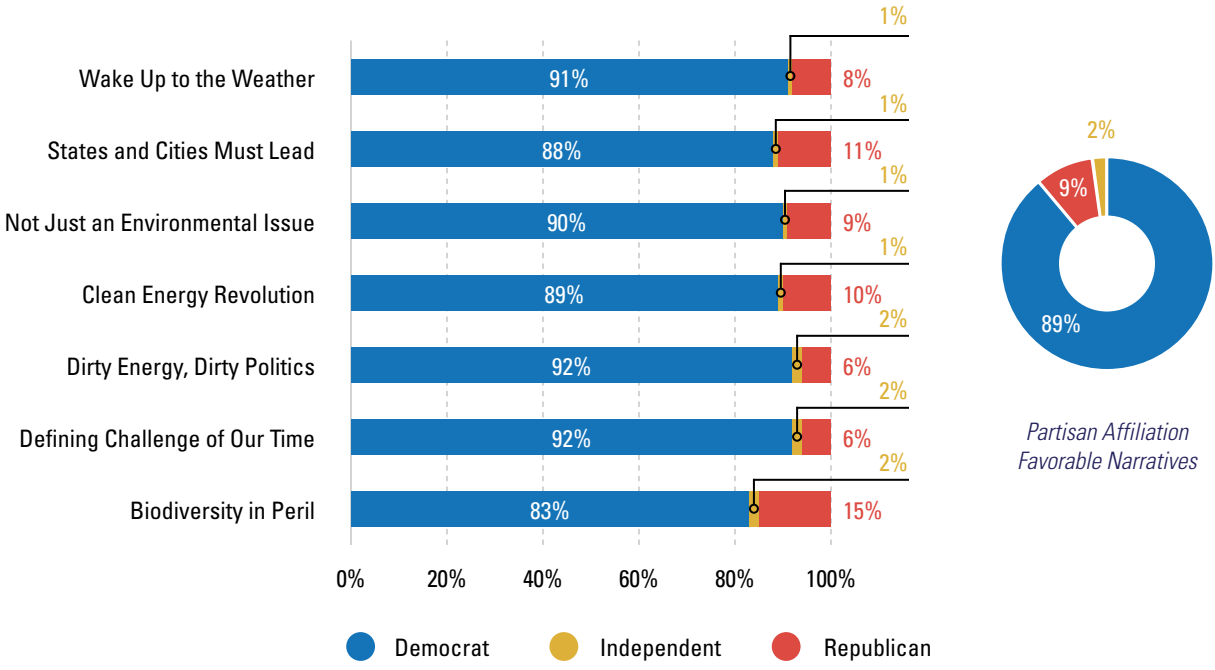
In addition, from January 2017 through 2018, we examined partisan affiliation with the 11 narratives tracked. Based on the data analyzed, we found that there was a pronounced ideological divide.[44] Democrats were overwhelmingly—although not exclusively—affiliated with favorable narratives on climate change. Republicans were overwhelmingly affiliated with unfavorable narratives on climate change. Figures 28 and 29 show the breakdown since the beginning of 2017.



Source: *Protagonist*

Figure 29: *Narrative by Partisan Affiliation Since Inauguration (Unfavorable Narrative)*

[44] Partisanship was the best proxy to understand the ideological breakdown of conversation about climate change that aligns with each narrative. Favorable and unfavorable narratives by partisan affiliation were based on candidates' and policymakers' self-declared party identification.

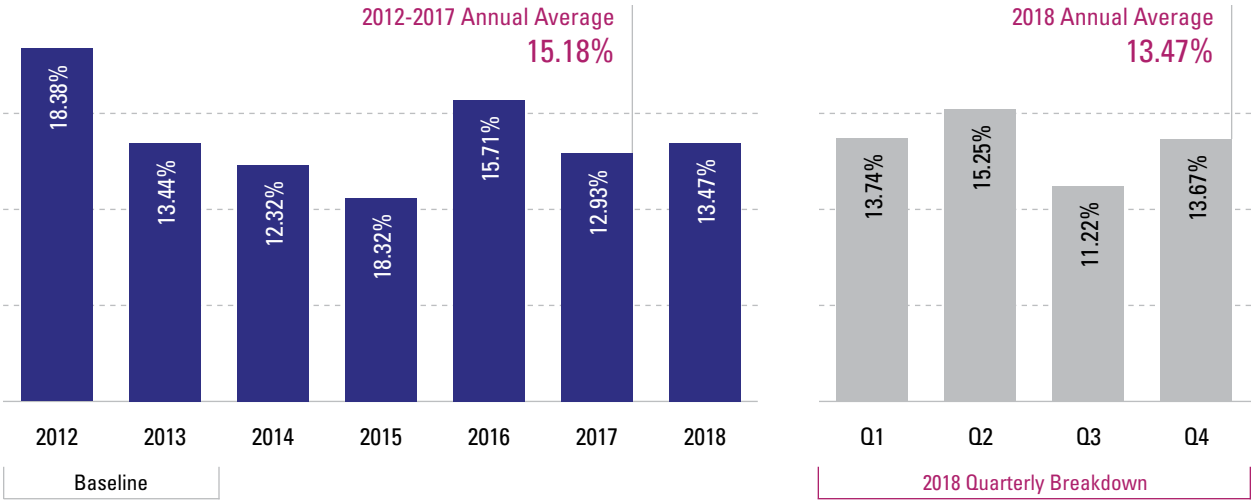


Source: *Protagonist*

Figure 30: *Narrative by Partisan Affiliation Since Inauguration (Favorable Narrative)*

The Solutions Orientation of Media Coverage

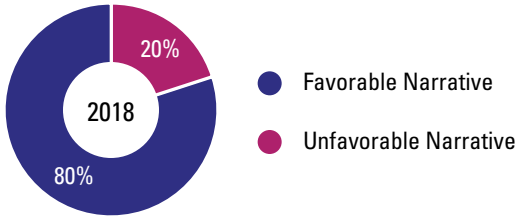
Secondly, media coverage and the public discourse (which includes but is not limited to candidates and policymakers) are not solutions-focused. One assumption that underpins the Foundation's U.S. theory of change is that climate messages must convey both the problem and the solution. Since baselines were established, the percentage of public discourse devoted to climate solutions has trended downward. From 2012 to 2017, it averaged 15.18% each year. In 2018, the annual average was 13.47% (see Figure 31 on the following page).



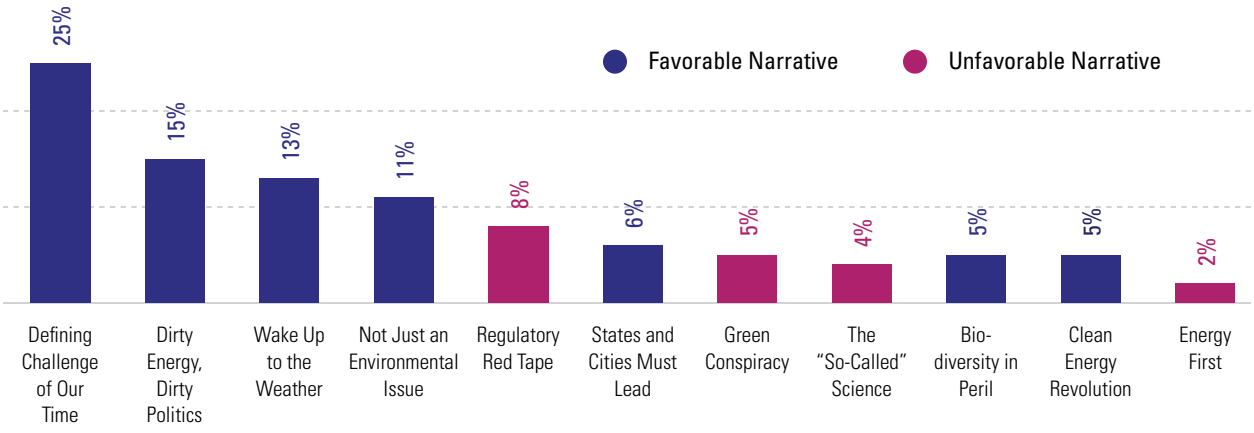
Source: *Protagonist*

Figure 31: *Percent of Total Public Discourse Climate Change Conversation Devoted to Solutions*

Although the total volume of solutions in the public discourse in 2018 was higher than in 2017, favorable but non-solutions-focused narratives were the most prominent. In 2017 and 2018, two narratives— "Defining Challenge of Our Time" and "Dirty Energy, Dirty Politics"—had the highest impact. In 2018, these two narratives accounted for 40% of the public discourse on climate change, and renewable/clean energy, reduced coal use/coal power plant closures, and the Paris Accord were the three most talked-about solutions. Together these solutions drove a disproportionate amount of the favorable conversation about climate change.

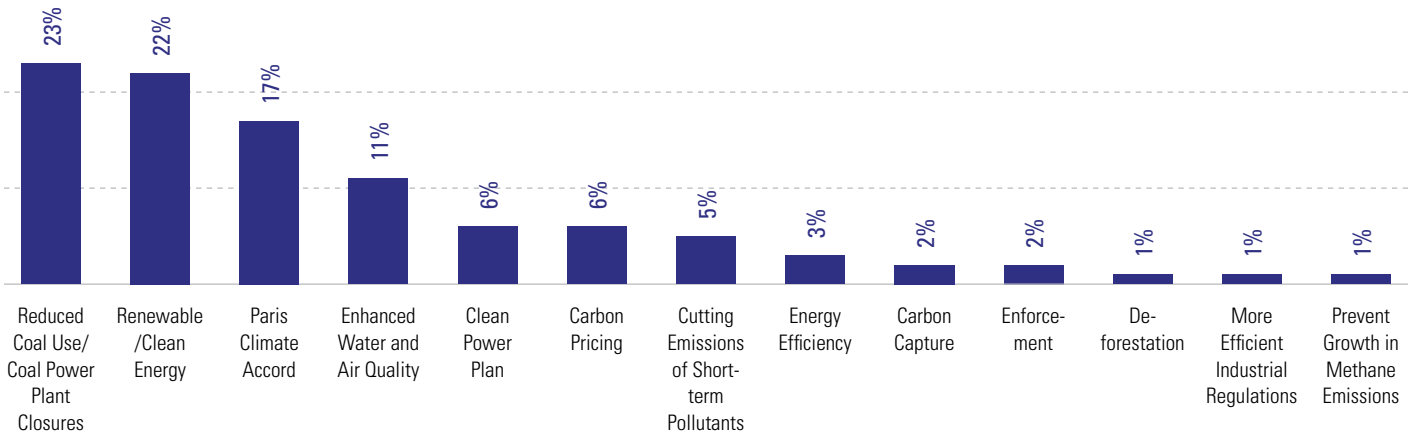


Total Favorable and Unfavorable Narrative Distribution



Source: *Protagonist*

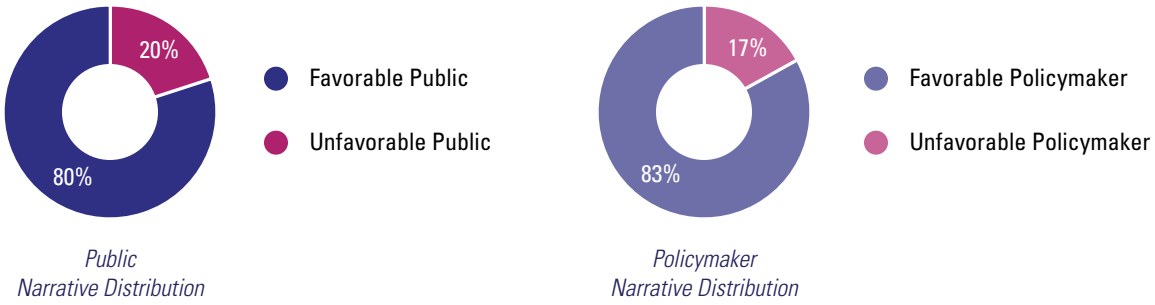
Figure 32: *Narrative Impact in Public Discourse on Climate Change in 2018*



Source: *Protagonist*

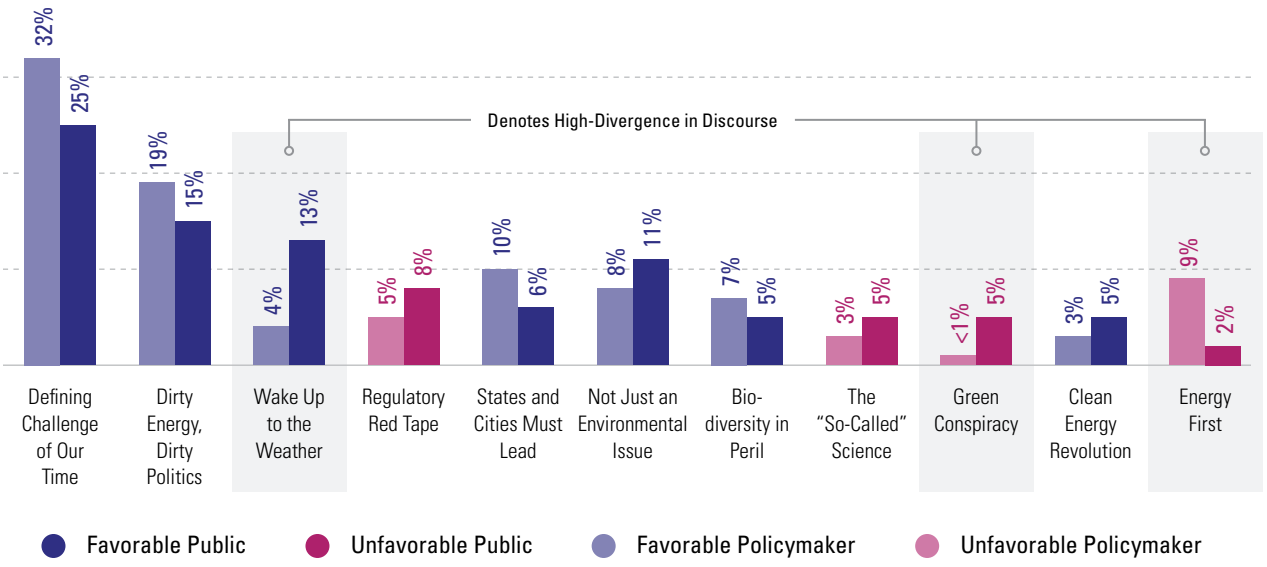
Figure 33: *Narrative Impact of Solutions Within the Public Discourse on Climate Change, Q1-Q4 2018 Averages*

Outright denial of climate change and disputes over the climate science among both policymakers and the public were minimal; however, the "So-Called Science" and "Green Conspiracy" narratives comprised a higher percentage of public discourse and were more volatile. In the first quarter of 2018, these two unfavorable narratives accounted for a relatively high percentage (24%) of the public discourse, but then tapered off to an average of 10% for the year. The most significant divergences between policymaker and the public discourse are shown in the pie charts below and the graph on the following page.



Source: *Protagonist*

Figure 34: *Public versus Policymaker Discourse on Climate Change in 2018 (Favorable and Unfavorable Narrative Distribution)*



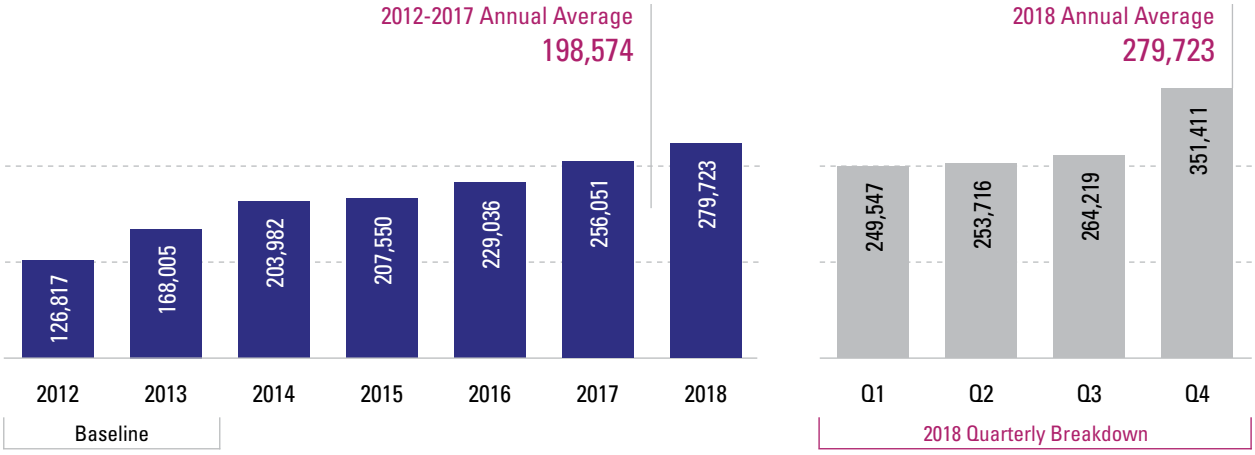
Source: *Protagonist*

Figure 35: *Narrative Impact in Public versus Policymaker Discourse on Climate Change in 2018 (Favorable and Unfavorable Narratives)*

The Base of Climate Advocates

Finally, in 2018, the number of advocates for climate solutions continued to grow. From 2012 through 2017, an annual average of 198,574 unique contributors participated in climate change conversations each month.[45] In 2018, the annual average was 279,723. However, the increase in the fourth quarter was driven by a few key events, including the release of the International Panel on Climate Change report (see Figure 36 on the following page).

[45] This includes social media accounts posting climate-related content and may include new accounts added to Twitter or existing accounts that have become active in the climate change discussion. It is worth noting that these were unique contributors in the narrative conversations about climate change; more than 200,000 Americans mention climate change online each quarter. Also, the increase in unique accounts significantly outpaced the growth in Twitter usage in the U.S. during this period.

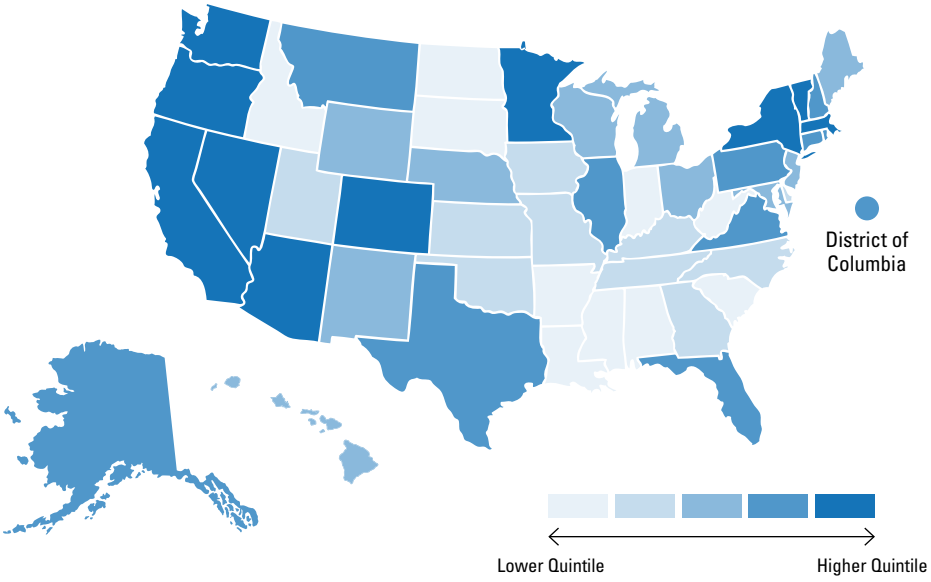


Source: *Protagonist*

Figure 36: *Average Unique Contributors* to Climate Change Conversation Per Month*

** Average unique contributors measures number of social media accounts posting climate-related content; may include new accounts added to Twitter or existing accounts that have become active in climate change discussion.*

At the same time, although the base of advocates is larger, it continues to lack diversity and the per capita distribution of advocates for climate solutions has not changed significantly over time. With limited exceptions, climate advocates are concentrated in coastal states and states with a history of support among the center-left for climate solutions and policies.



Rank	State
1	Oregon
2	Colorado
3	Massachusetts
4	Washington
5	New York
6	Vermont
7	Nevada
8	California
9	Arizona
10	Minnesota

Source: *Protagonist*

Figure 37: *Volume of Solution Mentions per Capita in Q4 2018**

** Data represents the number of posts discussing climate change solutions favorably weighted by the state population.*

Changes in the Landscape that Affected Progress

In 2018, the midterm elections brought more attention to climate change and environmental justice, and the outcomes changed the composition of Congress and political leadership in many states. For example, in November, the Democrats won the majority in the House of Representatives. In December, the Sunrise Movement's sit-in of then-Minority Leader Nancy Pelosi's office, which was attended by newly-elected Representative Alexandria Ocasio-Cortez, brought attention to the launch of a "Green New Deal."[46] Also, climate change was a signature issue for many successful gubernatorial candidates in the Midwest (e.g., Illinois, Michigan, and Wisconsin), West (e.g., Colorado and Oregon), and Southwest (e.g., Nevada and New Mexico).

The outcome of the midterm elections did raise questions about the future of the House Climate Solutions Caucus. The 90-member bipartisan caucus lost almost half of its Republican members, including one of the founding Republican members, former Representative Carlos Curbelo of Florida. The caucus is supposed to include an equal number of Republicans and Democrats. At the time of writing, it was unclear if that will be possible going forward.

Also, in the 2014-2017 Climate Solutions Big Bet Baseline and Landscape Report, we noted that discourse on climate change showed signs of increasing polarization. There was a growing gap between those on the left and right of the political spectrum, which poses obvious challenges to the Foundation and its grantees seeking to broaden the base of advocates for climate solutions. Research conducted by Gallup, the Pew Research Center, and the Yale Program on Climate Change Communications in 2018 continued to show deep partisan divides on climate change—its causes, how pressing the issue is, who is best positioned to address it (the government or the private sector), and the economic consequences of enacting policies to mitigate it. For example, polling conducted by the Pew Research Center in 2018 found that three-quarters of Democrats and those who lean Democrat believe that the Earth is warming primarily due to human causes, compared to 26% of their Republican counterparts.[47] These findings corroborate those of Gallup[48] and the Yale Program on Climate Change Communications.[49] As in past years, climate change continued to be a lower priority for the American public. Both Gallup[50] and Pew Research Center[51] released findings in the weeks prior to the midterm elections that found voters were most concerned about health care, the economy, and immigration. These issues influenced their votes the most.

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[46] The Green New Deal is a 10-year policy concept developed by the Sunrise Movement and introduced by Representative Alexandria Ocasio-Cortez and Senator Ed Markey "to mobilize every aspect of American society toward 100% clean and renewable energy, guarantee a good job to all members of our society, and create economic prosperity for all." More information and links to the Resolutions are available at https://www.sunrisemovement.org/gnd.

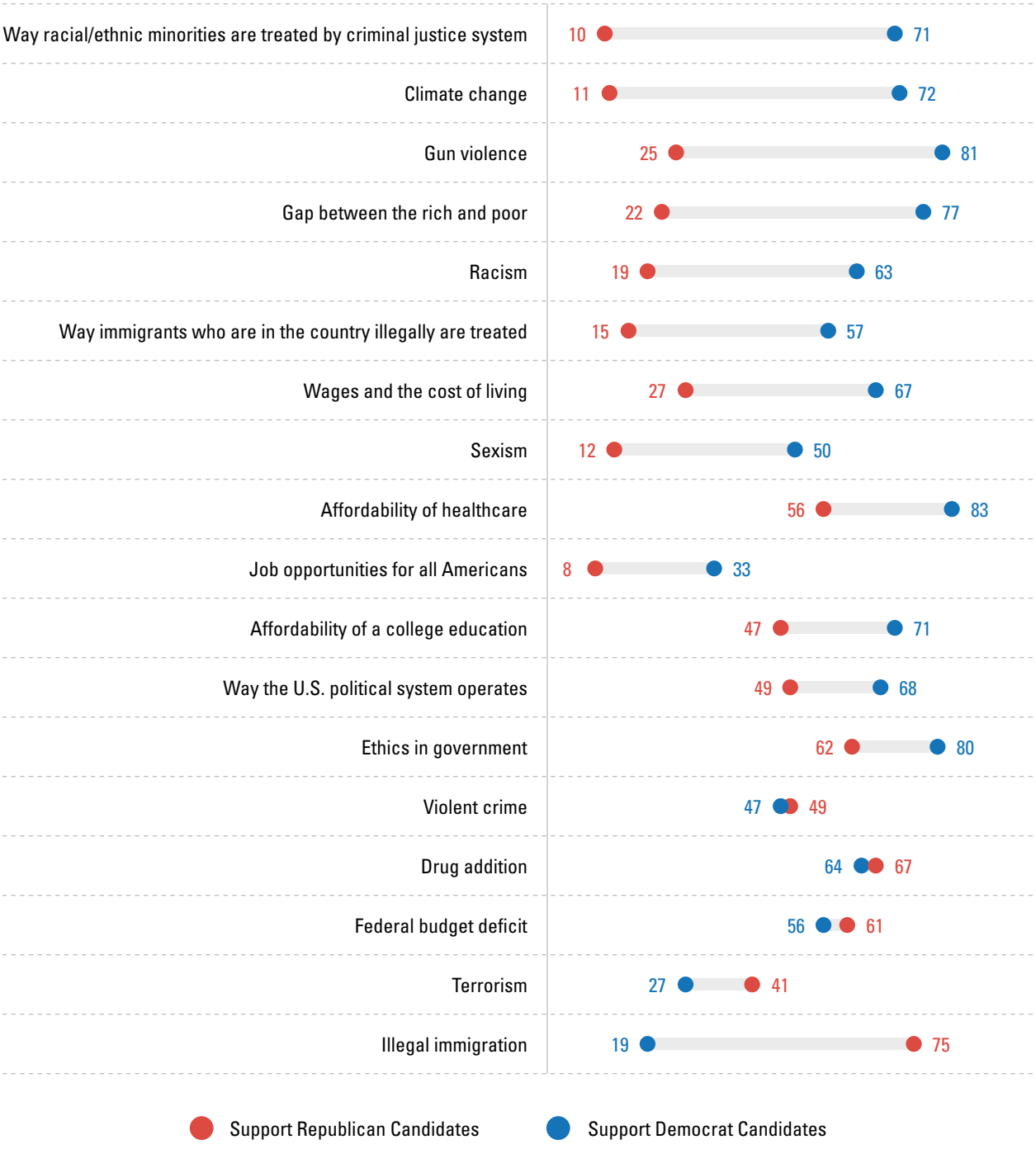
[47] "Majorities See Government Efforts to Protect the Environment as Insufficient." Pew Research Center, May 2018. http://assets.pewresearch.org/wp-content/uploads/sites/14/2018/05/11152912/Embargoed-Report-energy-climate-5-9-18.pdf

[48] "Where Americans Stand on the Environment, Energy." Gallup. https://news.gallup.com/opinion/gallup/231386/new-series-americans-stand-environment-energy.aspx?g_source=link_NEWSV9&g_medium=TOPIC&g_campaign=item_&g_ content=New%2520Series%3a%2520Where%2520Americans%2520Stand%2520on%2520the%2520Environment%2c%2520Energy

[49] "Politics & Global Warming, March 2018." Yale Program on Climate Change Communications. http://climatecommunication.yale.edu/publications/politics-global-warming-march-2018/2/

[50] Top Issues for Voters: Healthcare, Economy, Immigration, November 2, 2018. https://news.gallup.com/poll/244367/top-issues-voters-healthcare-economy-immigration.aspx

[51] Voter Enthusiasm at Record High in Nationalized Midterm Environment: Top voting issues: Supreme Court, health care, economy, September 26, 2018. http://www.people-press.org/2018/09/26/voter-enthusiasm-at-record-high-in-nationalized-midterm-environment/#top-issues-for-voters-supreme-court-health-care-economy



Source: *Pew Research Center, Survey of U.S. Adults Conducted September 25 - October 7, 2018, http://www.people-press.org/2018/10/15/little-partisan-agreement-on-the-pressing-problems-facing-the-u-s/*

Figure 38: *Percentage of Registered Voters Who Say Each is a "Very Big" Problem in the Country Today*

Contribution of the Foundation's Work

In 2018, the Foundation's grantees helped nurture favorable conversation among policymakers, normalize solutions in the media coverage, and to a lesser extent, broaden the climate solutions coalition. To achieve its desired outcome, since 2014, the Foundation has invested heavily in activities aimed at altering political discourse and broadening the climate solutions coalition. This subset of the Foundation's U.S. portfolio is the largest, and nearly 20 grantees work with and among a variety of constituencies that include long-term climate advocates, veterans, businesses, faith groups, and conservatives. A key characteristic of the Foundation's approach is that by supporting authoritative organizations and messengers, the Foundation hopes that elected state and federal officials will recognize the need for climate solutions and be motivated to act.

In 2018, the Foundation's grantees helped nurture favorable conversation among policymakers. More than 15 organizations were directly mentioned, or their content was mentioned, in the candidate and policymaker discourse. Direct mentions of organizations or content generated by the Foundation and its grantees included solutions nearly one-third of the time.

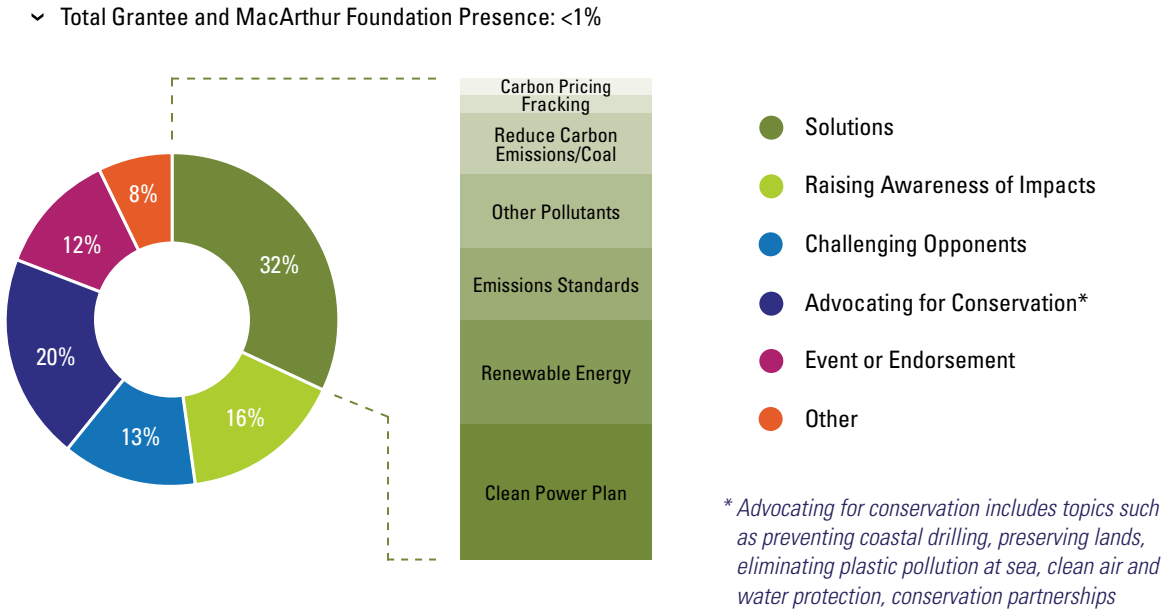


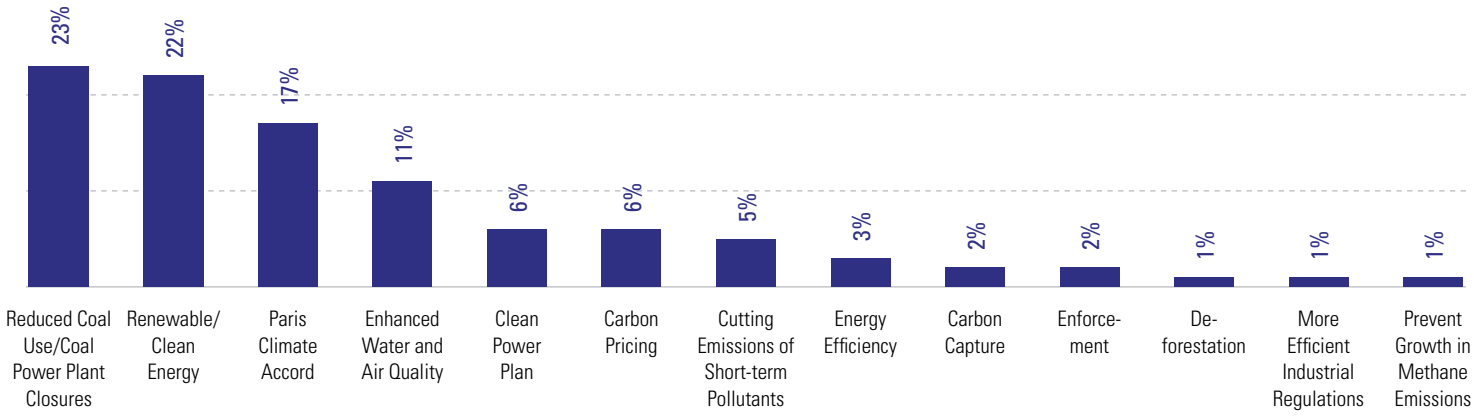
Figure 39: *Grantee Mentions in Candidate/Policymaker Discourse by Topic, Q1-Q4 2018*

In addition, in 2018, the Foundation and its grantees contributed to the normalization of solutions in the media. For example, there were significant grantee mentions in coverage about the Intergovernmental Panel on Climate Change report reported by Bloomberg, NBC News, Forbes, USA Today, and more. A joint op-ed written by Foundation President, Julia Stasch and Exelon CEO, Chris Crane ("It's Time for Environmentalists and the Energy Industry to Work Together") was published in Time magazine and called for more cooperation between environmental groups and the energy industry to address climate change.[52]

[52] "It's Time for Environmentalists and the Energy Industry to Work Together," Time, October 12, 2018. http://time.com/5423273/climate-change-united-nations-exelon-macarthur/

It is also worth noting that the Foundation's efforts to broaden the climate solutions coalition showed progress—albeit limited. A few of its grantees were focused specifically on outreach to conservatives to promote solutions such as carbon pricing and the expansion of clean energy. The Foundation invested in grantees with relationships to messengers seen by center-right policymakers to have conservative bona fides. Although some grant reports on the subject were not available at the time of writing, the data analyzed suggest that some Foundation grantees were successful in nurturing relationships in states with Republican governors and split or Democrat-dominated legislatures such as Illinois, Massachusetts, Nevada, and Ohio.

At the same, there was limited evidence of major "break-throughs" in 2018. The contribution of the Foundation—like progress toward the Foundation's desired outcome—was steady and incremental. Also, we see a lack of cohesion in terms of the solutions promoted and disconnects between what grantees are working on and the most prominent solutions driving favorable conversation in the public discourse (see the graph below).



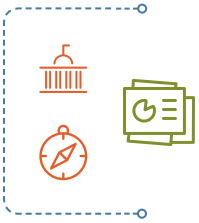
Total Number of Grantees Advocating for Solutions (self-reported)

12	7	11	4	7	11	5	12	2	2	5	1	1

Source: *Protagonist*

Figure 40: *Climate Change Solutions Driving the Favorable Conversation, 2018 Average*

Findings: India



Political Will to Advance Climate Solutions

7. Since baselines were established in 2015, the Government of India has continued to promote climate solutions; however, in 2018 there was no new major push or commitment to increase the country's level of ambition to mitigate climate change. To date, there are early signs (albeit limited) that the Foundation's approaches are helping to shift the political discourse and broaden coalitions on certain issues to include influential figures, academics, and civil society.

Progress Toward the Foundation's Desired Outcome

The Government of India's commitment to the Paris Accord remains strong. In 2018, the Ministry of Environment, Forest and Climate Change established several working groups to study the various Articles of the Paris Accord, and it dedicated more time and effort to preparing its Biennual Update Report for the United Nations Framework Convention on Climate Change than past inventories. Also, in 2018, the International Solar Alliance remained a high priority for the Government of India.

At the same time, as shown in the graphs that follow, political attention in 2018 was not focused on climate change. To measure progress toward the Foundation's desired outcome, we are tracking statements and announcements related to climate change and climate solutions made by central and state governments. An examination of the Government of India's press releases suggests that there was an uptick in the number of announcements, but no spike in "significant announcements."[53] There was a small increase compared to 2017, but that number was lower than the baseline period of 2015. Most of the announcements came from the Ministry of Environment, Forest and Climate Change, and likely with an eye toward the upcoming election. In addition, there was a slight increase in the number of announcements on air pollution and reporting on inauguration, completion, or procurement of power sector projects.

[53] The categorization reflects Oxford Policy Management's analysis of press releases from the three ministries and our best judgement about what constitutes a significant or major announcement.

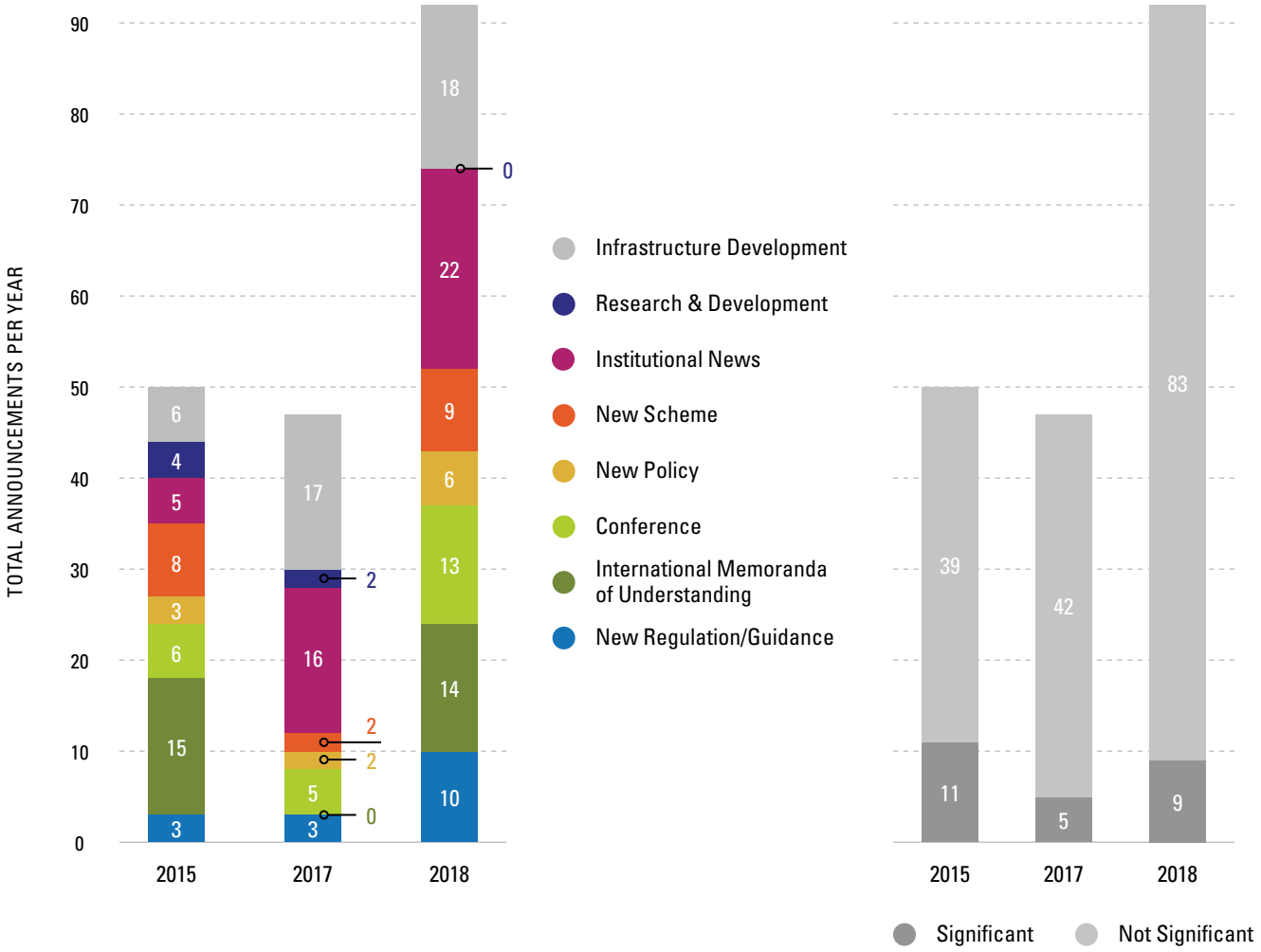


Figure 41: *Type and Number of Announcements by the Government of India, including by Significance of Announcement*

It is worth noting that political discussion about air pollution increased somewhat in 2018. Media reporting on the issue continued, including in cities beyond New Delhi, and the Government of India initiated several campaigns and some (mostly temporary) action was taken. However, the political narrative in New Delhi mostly involved blaming neighboring states for the problem and neighboring states pushing back.

Changes in the Landscape that Affected Progress

Changing contexts in 2018 had a slightly dampening effect on progress to build political will and to increase the country's level of ambition. For example, in 2018, the Ministries of Power and Finance were concerned about "saving" thermal power and resolving the problem of stranded assets.[54] Also, 2018 was a pre-election year. The Government of India was focused on communicating actions and results related to schemes that had previously been announced,

[54] There were approximately 40 gigawatts of "stressed" capacity from 34 projects, which were either non-performing assets or at risk of becoming non-performing assets. This was caused by lack of commercial demand, insufficient coal or gas, and other issues. This subject is also mentioned in the next Finding.

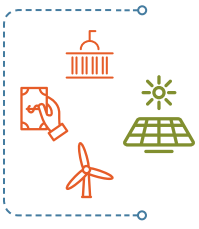
as opposed to announcing new ones. This was particularly true for flagship schemes such as Swachh Bharat Abhiyan (Clean India Mission) and electrification. In addition, the Government of India was preparing initiatives to double farmers' incomes (despite the high deficit limiting the amount of revenue available) and to complete infrastructure projects. In 2018, canceling farmer debt played a prominent role in the political debate.

Contribution of the Foundation's Work

In 2018, we saw early signs that the Foundation's approaches were helping to shift political discourse and broaden coalitions comprised of influential figures, academics, and civil society. To achieve the Foundation's desired outcome that political will to advance climate solutions is built, the Foundation is supporting activities aimed at altering political discourse and broadening the climate solutions coalition and improving partnerships to engage with the central and state governments. The narrative around India's climate leadership among many of the country's leading academics and influential figures in civil society traditionally focused on India's lack of historical responsibility. By 2018, a new narrative was reaching the mainstream, which emphasized a positive "co-benefits" approach to national climate policy. Several individuals published articles that called on India to pursue an ambitious climate agenda because of the co-benefits it will deliver. This was something that at least one of the Foundation's grantees had promoted for years and its work to advance that narrative continued with the support from the Foundation.

Furthermore, in reaction to hazardous levels of air pollution in many of India's cities, citizen concern and activism rose in 2018. In Gurugram, one of the Foundation's grantees helped citizens establish a group and Civil Society Action Plan to engage with the state government about solutions to the air quality crisis. New Delhi and the National Capital Region have been more proactive in responding to the crisis. In 2018, they launched a long-term action plan, as well as an emergency response plan, that was based on the recommendations of the grantee. Other state governments and municipalities demonstrated an enhanced level of political will by taking some limited action to tackle air pollution. For example, the Government of Punjab issued a new parking policy to incentivize a shift toward public transportation to reduce air pollution. The policy reflected recommendations put forward by the Foundation's grantees.

Finally, although no new announcements about economy-wide action on climate change happened in 2018, multiple grantees provided analysis to inform the Ministry of Environment, Forest and Climate Change's initial thinking about a 2050 strategy. This topic is also explored further in the Finding about civil society organizations' capacity to engage with the government on climate policies.



Renewable Energy Production

8. The potential for continued expansion of renewable energy in India remains strong; however, the sector faced more pronounced challenges in 2018. Thus far, the Foundation's approaches have laid the groundwork for mitigating some of the barriers to expansion, including increasing financing and building partnerships that can further catalyze investment and production.

Progress Toward the Foundation's Desired Outcome

The expansion of renewable energy continued in 2018, but at a slower rate than previous years. In 2018, renewable

energy accounted for 21% of India's total installed capacity. There was a 17% increase in installed capacity between 2017 and 2018, compared to 26% in the period from 2016 to 2017 and 29% in period from 2015 to 2016.

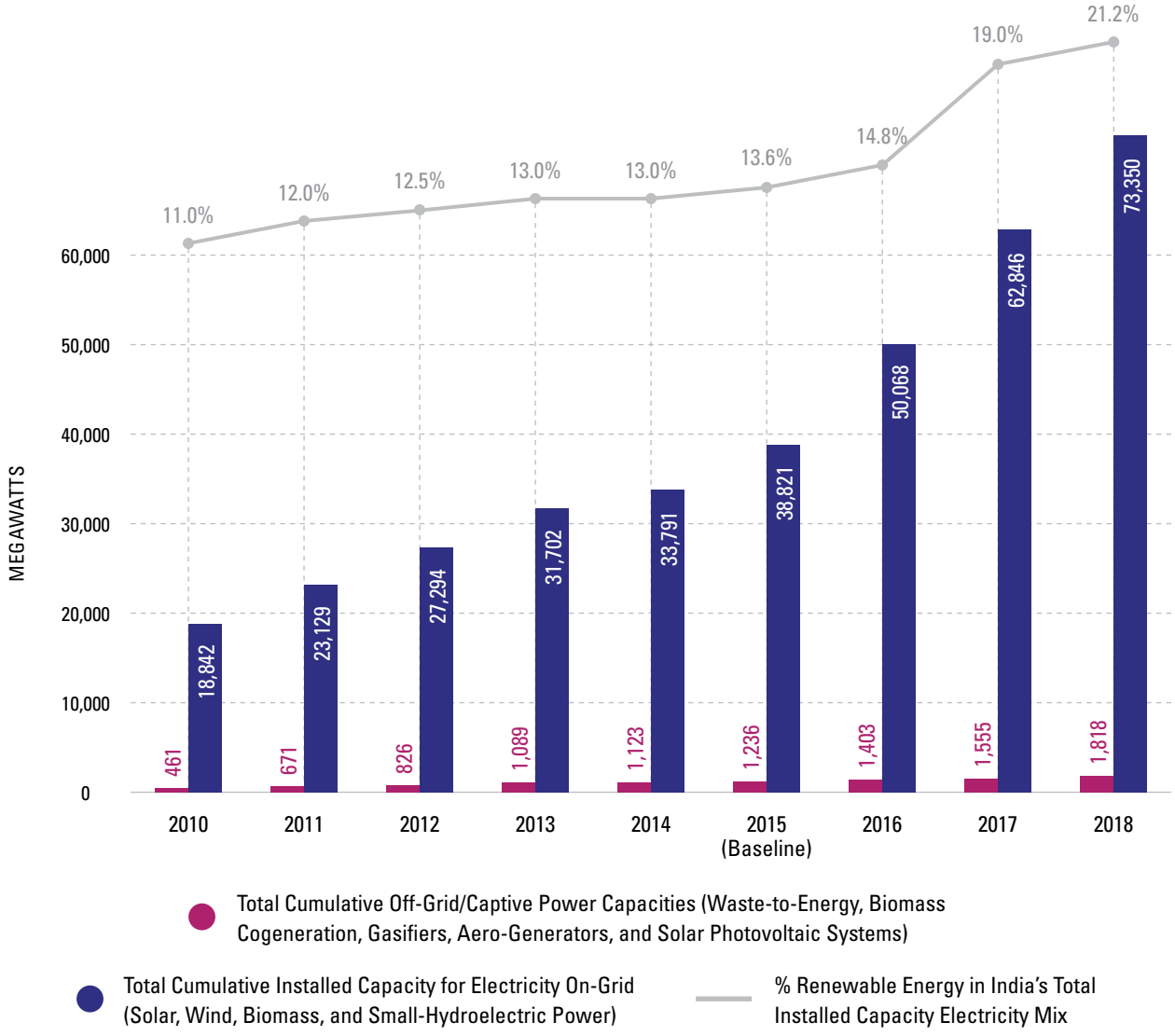
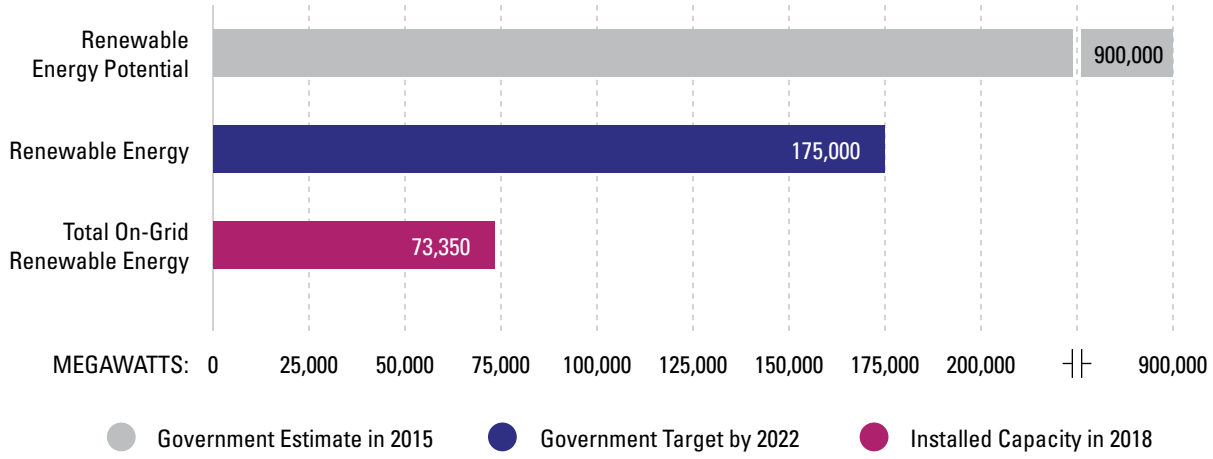


Figure 42: *India's Total Renewable Energy Installed Capacity in Megawatts and Percentage*

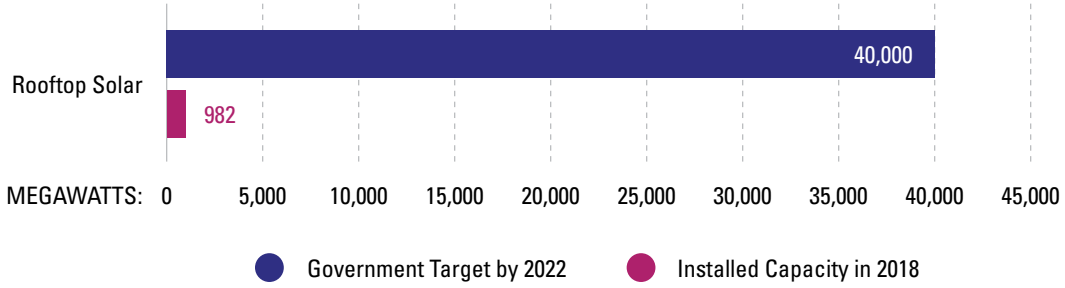
Although the growth rate was slower than previous years, the Government of India announced that it was confident the country would meet its 2022 and 2030 renewable energy goals, which are shown in the illustrations that follow.[55] Approximately 47 gigawatts of projects were bid out or under installation, and up to 80 gigawatts were projected to be bid out by 2020.

[55] In addition to what appears in the illustrations, in 2018, India's Ministry of New and Renewable Energy announced the country's medium- and long-term targets for offshore wind capacity, aiming for five gigawatts by 2022 and as much as 30 gigawatts by 2030.



Source: *Ministry of New and Renewable Energy Annual Report, https://mnre.gov.in/annual-report*

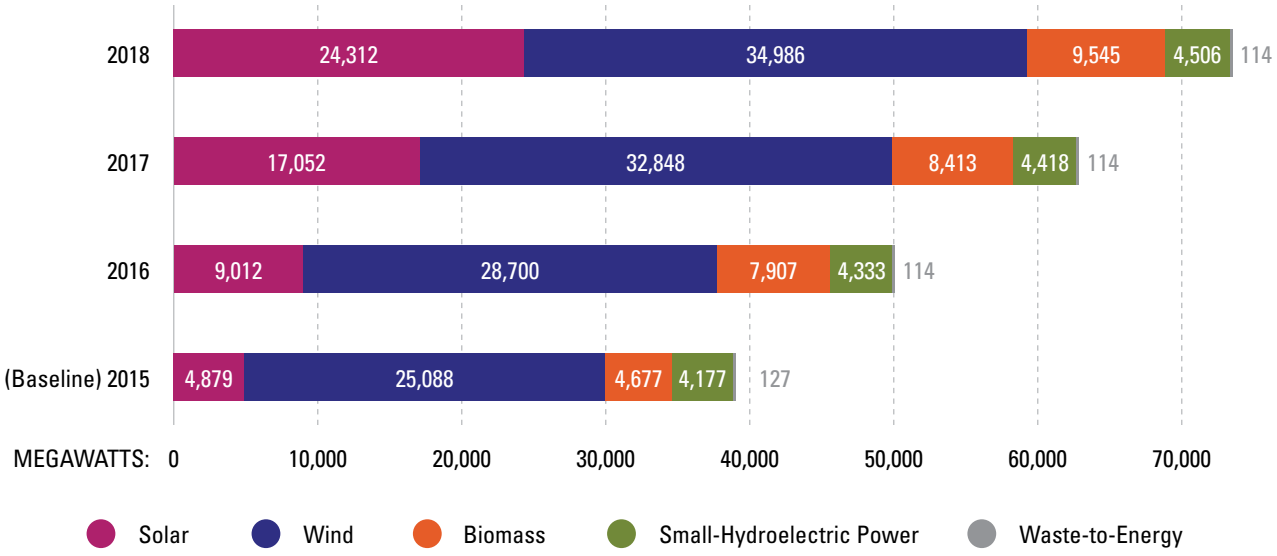
Figure 43: *Comparison of Installed Capacity in 2018 with the Government of India's Target by 2022 and Estimate in 2015 in Megawatts*



Source: *Ministry of New and Renewable Energy Annual Report, https://mnre.gov.in/annual-report*

Figure 44: *Comparison of Installed Capacity in 2018 with the Government of India's 2022 Targets in Megawatts*

Wind power continues to account for most of the renewable energy installed capacity in India, but its proportion dropped from 64% in 2015 to 48% in 2018. In contrast, the proportion of installed capacity from solar increased from around 13% to 33% during that same time period. Although the annual growth rate of grid-connected solar was lower in 2018 than previous years (43% compared to more than 80%), it was still higher than the relatively constant annual growth rate of wind at 14%.



Source: *Ministry of New and Renewable Energy Annual Report, https://mnre.gov.in/annual-report*

Figure 45: *Installed Grid-Connected Renewable Energy Capacity in Megawatts*

Changes in the Landscape that Affected Progress

Despite the increase in installed capacity from renewables, the challenges facing the renewable energy sector became more pronounced in 2018. A few of these are described in more detail below.

- Thermal power and banking crisis: The Government of India was preoccupied with tackling the problem of stalled projects and stranded assets within the thermal power sector, which put the banking sector at risk. This diverted political attention and focus away from a further expansion of renewables.
- Additional costs for developers: The introduction of a 25% safeguard duty on imported solar cells for a year increased costs for developers, and there was confusion about rules related to the Goods and Services Tax.
- Price and procurement disputes: With the rapid fall in the price for renewables, there were increasing disputes among regulators, distribution companies, and developers over purchasing renewable energy. The banks were also worried about the prices. Price disputes may have masked, or have been underpinned, by growing uncertainty about the viability of the tenders.

These and other difficult issues diverted the Government's attention from efforts to scale up the promotion and deployment of renewables. It may also have impeded the Foundation's grantees somewhat from advancing climate-friendly policies and activating a coalition to engage with the Government of India around renewable energy production. The summary on the following page shows changes in the barriers and opportunities to expand renewable energy in 2018.[56]

[56] The summary reflects qualitative data collected from discussions with "key informants," including grantees and non-grantees who took part in full-day workshop-style discussions or interviews facilitated by Oxford Policy Management, focusing on the Foundation's desired outcomes and discussing in detail some of the political and economic factors surrounding them.

Changes in 2018 in the Enabling Environment for Expansion of Renewable Energy			
Centralized Renewable Energy			
	Status	**New Barriers**	**New Opportunities**
Policy and Regulation	Positive	› Increasing risk and uncertainty in procurement	› Electricity Act amendments published › Increasing interest in cross-border electricity trade
Institutions	Poor ↑		› Renewable energy now largely on autopilot and government understanding of how to manage it has increased
Financial	Poor	› Banks concerned about risks in sector › Safeguard duties	
Political Will	Positive ↓	› Government attention is focused on thermal power and banking sector	
Technology	Mixed		› Government focused on addressing grid integration issues; exploring renewable energy with storage › New quality standards for solar panels › Interest in off-shore wind energy
Decentralized Renewable Energy			
	Status	**Barriers**	**Opportunities**
Policy and Regulation	Mixed		› "Stristi" concept note on expanding roof top solar was a positive first step, but stalled
Institutions	Poor		
Financial	Very Poor		
Political Will	Poor	› A risk that promoting decentralized renewable energy is seen as not aligned to salvaging the distribution sector	› Growing interest in biogas (as a "vote-winner")
Technology	Positive		

Contribution of the Foundation's Work

Although the data analyzed did not directly connect the Foundation's work to further renewable energy production in 2018, there was evidence that it helped to expand finance (one of the barriers to increasing the production of renewable energy) and strengthen institutional capacity and partnerships that informed key decisions, especially at the state level. The Foundation supports a variety of approaches to catalyze renewable energy through grants and impact investments in India. They include expanding funding opportunities and the climate solutions philanthropic community, advancing climate-friendly policies and regulatory action, and broadening the climate solutions coalition and improving partnerships.

For example, several grantees helped increase the data and information available about renewable energy to support state government decision-making. One organization worked with the Bangalore Electricity Supply Company Limited

to pioneer the use of Light Detection and Ranging technology to identify the most suitable rooftops for rooftop solar projects and to develop a consumer tool for calculating their solar potential.[57] Also, in Karnataka, by improving the evidence on integrating renewable energy into the grid to decision-makers, grantees have been able to strengthen and speed up investment and policymaking. For example, they presented their analysis of the geographical distribution of renewable energy potential to the Karnataka Power Transmission Corporation Limited. In response, the Corporation asked for specific recommendations about which lines and substations to upgrade, and it acted upon the grantees' suggestions. The Corporation was already considering network upgrades, but grantees provided evidentiary support for their internal analysis. While the Foundation's approaches may not have directly facilitated new investment in the infrastructure to support an expansion of renewables, it certainly appears to have helped speed it up.

In addition, in 2018, initial steps were taken by the Foundation's India grantees to build partnerships that strengthen markets for renewables. Seven new aggregators were in the process of joining, and providing data to, the Green Power Market Development Group, including Mahindra World City, Tata Motors, H&M Group, and Naroda Industrial Estate.

Clean Technology Deployment

9. In 2018, solid gains were made to promote energy efficiency and deploy clean technology. Although several barriers persist, Foundation-supported efforts helped strengthen institutional capacity to implement ongoing government energy efficiency programs as well as partnerships within the private sector to promote and facilitate the adoption of clean technology.

Progress Toward the Foundation's Desired Outcome

The promotion of energy efficiency and clean technology was steady in 2018. To assess progress toward the Foundation's desired outcome, indications of progress include that a clear vision and policy platform on clean technology and its role within India's state and central governments is articulated, collaboration between clean technology and other sectors of the Indian economy increase, and the government and private sector promote greater use of energy efficiency measures. In 2018, implementation of several central and state programs continued. For example:

- The number of appliances on the mandatory list for energy efficiency labeling increased by one (inverter air conditioners) and on the voluntary list by one (chillers).
- No new state adopted the Energy Conservation Building Code, but various states such as Andhra Pradesh and Telangana made announcements updating their Energy Conservation Building Code to reflect the 2017 standards and adopting implementation measures. Also, the Government of India launched new codes for residential buildings in late 2018.
- The coverage of the Perform Achieve Trade (PAT) scheme is now being expanded every year. In 2018, 109 installations were added with a combined energy consumption reduction target of 0.699 million tonnes/tons of oil equivalent.

[57] The Government of Bihar has requested that the grantee, with support by the Foundation, replicate the study in Patna.

Some of the other measures we are tracking are electricity consumption by sector and the number of Energy Service Companies empaneled with the Bureau of Energy Efficiency. In 2018, electricity consumption per capita continued to increase, reaching 1,149 kilowatt hours per capita. Electricity consumption within the industrial sector increased by 124% over the last decade (compared to 86% for agriculture and 77% for commercial sectors). Despite comparatively low per capita energy usage in India (approximately one-third of the global average[58]), consumption is increasing. This poses challenges to further promotion of energy efficiency and clean technology.

Changes in the Landscape that Affected Progress

In 2018, none of the major barriers to further deployment of energy efficiency and clean technology showed signs of improvement. The lack of major changes in the enabling environment makes the 2018 gains even more impressive. Details about some of the most significant constraints are explored below.

- Fragmented overall government vision: In 2018, there was no national target or overarching policy strategy for energy efficiency and clean technology (beyond the increasingly outdated 2010 National Mission for Enhanced Efficiency), and it is barely mentioned in the Nationally Determined Contribution.
- Misaligned political interests: The generation and consumption of energy was often cited by the Government of India as a development indicator. That places energy efficiency in potential tension with development. Energy efficiency is also harder for politicians to promote; it is not something that lends itself to a photo opportunity (except for appliances and LED lightbulbs, which have received political attention).
- Institutional mandate and capacity constraints: The mandate and responsibility for clean technology was spread across different government agencies, all with limited internal resources. There was a lack of coordination and authority to motivate and enforce action by line ministries with better implementation capacity. For schemes reliant on state or municipality implementation, the capacity constraints have become almost prohibitive.
- Disincentives within the electricity tariff structure: The pricing structure does not always set the right incentives for energy efficiency. Commercial and industry users are the highest payers (subsidizing agricultural users), and utilities do not have enough incentives to promote efficiency within these sectors.
- Limited domestic clean technology manufacturing: There are gaps in the availability of affordable technology due to a reliance on expensive imports (e.g., hybrid cars). The availability of capital constrains local manufacturers developing new clean technology (e.g., for battery storage). The lack of a policy framework and political push also affects investor interest.

The summary on the following page shows the status of barriers and opportunities to expand energy efficiency and the deployment of clean technology by sector.[59]

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[58] Source: International Energy Agency. World Energy Outlook 2015. https://www.iea.org/publications/freepublications/publication/WEO2015.pdf

[59] The summary reflects qualitative data collected from discussions with "key informants," including grantees and non-grantees who took part in full-day workshop-style discussions or interviews facilitated by Oxford Policy Management, focusing on the Foundation's desired outcomes and discussing in detail some of the political and economic factors surrounding them.

Summary of Sector-specific Enabling Environment for Clean Technology

Clean Technology and Energy Efficiency in Transport Sector

	Status	Barriers	Opportunities
Policy and Regulation	Mixed	› Lack of national policy clarity; draft electric vehicle policy not adopted	› Some states adopting electric vehicle pilot programs (e.g., West Bengal, Pune)
Institutions	Poor	› Policy responsibility for electric vehicles housed in NITI Aayog, but lack of capacity › Utilities not aware of potential impact on energy demand	
Financial	Poor		
Political Will	Mixed	› Powerful automobile lobby against electric vehicles › Transport fuel not getting attention (beyond the courts)	› Ambitious electric vehicle target (although lack of clarity about how to achieve it) › Global movement and pressure towards electric vehicles
Technology	Mixed	› Hybrid vehicles are very expensive, and localized manufacturers have not been nurtured › No real solutions to charging infrastructure	› Electric two- and three-wheelers developing despite lack of policy clarity

Clean Technology and Energy Efficiency in Residential Sector

	Status	Barriers	Opportunities
Policy and Regulation	Mixed	› Lack of consumer demand, connected to awareness and affordability (need to monetize payback period)	› Success of LED procurement set precedent for other appliances › Steady expansion and ratcheting up of appliance standards (e.g., draft cooling action plan) › Steady increase in states adopting Energy Conservation Building Code
Institutions	Mixed	› Limited state and municipality level capacity for adopting and enforcing Energy Conservation Building Code	› Steady increase in states adopting Energy Conservation Building Code
Financial	Mixed		
Political Will	Mixed	› Manufacturers lobbying of appliance standard setting › Split incentives for building efficiency between government, developers, and buyers	› Political "win" of LED program and desire to replicate
Technology	Positive		

Clean Technology and Energy Efficiency in Industry Sector

	Status	Barriers	Opportunities
Policy and Regulation	Mixed	› Lots of gaps, particularly for non-Perform Achieve Trade sectors, Small and Medium Industrial Enterprises	› Perform Achieve Trade scheme being steadily expanded › Transparency of energy consumption data (unlike most countries)
Institutions	Mixed		› Perform Achieve Trade scheme built institutional and private sector capacity
Financial	Mixed		
Political Will	Mixed		
Technology	Positive	› Limited options (and lack of Research & Development) for fuel switching and efficiency in many processes	› Energy efficiency of some large industries (cement, fertilizer, etc.) at high global standard

Contribution of the Foundation's Work

Through the Foundation's grantmaking, there were indications in 2018 that grantees helped strengthen institutional capacity among government agencies and partnerships within the private sector. Also, grantees' efforts contributed to future energy savings (although the exact amount is difficult to quantify).To expand clean technology deployment in India, the Foundation is supporting a variety of approaches, including expanding funding opportunities and the climate solutions philanthropic community, advancing climate-friendly policies and regulatory action, and broadening the climate solutions coalition and improving partnerships.

For example, one grantee supported the Bureau of Energy Efficiency by providing analytical and technical assistance to develop new energy efficiency policy and standards, including a revised policy for refrigerators and a new chiller energy labeling scheme. According to the Bureau, the chiller labeling program is expected to save more than 500 million units of electricity in 2019 alone. One organization also supported the Bureau to develop a State Energy Efficiency Index. The Index was launched by the Minister of Power in August 2018, and an updated version is planned for next year. We will continue to follow how much attention the 2018 version of the Index receives from state governments and the extent to which it drives significant shifts in policy or actions. Although these activities may have progressed without support from the Foundation's grantees, the data collected and analyzed suggests that grantees made these policies and schemes more ambitious and effective.

In addition, in 2018, the Foundation's grantmaking supported activities to design and pilot a motor replacement program for a variety of industrial sectors. When the Government of India announced that all motor manufacturers had to reach high efficiency standards, Energy Efficiency Services Limited (a Government of India energy service company) and one of the Foundation's grantees saw an opportunity to encourage small- and medium-size enterprises to retrofit inefficient motors with higher efficiency motors. However, industry needed proof of the energy-saving potential. One Foundation grantee provided this evidence by carrying out a market survey to understand the demand and potential for energy savings and undertaking three demonstration projects. In addition, the organization leveraged its existing networks with industry to act as ambassadors for the program and facilitated memoranda of understanding with industry associations. Although Energy Efficiency Services Limited had the technical ability and contacts to carry out this process, it likely would have taken longer. The Foundation's grantee completed the demonstration projects in just a few months. As a result, the Ministry endorsed the program and began procuring and supplying 120,000 motors faster than expected.

There was also some evidence in 2018 that the private sector (especially small and medium enterprises) was increasingly informed about, and interested in, clean technology through partnerships nurtured by the Foundation's grantees. For example, 200 enterprises engaged in a process led by one of the Foundation's grantees to inventory greenhouse gas for small but energy intensive sectors. The resulting Greenhouse Gas tracker allows small and medium industrial enterprises from ceramics, foundry, forging, and steel re-rolling sectors to compare themselves against industry best practices. Also, the "Climate Solver+" program has facilitated new partnerships between small and medium enterprises and potential investors for scaling-up clean technology. An investment group of 20 to 25 investors was established to connect with small and medium enterprises, many of which have completed the Climate Solver+ business incubation program.

Policies and Practices to Put a Price on Pollution

10. In 2018, there were no significant steps taken to advance policies or practices that put a price on pollution. Also, since baselines were established in 2015, there were no major changes in the enabling environment. One bright spot, however, is that several grantees helped bolster systems to monitor, report, and verify emissions that will be necessary to support future pollution-pricing schemes.

Progress Toward the Foundation's Desired Outcome

Progress to advance pollution-pricing policies and practices remained limited in 2018, but there were some encouraging developments. In 2018, the Government of India published their second Biennual Update Report to the United Nations Framework Convention on Climate Change, increasing the number of economy-wide greenhouse gas inventories published by the Government to five. The process of developing this emissions inventory was considered more robust and transparent than in previous years. In addition, to measure progress toward the Foundation's desired outcome, we are tracking the number of Certified Energy Auditors.

Changes in the Landscape that Affected Progress

There was no major change in the contexts that help or hinder the Foundation, its grantees, and others from advancing efforts to increase support for policies and practices that put a price on pollution. The enabling environment largely remained the same. That said, in 2018, the Government of India reduced the excise duty for petrol and diesel (despite a commitment to not do this in the months and years prior). As the price of fuel increased, the Government of India was under pressure to reduce the price for consumers. With the upcoming elections around the corner, in October 2018, the Government cut the price by 2.5 rupees per liter. A summary of the main barriers and opportunities are shown in the table below.

Summary of Enabling Environment for Strengthening the Price on Pollution

	Status	Barriers	Opportunities
Policy and Regulation	Mixed		› Ministry of Environment, Forest and Climate Change convened a working group to explore options for domestic carbon markets in context of the Paris Accord
Institutions	Poor	› Very limited capacity to establish and manage a cap-and-trade system, e.g., availability of data	› Capacity has been increased through Perform Achieve Trade experience and preparing the Biennual Update Report, and efforts in states to establish a pilot Emissions Trading Scheme for air pollution
Political Will	Poor	› No recognition of potential of cap-and-trade systems, even within civil society	› Companies setting a carbon price/target because they expect a carbon price at some point in the future › Ministry of Environment, Forest and Climate Change interested in what is happening in China with carbon markets
Technology	Mixed		

Contribution of the Foundation's Work

In 2018, multiple grantees helped improve institutional capacity for monitoring, reporting, and verification of emissions. For example, several grantees were actively involved in verifying the figures contained in the emissions inventory for 2014, which was published in 2018. There are other examples at the state level as well. The Foundation aims to enhance pollution pricing by supporting activities to alter political discourse, expand the climate solutions philanthropic community, advance climate-friendly policies and regulatory action, and broaden the climate solutions coalition and improve partnerships. One Foundation grantee supported the pollution control board in Gujarat to strengthen the reporting of real-time emissions data on industry installations and use that information to enforce regulation. In Maharashtra, that same organization helped state government with the public release of data on industry emissions for the first time, which put a spotlight on the fact that installations exceeded emission limits. Other states are now following Gujarat and Maharashtra's lead, including Odisha.

These developments at the state level provided evidence to NITI Aayog of the potential of using market-based instruments to improve the environmental regulation regime.[60] In 2018, NITI Aayog co-hosted a conference with every state pollution control board and civil society organizations on innovative new approaches to pollution regulation, including market-based instruments. They also agreed to co-author the first handbook for state-level regulators on the use of market-based instruments using a Continuous Emissions Monitoring System.

Finally, as a result of the work of one of the Foundation's grantees, there was evidence that companies had a clearer understanding of the need for, and how, to report environmental information. There was an increase in the number of companies voluntarily reporting on emissions, but more significantly, some large companies are adopting bold climate initiatives, with 20 companies announcing their commitment to adopt "science-based targets" to mitigate climate change.

Capacity of Civil Society Organizations to Engage With Government

11. Since 2015, the number and type of civil society organizations that engage with the central government on climate policy has not significantly changed. What has slightly changed is the nature of partnerships. Also, there are emerging signals that the Foundation's approaches have helped establish or strengthen platforms for sharing information and that grantees' capacity to engage with decision-makers and assist with policymaking is increasing.

Progress Toward the Foundation's Desired Outcome

In 2018, there was no significant change in the diversity of civil society organizations engaging with the Government on climate policy. The indications that progress is being made toward the Foundation's desired outcome of increasing civil society organizations' capacity to engage with the Government of India on climate policy include: 1) central and state government look to civil society organizations as stakeholders and partners in the policymaking processes,

[60] The National Institution for Transforming India, also called NITI Aayog, was formed in January 2015. It is a policy think tank of the Government of India, established with the aim to achieve Sustainable Development Goals and to enhance cooperative federalism by fostering the involvement of State Governments of India in the economic policymaking process. For more information, visit https://niti.gov.in/.

2) civil society organizations' recommendations are incorporated into government-proposed national and international climate policies, and 3) a broader base of organizations participate in advocacy efforts around climate solutions.

According to those interviewed, the extent to which civil society organizations are working on climate change, policy, and whether they are viewed as partners of the Government decreased slightly, but not to a substantive degree. Also, there was no change in terms of the civil society organizations identified as the "most influential" on climate policy. Most are based in New Delhi and all but one of the top-12 are the Foundation's grantees.[61] There were signs that the Ministry of Environment, Forest and Climate Change increasingly recognizes the importance of civil society organizations providing data and analysis. For example, in 2018, the process of preparing the Biennual Update Report was more consultative, transparent, and robust than in previous years. Also, the Ministry launched a process for preparing India's 2050 climate strategy that involved a variety of civil society organizations, think-tanks, and research institutes.

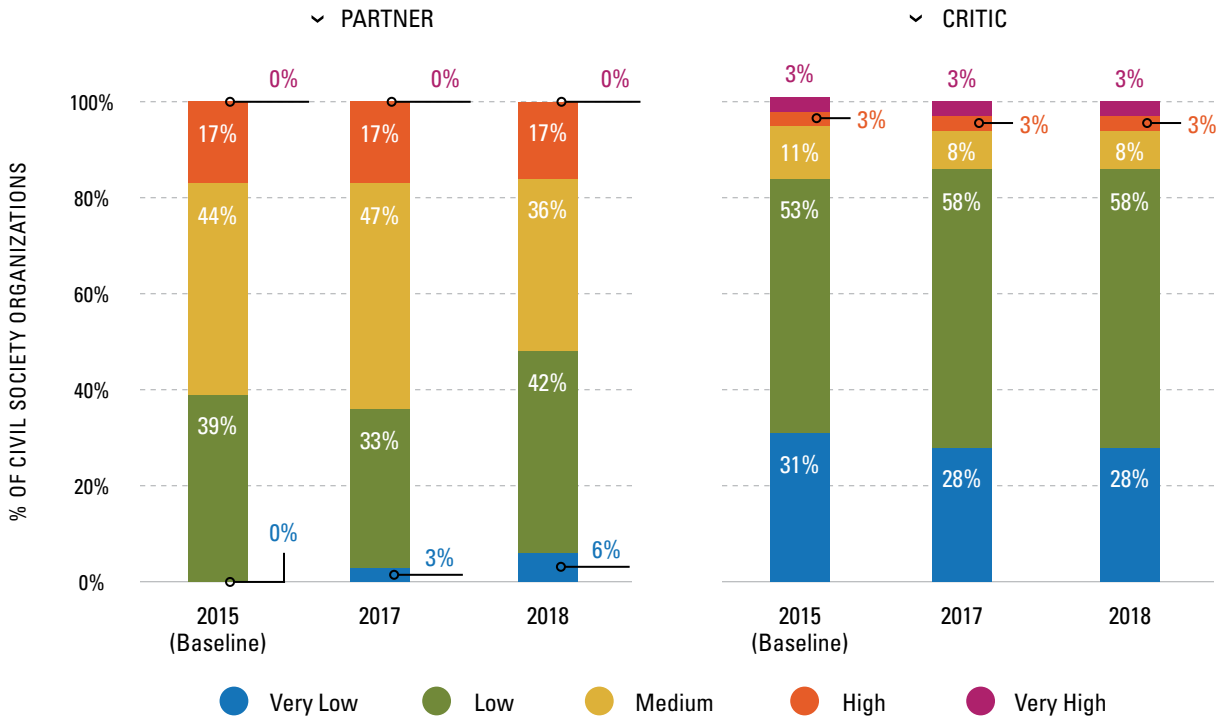

Figure 46: *Percentage of "Major" Civil Society Organizations in India Perceived as Partners or Critics by Key Informants*

[61] Our assessment reflects qualitative data collected from discussions with "key informants," including grantees and non-grantees who took part in full-day workshop-style discussions and interviews with government stakeholders facilitated by Oxford Policy Management, focusing on the Foundation's desired outcomes and discussing in detail some of the political and economic factors surrounding them.

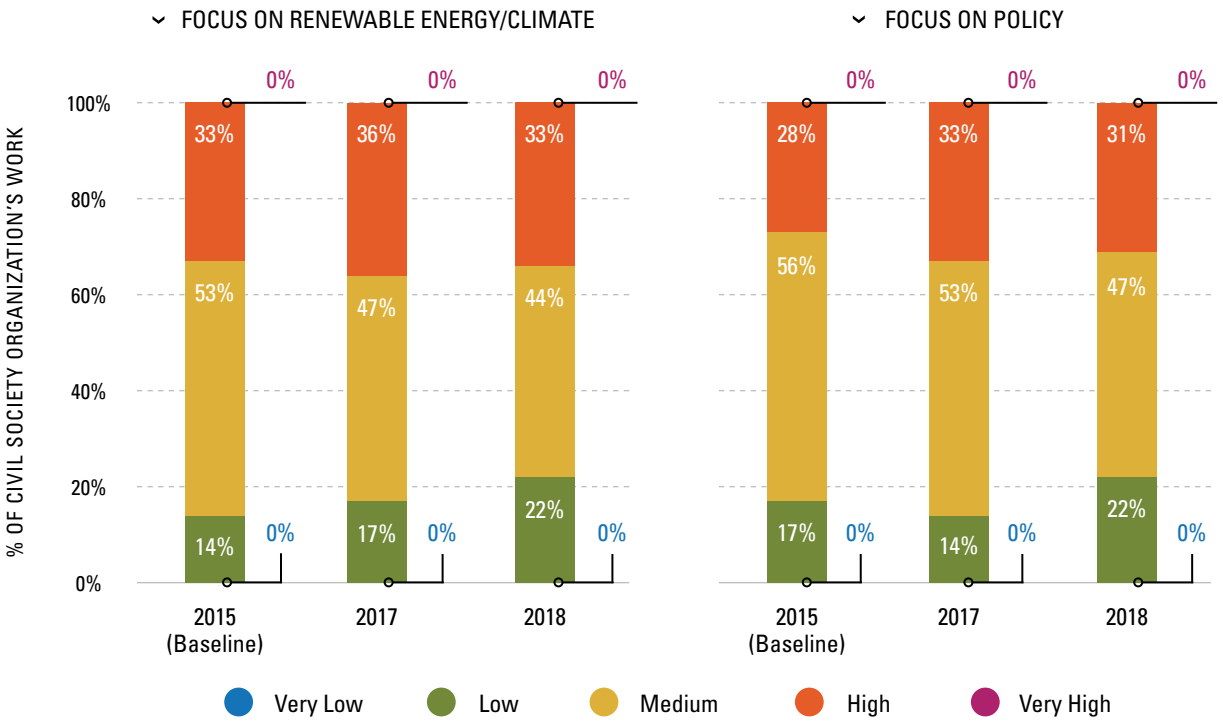

Figure 47: *How "Major" Civil Society Organizations Were Rated by Key Informants*

Changes in the Landscape that Affected Progress

In 2018, there were some developments in the broader social, political, and economic contexts that affected the nature and extent to which civil society organizations could engage with and inform the national climate policymaking process. Examples are included in the bullets below.

- Air quality is one of the few issues where civil society organizations could play an agenda-setting role. The combination of media coverage and pressure from civil society helped ensure that air quality was taken more seriously by the Government of India.
- NITI Aayog is now established as the Government of India's "think tank." By 2018, NITI Aayog showed its ability to convene various stakeholders and champion new ideas (particularly regarding Sustainable Development Goals and data transparency). Despite NITI Aayog's influence with the Prime Minister's office, we saw evidence of a disconnect with line ministries responsible for implementation.
- The Ministry of Finance has more influence over the power sector and civil society organizations have less compared to previous years. The financial stress of the power sector meant the Ministries of Power and Finance were focused on a narrow set of issues. In this environment, it was harder for civil society organizations to engage with these Ministries to advance climate agendas.

Contribution of the Foundation's Work

In 2018, grantees helped to forge or nurture partnerships with a variety of actors, and we see signals that the grantees' own capacity to engage with and educate central and state governments increased. Since the launch of the Climate Solutions Big Bet, the Foundation has provided significant support for activities aimed at increasing

civil society organizations' capacity to engage with the central and state governments on climate policy. To achieve its desired outcomes, the Foundation supports approaches to broaden the climate solutions coalition and improve partnership and advancing climate-friendly policies and regulatory action.

As noted in the previous Findings, grantees helped establish and strengthen multiple platforms for sharing learning, informing policy, and nurturing partnerships, including:

- One organization's work on the Nationally Determined Contribution roadmap increased the quality of their relationship with the Ministry of Environment, Forest and Climate Change and other departments that struggled to connect energy efficiency programs with climate mitigation targets. The organization's work helped foster trust among decision makers in the Ministry, the Bureau of Energy Efficiency, and several state departments.
- The Climate Solver program expanded and laid the foundation for a community of practice for climate innovators that can be linked to global networks.
- The number of aggregators participating in the Green Power Market Development Group grew and more partnerships were built with other climate-focused organizations.
- A variety of grantees assisted the Ministry of Environment, Forest and Climate Change to prepare the Biennual Update Report. Previous reports to the United Nations Framework Convention on Climate Change reflected input from civil society and consultants, but the Ministry was even more open about this relationship in 2018. The process to develop the Biennual Update Report was widely seen as more participatory, robust, and transparent. There was a new leadership team formed within the Ministry that recognized the value of bringing civil society organizations on board for their substantive inputs and to foster shared ownership of the output.

There were other signs that grantees engaged in new and more effective ways with each other, climate supporters, and policymakers. For example, one organization put its energy economic modeling to use to help build an open-source power sector model. In another instance, a grantee's communication and public outreach work improved as a result of the grant, including pioneering a Hindi/English blog series. One single blog received 9,664 views—the most viewed page of that organization's website ever. On average, people are spending approximately four minutes on each post. The blog created spill-over effects in the way other teams within the organization are embracing communications tools.

Findings: Impacts

Broadened and Deepened Participation in Climate Solutions, Trajectory of Emissions, and Carbon Intensity of Economies

12. Recent progress in the U.S. and India to deepen participation in climate solutions, lower or level off emissions, and transform from high to low carbon economies has been mixed. Despite some notable state-level successes in 2018—some of which the Foundation's approaches have contributed to in a positive way—the U.S. does not currently appear poised to exceed its emissions reductions targets.

Recent developments in India are encouraging. The International Solar Alliance remains a high priority for the Government of India, signaling climate leadership to the rest of the world. Also, the Government has so far fulfilled its obligations to the United Nations Framework Convention on Climate Change, and the Foundation's grantees contributed to the preparation of the Biennial Update Report.

Progress Toward the Foundation's Desired Outcome

Coal continued to decline in the U.S. and strides were made to address methane emissions. The most recent data available from the World Bank show that the carbon intensity of the U.S. economy is going down (in 2014, it was 0.3kg PPP $ of GDP, and we do not have updated figures since the launch of the Climate Solutions Big Bet). At the same time, as noted in the previous findings, the long-term downward trend in overall U.S. emissions showed signs of reversing in 2018.

India's Biennial Update Report, published in 2018, described a decrease in emissions intensity by 21% between 2005 and 2014. The Biennial Update Report also stated that India would meet both its Copenhagen and Paris commitments. India's total greenhouse gas emissions have increased from 2.136 billion tonnes of CO_2 equivalent in 2010 to 2.607 billion tonnes of CO_2 equivalent in 2014, which was prior to the launch of the Foundation's work in India.[62] However, given India's development growth trajectory, this is in line with projections and the Foundation's desired impact of leveling off emissions while meeting development goals.

To assess progress toward the Foundation's desired impacts in the U.S. and India, we are tracking the trajectory of greenhouse gas emissions in each country, whether the two countries exceed their emissions goals, and changes in the carbon intensity of their economies. At the initiative level, to understand the ultimate contribution of the Foundation's work, we are tracking treaties international forums, and multilateral agreements on climate as indications that global participation in climate solutions is broadening and deepening. This includes tracking the implementation of the 2015 Paris Accord.

The U.S.'s role at the 24th Conference of the Parties (COP24) reinforced concerns about the country's effect on other nations and its ability to meet its emissions reduction targets. In December 2018, COP24 took place in Katowice,

[62] Figures reported in the Biennial Update Report are sourced from the Government of India's national greenhouse gas inventory. Emissions data we are tracking that appears in Appendix A are from the World Bank, which sources its numbers from the Carbon Dioxide Information Analysis Center, an organization within the U.S. Department of Energy.

Poland and one of the main goals of the meeting was to establish a "rulebook" to guide implementation of the Paris Accord.[63] Two sets of reports influenced the tenor of the discussions in Poland. The United Nations Framework Convention on Climate Change invited the Intergovernmental Panel on Climate Change "to provide a special report in 2018 on the impacts of global warming of 1.5 C above pre-industrial levels and related global greenhouse gas emission pathways." The report found that nations must take "unprecedented" actions and cut their emissions in half by 2030 to prevent the worst consequences of climate change.[64] A trio of scientific papers by researchers with the Global Carbon Project also found that global emissions grew 1.6 percent in 2017 and were projected to rise by 2.7 percent in 2018.[65] At COP24, the U.S. undermined efforts to embrace the reports' warnings. It joined Saudi Arabia, Russia, and Kuwait in refusing language "welcoming" the Intergovernmental Panel on Climate Change's report. Instead, the U.S. and these nations pushed a proposal to "note" it and thereby discount its findings.[66]

By the end of COP24, delegates agreed on a series of rules guiding how countries will monitor and report their greenhouse gas emissions, the efforts they are taking to reduce them, and how they will update their emissions plans. However, the overall lack of ambition and urgency was widely criticized. Largely absent from the talks was discussion about how countries will step up their efforts to cut emissions by 2020. That year marks the deadline for countries to show they have met their emissions targets and to affirm new, much more ambitious targets. In addition, developing nations continued to voice concerns about fairness (i.e., being compelled to address rises in carbon emissions that developed nations disproportionately caused). These countries secured assurances for financial support to pay for mitigations of, adaptations to, and damages from climate change, but the promised contributions remained short of the $100 billion target. Several unresolved issues, including provisions on a global carbon market mechanism, were punted to the next round of talks.[67]

In 2018, there were two bright spots. The first is the International Solar Alliance, which is comprised of more than 122 countries and initiated by India.[68] The other is the Kigali Amendment to the Montreal Protocol, which will bring about a global phase-down of HfCs. After ratification by 65 countries, the Amendment continued to move forward in 2018 and took effect in January 2019. The goal is to achieve a more than 80% reduction in consumption of HfCs by 2047. If successful, the Amendment will help avoid an up to 0.5 degrees Celsius increase in global temperature by the end of the century. The Trump Administration has not submitted the Amendment to the Senate for a vote but has said it will not undercut the international process and previous U.S. commitments.

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[63] The main aim of the Paris Accord is to strengthen the response to climate change by keeping global temperature rise to "well below 2 degrees Celsius" and "to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius."

[64] United Nations Framework Convention on Climate Change. "IPCC Special Report on Global Warming of 1.5 C." https://unfccc.int/topics/science/workstreams/cooperation-with-the-ipcc/ipcc-special-report-on-global-warming-of-15-degc#eq-1

[65] R B Jackson, C Le Quere, R M Andrew, J G Canadel, J I Korsbakken, Z Lui, G P Peters, and B Zheng. "Global energy growth is outpacing decarbonization." Environmental Research Letters, Vol. 13. No. 12. December 5, 2018. https://iopscience.iop.org/article/10.1088/1748-9326/aaf303/meta

[66] Chemnick, Jean. "U.S. stands with Russia and Saudi Arabia against science." E&E News. December 10, 2018. https://www.eenews.net/stories/1060109127

[67] Prior to COP24, in September 2018, the Bangkok Climate Change Conference took place. Climate negotiators met to discuss the framework for continued implementation of the Paris Accord. They wrestled with challenges surrounding the plan for developed countries to spend $100 billion a year to finance projects in the developing world. Climate advocates said that a coalition of countries led by the U.S. was "roadblocking" negotiations related to financing the commitments outlined in the Paris Accord. The Bangkok meeting fell short of its aim to help prepare and adopt a completed text that could be presented at the 24th session of the Conference of Parties to the United Nations Framework Convention on Climate Change. https://www.theguardian.com/environment/2018/sep/10/limited-progress-at-bangkok-climate-talks

[68] The International Solar Alliance's vision and mission is to "provide a dedicated platform for cooperation among solar resource rich countries where the global community, including bilateral and multilateral organizations, corporates, industry, and other stakeholders, can make a positive contribution to assist and help achieve the common goals of increasing the use of solar energy in meeting energy needs of prospective ISA member countries in a safe, convenient, affordable, equitable and sustainable manner." More information is available at http://isolaralliance.org/Index.aspx.

Changes in the Landscape that Affected Progress

Broader changes in the landscape that could affect progress toward the Foundation's desired impacts and the trajectory of global greenhouse gas emissions included other international agreements. In April 2018, the International Maritime Organization approved the world's first broad agreement to cut worldwide greenhouse gas emissions from ocean shipping with the hope of phasing emissions out entirely. Currently, emissions from shipping companies are projected to rise 250% by 2050 due to 90% of global trade in goods travels by ships heavily fueled by oil. Under the new agreement, companies would be required to reduce their greenhouse gas emissions by 50% by 2050. Shipping is not included in the Paris Accord, and this represented the first time that CO_2 from ships at sea would be regulated. Climate advocacy groups welcomed the move as a long overdue step but called it insufficient, noting that the agreement is a political, not a legal, document. Those criticisms proved accurate when the agreement stalled, and the industry failed to approve emission reduction measures in October 2018.[69]

Aviation, along with shipping, is also not part of the Paris Accord. It currently accounts for two percent of global emissions linked to climate change and is growing rapidly. In June 2018, the International Civil Aviation Organization adopted standards requiring airlines to monitor, report, and verify their emissions. The standards will support the implementation of the International Civil Aviation Organization's Carbon Offset and Reduction Scheme for International Aviation which aims to increase fuel efficiency by two percent per year and stabilize CO_2 emissions at 2020 levels. Based on expected participation, it is estimated the plan will offset around 80% of the emissions above 2020 levels. Climate advocates expressed concern over a last-minute addition to the standards pushed by Saudi Arabia to allow conventional fossil fuels to be recognized alongside sustainable aviation fuels, if they could demonstrate at least a 10% reduction in life cycle CO_2 emissions. The new regulations go into effect on February 28, 2019.[70]

Contributions of the Foundation's Work

Establishing a strong connection between the Foundation's work and its desired long-term impacts in each country-specific context and at the overall initiative level is difficult (if not impossible). That said, the Foundation's work in the U.S. and India are having a positive incremental effect within a broad ecosystem of climate actors. In the U.S., the Foundation and its grantee partners influenced the closure of coal-fired power plants and helped states adopt CO_2 and methane emissions policies in the absence of federal regulations, and much more. Taken together, the approaches the Foundation supports in the U.S. are contributing to a more favorable trajectory of CO_2 and other greenhouse gas emissions and positive changes in the carbon intensity of the U.S. economy by mitigating federal inaction, and as noted in the examples provided in Finding 1, preventing further backsliding on environmental protections. The Kigali Amendment to the Montreal Protocol is also supported by the Foundation. In 2018, the Foundation continued to work with other climate funders in support of a global phase-down of HfCs through the Kigali Cooling Efficiency Program. Philanthropy's contribution of up to $52 million will help improve the energy efficiency of cooling and refrigeration equipment, lower cooling demand while improving access to cooling technology in developing countries, and to promote market innovations to spur adoption of climate-friendly coolants.[71]

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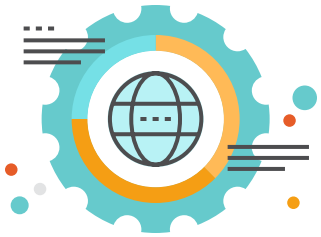
[69] McKenna, Phil. "An Ambitious Global Effort to Cut Shipping Emissions Stalls." Inside Climate News. October 26, 2018. https://insideclimatenews.org/news/26102018/shipping-emissions-heavy-fuel-oil-greenhouse-gases-imo-agreement-international-maritime-organization

[70] Vedder Price. ICAO CORSIA Update: Compliance Complexities Under ICAO's New Carbon Offsetting Scheme. December 2018. https://www.vedderprice.com/icao-corsia-update-compliance-complexities-under-icao%E2%80%99s-new-carbon-offsetting-scheme

[71] Source: Kigali Amendment to Montreal Protocol: For Information Paper Prepared for the Board of Directors. MacArthur Foundation, June 2017.

In India, it is too soon to report on the contribution of the Foundation's work toward its desired impacts of leveling off emissions, deepening participation in climate solutions, or transforming the Indian economy from high carbon to low carbon. As noted in Finding 9, the grantees had a hand in contributing to energy savings (e.g., through the deployment of clean technology) but the exact amount is difficult to quantify. For the most part, many of the grantees' activities are having an effect that will not be clear from an impact standpoint for some time.

5 | Conclusion



The pathway to ensuring that global temperature rise stays well below two degrees Celsius over pre-industrial levels is based on the premise that if the U.S., India, and China exert global leadership on climate change, then other nations will be compelled to act. The development of the Climate Solutions Big Bet: 2018 Annual Report provided an opportunity to reflect on the relevance of the Foundation's theory of change. To conclude, what follows is Grassroots Solutions' and M+R's interpretation of the implications as well as recommendations for the Foundation, its grantees, and other collaborators to consider.

Implications for the Foundation's Theory of Change

Based on our analysis of the data collected and tracked in 2018, most aspects of the Foundation's approaches and its theory of change still appear sound and relevant. The data examined affirm continued focus on promoting leadership in the U.S., India, and China to achieve the Foundation's desired long-term impacts and outcomes. At the same time, although several trends we are tracking are headed in the right direction (and the Foundation's approaches have had positive effects), in 2018, the pace of progress continued to not match the Foundation's stated ambitions, the starkness of the challenge outlined in the Intergovernmental Panel on Climate Change report, or the hoped-for progress toward the outcomes the Foundation has identified to demonstrate leadership. In 2018, changes in conditions across much of the globe's land and ocean surfaces continued. According to the National Aeronautics and Space Administration, in 2018, the average temperature across global land and ocean surfaces was 1.48 degrees Fahrenheit (0.82 degrees Celsius) above the 20th century average. 2018 was the warmest year since 1880, while 2015, 2016, and 2017 collectively represent the warmest years in the modern record.[72] In 2018, we generally see steady— rather than "breakout" or "transformative"—changes in the U.S. and India.

After the Trump administration announced the U.S.'s withdrawal from the Paris Accord, and an overall retreat from global leadership on climate change, there was hope that India and China would step in to fill some of the void. Both countries have made efforts. For instance, an example of leadership is the International Solar Alliance, which is comprised of more than 122 countries and was initiated by India. Also, two of the major Indian political parties, the Congress Party and the Bharatiya Janata Party, issued platforms addressing climate change and the environment. China announced large-scale clean energy demonstration projects, especially solar and nuclear, and opening of its carbon market.

At the same time, due to a variety of domestic economic and political challenges, leadership from India and China will likely not be enough to fill the global leadership void left by the U.S. to achieve the desired impacts in the timeframe laid about by the science. The Chinese government is facing a slowing economy—2018 was its slowest

[72] Source: The National Aeronautics and Space Administration. 2018 Fourth Warmest Year in Continued Warming Trend, According to NASA, NOAA. February 6, 2019. https://www.nasa.gov/press-release/2018-fourth-warmest-year-in-continued-warming-trend-according-to-nasa-noaa

year of economic growth in 28 years.[73] India is still struggling to get to full electrification for its citizens, which is a key metric of economic development. These domestic issues could force the governments to abandon or scale back decarbonization plans and replace them with more carbon intensive ways to achieve their development goals. Moreover, India and China are also grappling with issues with other countries that could draw political attention away from climate change mitigation. For China, it is unclear how trade talks with the U.S. will end. If there is no resolution to the "trade war" between the two countries, it could negatively affect China's economy. In India, if the tensions between India and Pakistan boil over into a conflict, that could further draw the Indian government's attention away from the implementation of climate policies.

In 2018, the Trump administration's actions fostered mounting uncertainty about the country's ability to meet its emissions reduction targets. In response, the Foundation funded defensive efforts to enforce domestic environmental protection laws and strengthened its support for proactive subnational activities. While the U.S. can continue to make progress through the actions of subnational players and through the private sector, action at the federal level is still necessary to advance climate solutions at scale. The commitments and efforts by almost half of the states, including some of the states with the highest emissions, will not be sufficient to meet the U.S.'s Nationally Determined Contribution under the Paris Accord. Gains to increase renewable energy deployment and steps to curb other greenhouse gases are positive, but not enough. Overall emissions are not decreasing at a fast-enough rate and reductions appear to be stalling. The Foundation's support for legal defense in response to the Trump administration's rollback of existing climate and environmental protections have helped prevent further backsliding, but legal defense protects the status quo. It does not create the momentum necessary to advance the types of ambitious solutions called for by scientists and policy experts to ensure that global temperature rise stays well below two degrees Celsius.

Recommendations for Consideration

Based on the findings outlined in this report and changes in the social, economic, and political contexts in the U.S., India, and China in mind, we believe it is a strategically significant moment to explore with grantees what constitutes enough progress and urgency. We do not see evidence to suggest that a focus on the three countries is misguided, but what grantees are collectively working toward and the duration of some grants—especially in India—may warrant reexamination, with a lens of supporting more innovation and transformative, as opposed to incremental, changes. In addition, the Foundation supports diverse and varied activities to achieve its desired outcomes in each country-specific context. Although there are no "silver bullets," we believe it is worth exploring how more cohesion and focus among subsets of the Foundation's portfolio could help the Foundation and its grantees advance more ambitious aims.

The Foundation's grantees are well positioned to help identify or revise umbrella goals, timelines, messaging, and targets for each approach and its associated outcomes. The Foundation can also encourage (or require) grantees to be more ambitious and measure success in terms of shifting structures and systems that will catalyze more transformative, longer-term results. Obviously, some of the biggest barriers to achieving more ambitious results

[73] CNBC, "China's economy grew 6.6% in 2018, the lowest pace in 28 years." January 20, 2019. https://www.cnbc.com/2019/01/21/china-2018-gdp-china-reports-economic-growth-for-fourth-quarter-year.html

have deep-rooted, highly political or cultural dimensions. For example, in India, the electricity tariff regime is a key barrier to promoting energy efficiency. Progress would require addressing a complicated set of political, economic, and social factors. The challenge of scaling-up the level of ambition, therefore, raises some important questions about how, and on what issues, the MacArthur Foundation can be most supportive. With that said, we believe that a participatory process with the Foundation's grantees to collaboratively identify transformative changes the Foundation can support and to refine the methods of assessing progress and the contribution of the Foundation's approaches in each country-specific context is worthwhile.

Some other specific recommendations for the Foundation to consider in tandem with its grantees to promote each country's climate leadership are as follows.

Recommendations for the U.S.

- Capitalize on where there is momentum among candidates, policymakers, and the public and align activities to alter political discourse around one of the highest-impact narratives (e.g., "Defining Challenge of Our Time"). Then work to infuse that narrative with solutions that have the greatest potential to reduce emissions and transform the U.S. economy.
- At the state level, identify a narrower set of geographic states and regions to focus on that are ripe to advance transformative climate solutions that could have positive spillover effects and because of their potential federal-level importance.

Recommendations for India

- Concentrate on building on the most promising initial gains and ensuring follow-through as opposed to broadening the array of climate solutions supported. For example, the development of the State Energy Efficiency Index is a very positive step. To further its impact, states need to feel under pressure to improve their scores.
- Identify—if there is appetite—structural barriers to tackle that are currently impeding transformative change. For example, rather than supplementing capacity within a government agency or decision-making body with the work of non-governmental organizations, work to grow the leadership capacity within those agencies.
- Support more grassroots efforts that can help connect climate change to high-profile challenges such as the agrarian crisis.
- Provide grants that are longer-term in duration, or if that is not possible, a smaller number of large grants.

A Note about the Dynamic Nature of the Landscape

Finally, as we noted in the introduction, the climate field and conditions in each country are dynamic and constantly changing. For example, the recent elections in India returned Prime Minister Modi and his ruling Bharatiya Janata Party to power, signaling a continuation of the Prime Minister's climate commitments. In the first quarter of 2019 in the U.S., there has been a significant uptick in climate-related discussion among policymakers and efforts to advance climate policies and regulatory action. The Democratic majority in the House of Representatives is approaching the issue with increased urgency. In the first 64 days of the new Congress, House Speaker Nancy Pelosi reinstituted a special select committee on climate and various congressional committees scheduled at least 15 hearings explicitly

on the causes and effects of climate change and potential responses. The Green New Deal, a congressional resolution that lays out an aggressive proposal for tackling climate change, has had an immediate impact on the public and policymaker discourse and could signal steps to take future action at the federal level. We noted earlier that candidate and policymaker discourse dedicated to climate change in 2018 remained small. Over the coming year that may change. Eight declared candidates for the Democratic nomination have already endorsed the Green New Deal, injecting climate squarely into the 2020 Presidential race.

In addition, in early 2019 we have observed an uptick in the advancement of climate-friendly policies at the state level, which is something that the Foundation has supported. In New Mexico, Governor Michelle Lujan Grisham signed the historic Energy Transition Act, which would make the state 100 percent zero-carbon by 2045. In Nevada, bills to increase renewables and achieve zero carbon emissions by 2045 passed the legislature and were signed into law by the Governor. In Maryland, a bill that would require that the state get 50 percent of its energy from renewable energy sources by 2030 has passed the legislature and is now law. The state legislature is also pursuing a grant program to help school districts adopt a zero-emissions school bus fleet. In Colorado, a bill that would drastically reform the state's oil and gas industry to protect public health and safety has passed and been signed by the Governor. The Governor also signed a bill that commits the state to a series of greenhouse gas emissions reductions, including a 50 percent cut by 2030 and a 90 percent cut by 2050. In Washington, the legislature passed, and Governor Jay Inslee signed, legislation that would require utilities to quit coal by 2025 and mandate 100 percent clean energy by 2045. And Oregon is poised to pass a cap and invest plan joining California's carbon market. While the final fate of these proposals will not be known until the end of each legislative session, the increased activity is promising and shows sub-national players aggressively stepping up to try and fill the policy void created by federal level inaction or regression.

Again, these examples serve as illustrations of how quickly things can evolve. We will continue to track and document progress and changes in the landscape to help the Foundation and its grantee partners make strategic decisions and consider refinements to further capitalize on, amplify, and complement areas where we see momentum.

Appendix A: Data Points Tracked

Associated with the impacts and outcomes are a variety of measures that we are using to assess progress toward the Foundation's desired impacts and outcomes and how the approaches undertaken are contributing to promoting leadership and climate solutions. Following is a list of data points tracked through 2018 for the overall Climate Solutions initiative, the U.S., and India since baselines were established (2012 for the U.S. and 2015 for India).

Impact Measures

EMISSIONS: Lowered the trajectory of global greenhouse gas emissions

- 1.A.1.1 Change in global surface temperature (in Celsius)
- 1.A.1.2 Atmospheric CO_2 levels (in parts per million based on the last measurement of the year)
- 1.A.1.3 Change in sea level (in millimeters based on the last measurement of the year)

	2012	2013	2014	2015	2016	2017	2018
Change in Global Surface Temperature (relative to 1951-1980 average)	0.63	0.65	0.74	0.87	0.99	0.9	0.82
Atmospheric CO_2 Levels	395.09	397.62	399.62	402.56	405.6	407.46	409.07
Change in Sea Level	70.6	69.1	75.7	85.6	86.1	86.8	87.9*

** As of September 2018*

Source: *National Aeronautics and Space Administration (NASA) Statistics, https://climate.nasa.gov/vital-signs/global-temperature/*

- 1.B.1 CO_2 emissions (in million metric tonnes)

	2012	2013	2014	2015	2016	2017	2018
World Emissions*	35,470.89	35,837.59	36,138.29	-	-	-	-
U.S. Emissions**	5,366.7	5,159.6	5,568.8	5,420.8	5,310.9	-	-
India Emissions*	2,018.50	2,034.75	2,238.38	-	-	-	-
China Emissions*	10,028.57	10,258.01	10,291.93	-	-	-	-

* **Source:** *World Bank, https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?end=2014&locations=CN-IN-US-1W&start=1990&view=chart*

** **Source:** *U.S. Environmental Protection Agency, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016*

CARBON PRICING: Transformed economies from high carbon to low carbon

- 2.A.1 Changes in the carbon intensity of global economy (in billions of U.S. dollars)

	2012	2013	2014	2015	2016	2017	2018
U.S.	$40.6	$35.3	$37.0	$44.1	$43.1	$40.5	-
India	$7.8	$6.6	$8.3	$10.2	$13.7	$10.9	-
China	$61.7	$62.0	$87.8	$102.9	$96.9	$126.6	-
Global	$257.3	$234.0	$273.0	$285.9	$274.0	$297.8	-

Source: *Frankfurt School-United Nations Environment Programme, https://resources.solarbusinesshub.com/solar-industry-reports/item/global-trends-in-renewable-energy-investment-2018*

- 2.A.2 Carbon intensity per Gross Domestic Product for G20 member nations (in kilo tonnes of CO_2 per billion 2005 U.S. dollars)

	2012	2013	2014	2015	2016	2017	2018
Argentina	75.97	76.23	75.38	-	-	-	-
Australia	62.09	59.29	57.12	-	-	-	-
Brazil	53.35	54.92	57.02	-	-	-	-
Canada	55.57	55.31	54.54	-	-	-	-
China	221.91	214.48	201.12	-	-	-	-
France	19.28	19.38	17.68	-	-	-	-
Germany	61.98	63.12	58.90	-	-	-	-
India	164.34	161.28	162.91	-	-	-	-
Indonesia	132.96	131.13	126.57	-	-	-	-
Italy	27.02	25.90	23.96	-	-	-	-
Japan	33.42	32.81	31.92	-	-	-	-
Mexico	53.15	50.63	48.86	-	-	-	-
Russia	224.93	220.68	213.52	-	-	-	-
Saudi Arabia	148.38	147.01	148.67	-	-	-	-

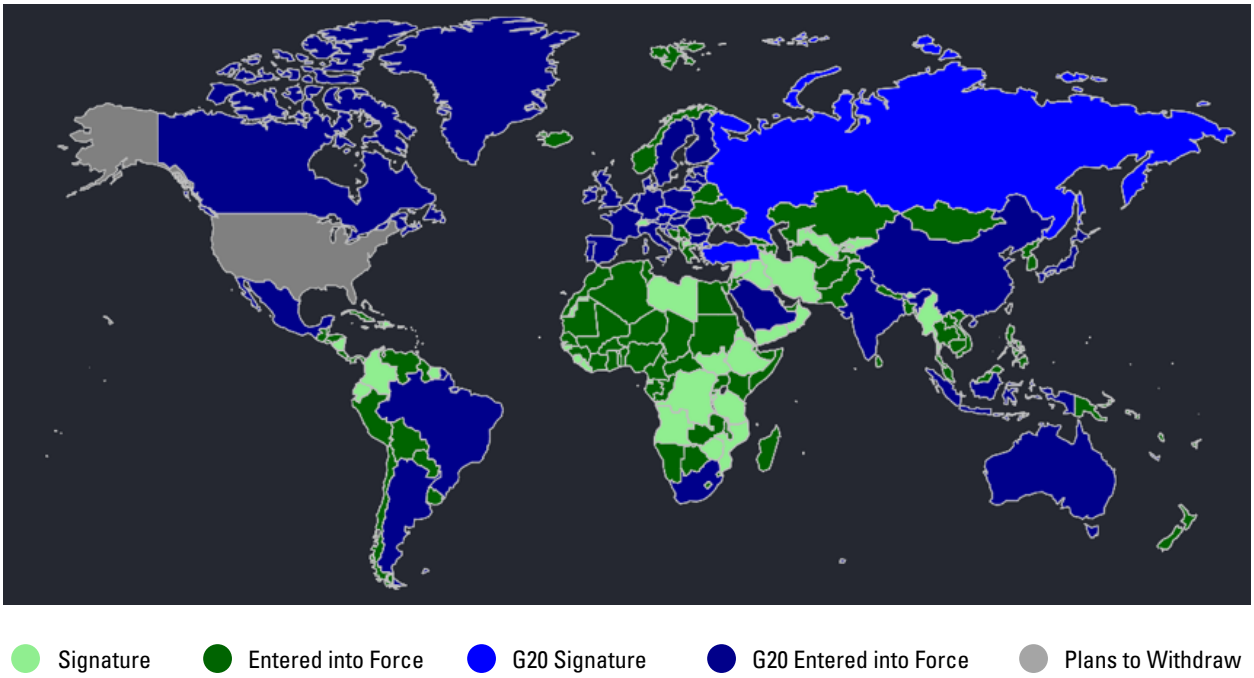
(continued next page)

	2012	2013	2014	2015	2016	2017	2018
South Africa	187.06	183.35	180.27	-	-	-	-
South Korea	70.65	69.66	68.77	-	-	-	-
Turkey	59.13	56.11	57.48	-	-	-	-
United Kingdom	24.82	23.95	21.81	-	-	-	-
U.S.	46.60	46.84	46.36	-	-	-	-
European Union	35.62	35.02	33.05	-	-	-	-

Source: *The Shift Project Data Portal, http://www.tsp-data-portal.org/Carbon-Intensity-of-GDP#tspQvChart*

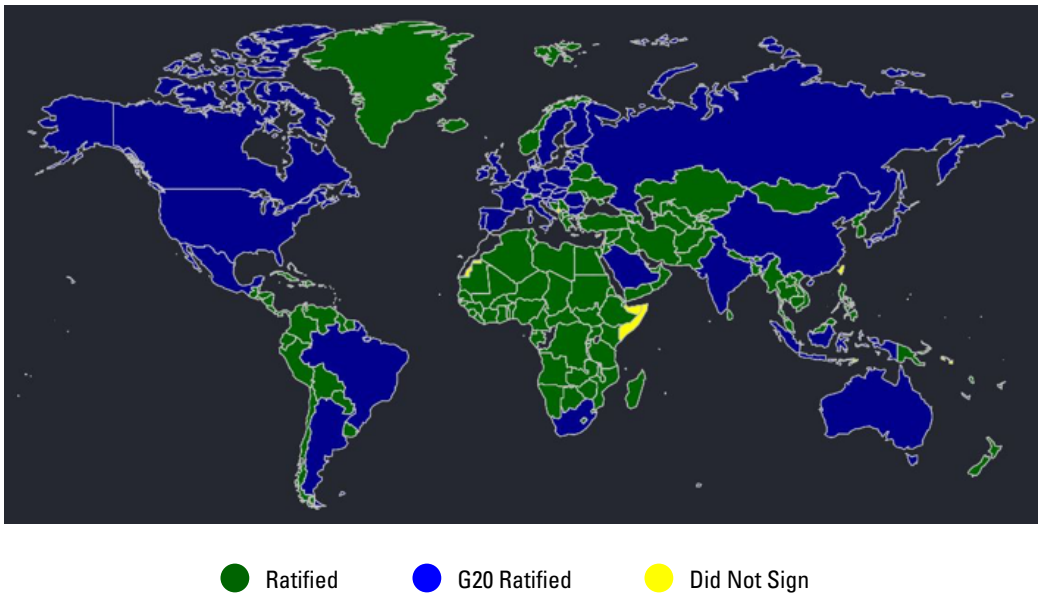
POLICIES/TREATIES: Broadened and deepened participation globally in climate solutions

- 3.A.1 Paris Accord



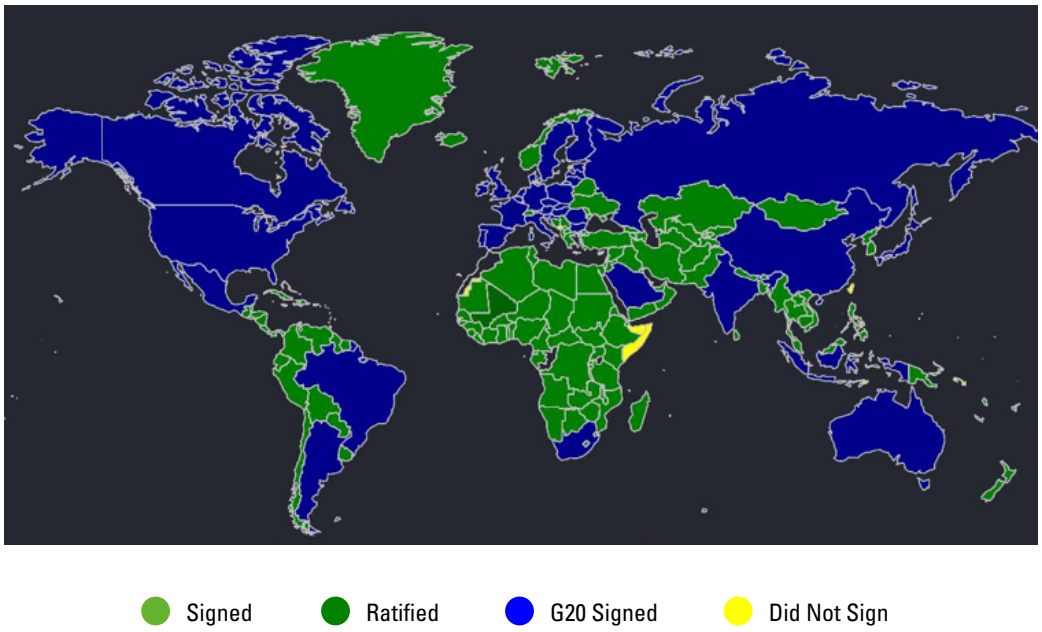
Source: *United Nations Framework Convention on Climate Change, https://unfccc.int/process/the-paris-agreement/status-of-ratification*

- 3.A.2 Montreal Protocol



Source: *United Nations Environment Programme, http://ozone.unep.org/en/treaties-and-decisions*

- 3.A.3 Kigali Amendment



Source: *United Nations Environment Programme, http://ozone.unep.org/en/treaties-and-decisions*

U.S. Outcome Measures

EMISSIONS: Reduced emissions of greenhouse gas pollutants and CO_2

- 1.a.1.1 U.S. Greenhouse gas emissions by gas (in million metric tonnes of CO_2 equivalent)

	2012	2013	2014	2015	2016	2017	2018
Carbon Dioxide	5,366.7	5,519.6	5,568.8	5,420.8	5,310.9		-
Methane	662.5	662.6	664.0	665.4	657.4		-
Nitrous Oxide	335.8	363.2	361.2	379.6	369.5		-
Fluorinated Gases	163.7	163.8	169.2	172.4	173.4		-

Source: *U.S. Environmental Protection Agency, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016*

- 1.a.1.2 Coal-fired power plants retired in the U.S.

	2012	2013	2014	2015	2016	2017	2018
Active Coal-fired Plants	649	642	635	623	589	564	488*
Cumulative Number of Plants Retired	57	80	100	142	183	193	-

** As of October 2018*

Source: *U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/*

- 1.a.1.3 Megawatts of coal-fired plants retired

	2012	2013	2014	2015	2016	2017	2018
Coal-fired Megawatts Retired (based on net summer capacity)	7,910.7	4,741.3	3,942.8	13,736.5	7,245.5	6,263.1	11,215.3*
Electricity Generated by Coal	1,514,043	1,581,115	1,581,710	1,352,398	1,239,149	1,207,901	956,561*

** As of October 2018*

Source: *U.S. Energy Information Administration, https://www.eia.gov/electricity/data.php#gencapacity*

- 1.a.1.4 CO_2 emissions (kilograms per 2010 U.S. dollars of Gross Domestic Product)

	2012	2013	2014	2015	2016	2017	2018
CO_2 Emissions	0.329	0.326	0.324	-	-	-	-

Source: *World Bank, https://data.worldbank.org/indicator/EN.ATM.CO2E.KD.GD?locations=US*

POLITICAL WILL: Built political will to advance climate solutions

- 2.a.1 Percent of candidate/policymaker discourse on climate change
- 2.a.2 Favorable and unfavorable discourse among candidates/policymakers
- 2.b Percent of public media conversation on climate change devoted to solutions

	2012	2013	2014	2015	2016	2017	2018
Percent of Candidate/ Policymaker Discourse on Climate Change	0.46%	0.58%	0.90%	1.06%	0.66%	0.97%	1.33%
Favorable Discourse	46%	40%	41%	38%	66%	73%	83%
Unfavorable Discourse	54%	60%	59%	62%	34%	27%	17%
Percent of Public Media Conversation on Climate Change Devoted to Solutions	18%	13%	12%	18%	16%	13%	13%

Source: *Protagonist*

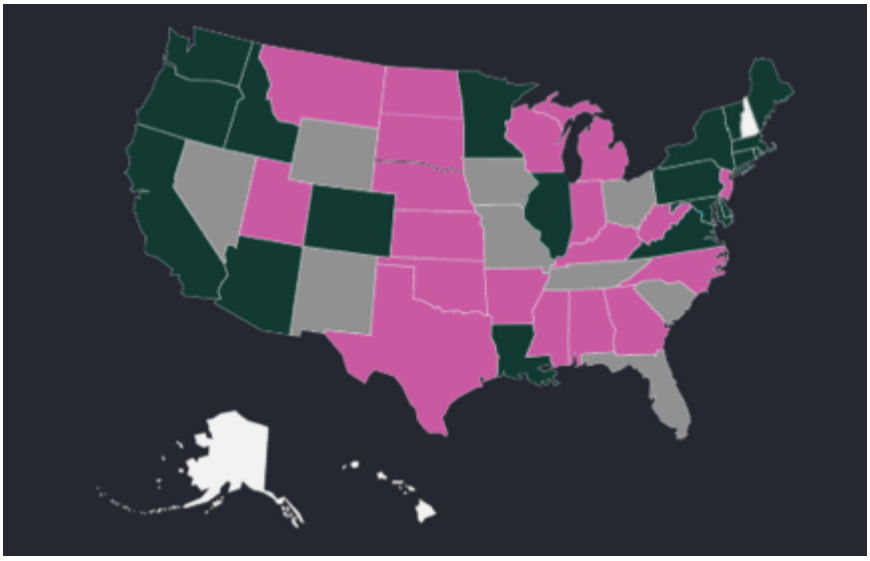
- 2.c U.S. Federal votes on energy and climate bills

	2012	2013	2014	2015	2016	2017	2018
Votes **Protecting** Clean Energy/Climate (Senate)	6	3	1	3	2	-	-
Votes **Harming** Clean Energy/Climate (Senate)	1	1	2	10	3	-	-
Votes **Protecting** Clean Energy/Climate (House)	1	2	0	1	7	-	-
Votes **Harming** Clean Energy/Climate (House)	16	12	18	12	10	-	-

Source: *League of Conservation Voters Scorecard, http://scorecard.lcv.org/scorecard?year=all*

POLICIES/TREATIES: Enforced environmental laws

- 3.b.1 Status of Clean Power Plan (CPP), 2016

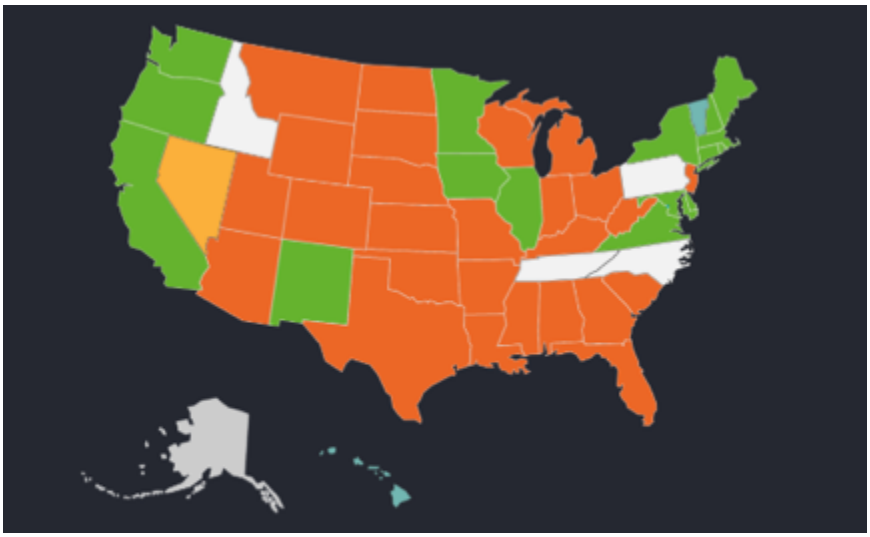


19 States: Suspending CPP Implementation

19 States: Continuing CPP Implementation

9 States: Assessing Whether to Continue CPP Implementation

Source: *E&E News, https://www.eenews.net/interactive/clean_power_plan#planning_status*



1 State: Exempt

26 States: Suing

16 States: Supporting

4 States: Not Suing

1 State: Opposing

2 States: Exempt and Supporting

Source: *E&E News, https://www.eenews.net/interactive/clean_power_plan#legal_challenge_status*

RENEWABLES AND CLEAN TECHNOLOGY: Increased deployment of renewable energy

- 4.a.1 Net Generation: All sectors (in thousand megawatt hours)
- 4.a.2 Net Generation: Renewables (in thousand megawatt hours)

	2012	2013	2014	2015	2016	2017	2018
Coal	1,514,043	1,581,115	1,581,710	1,352,398	1,239,149	1,205,835	-
Natural Gas	1,225,894	1,124,836	1,126,609	1,333,482	1,378,307	1,296,415	-
Nuclear	769,331	789,016	797,166	797,178	805,694	804,950	-
Conventional Hydroelectric	276,240	268,565	259,367	249,080	267,812	300,333	-
Wind	140,822	167,840	181,655	190,719	226,993	254,303	-
All Utility-scale Solar	4,327	9,036	17,691	24,893	36,054	53,286	-
Geothermal	15,562	15,775	15,877	15,918	15,826	15,927	-
Wood/Wood-derived Fuels	37,799	40,028	42,340	41,929	40,947	41,152	-
Other Biomass	19,823	20,830	21,650	21,703	21,813	21,610	-
All Solar	-	-	28,924	39,032	54,866	77,276	-
Small-scale Solar Photovoltaic Systems	-	-	11,233	14,139	18,812	23,990	-

Source: *U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/*

- 4.a.3 Percent of U.S. energy production from renewables and investment in clean energy deployment (in billions of U.S. dollars)

	2012	2013	2014	2015	2016	2017	2018
U.S. Energy Production from Renewables*	12.22%	12.84%	13.16%	13.35%	14.94%	17.02%	-
New Private Sector Investment in Clean Energy Deployment**	$40.60	$35.30	$38.40	$51.40	$46.40	$40.50	-

* Source: *U.S. Energy Information Administration*

** Source: *Frankfurt School-United Nations Environment Programme, https://resources.solarbusinesshub.com/solar-industry-reports/item/global-trends-in-renewable-energy-investment-2018*

- 4.a.4 Where Americans got their electricity, 2017 versus 2016 (in thousand megawatt hours)

	2016	2017	% Change
Coal	1,239,149	1,205,835	-2.8%
Petroleum Liquids	13,008	12,414	-4.8%
Petroleum Coke	11,197	8,976	-24.7%
Natural Gas	1,378,307	1,296,415	-6.3%
Other Gas	12,087	12,469	+3.1%
Nuclear	805,694	804,950	-0.1%
Conventional Hydroelectric	267,812	300,333	+10.8%
Renewable Sources	341,633	386,968	+13.4%
Wind	226,993	254,993	+11.7%
Solar	36,054	53,286	+32.3%
Wood/Wood-derived Fuels	40,947	41,152	+0.5%
Other Biomass	21,813	21,610	-0.9%
Geothermal	15,826	15,927	+0.6%
Hydroelectric Pumped	-6.686	-6.495	-2.9%
All Energy Sources	4,076,675	4,034,268	-1.1%

Source: *U.S. Energy Information Administration, https://www.eia.gov/electricity/data/browser/*

- 4.b U.S. production and investment tax credits (in billions of U.S. dollars)

	2012	2013	2014	2015	2016	2017	2018
Production Tax Credit	$1.6	$1.7	$1.5	$2.6	$3.4	-	-
Investment Tax Credit	$0.5	$0.5	$0.6	$1.2	$2.6	-	-
Combined Tax Credits	$2.1	$2.2	$2.1	$3.8	$6.0	-	-

Source: *Congressional Research Service, M. Sherlock, https://fas.org/sgp/crs/misc/R44852.pdf*

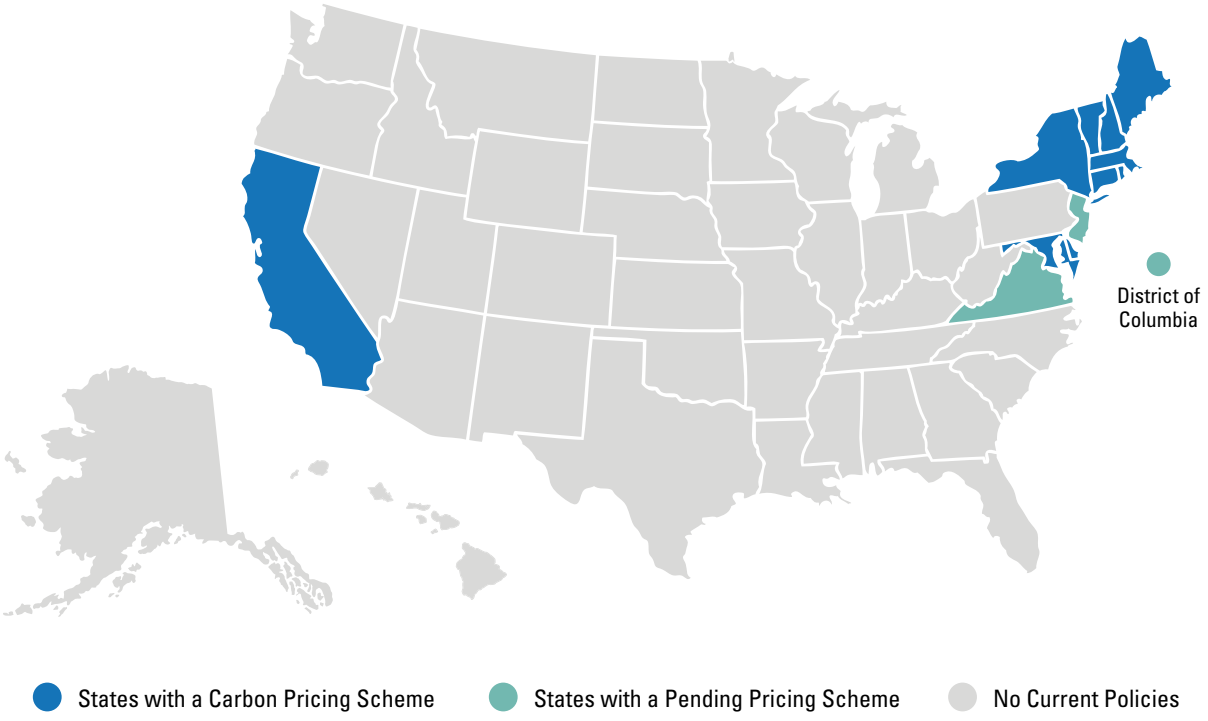
CARBON PRICING: Established board-based support for carbon pricing

- 5.a Carbon intensity of U.S. Gross Domestic Product (in kilograms of CO_2 per 2011 Purchasing Power Parity dollars of Gross Domestic Product)

	2012	2013	2014	2015	2016	2017	2018
Carbon Intensity of U.S. Gross Domestic Product	0.323	0.32	0.318	-	-	-	-

Source: *World Bank, https://data.worldbank.org/indicator/EN.ATM.CO2E.PP.GD.KD?end=2014&locations=US&start=1990&view=chart*

- 5.b State Carbon Pricing Policies



Source: *Center for Climate and Energy Solutions. "Market-Based State Policy." https://www.c2es.org/content/market-based-state-policy/*

India Outcome Measures

POLICIES/TREATIES: Increased civil society organization's capacity to engage with and affect the government's climate policies

- 1.a.1.1 Percent of major civil society organizations focusing on climate/renewable energy and policy

	2015	2016	2017	2018
Very High Proportion	0%	-	0%	0%
High Proportion	28%	-	33%	31%
Medium Proportion	56%	-	53%	47%
Low Proportion	17%	-	14%	22%
Very Low Proportion	0%	-	0%	0%

Source: *Oxford Policy Management Context Assessment*

- 1.a.1.2 Percent of major civil society organizations working on federal climate change policy that the Government of India see as a partner

	2015	2016	2017	2018
Very High Extent	0%	-	0%	0%
High Extent	17%	-	17%	17%
Medium Extent	44%	-	47%	36%
Low Extent	39%	-	33%	42%
Very Low Extent	0%	-	3%	6%

Source: *Oxford Policy Management Context Assessment*

- 1.a.1.3 Number of the most influential civil society organizations on climate change policy

	2015	2016	2017	2018
Major Civil Society Organizations on Climate Change Policy	36	-	36	-

Source: *Oxford Policy Management Context Assessment*

RENEWABLES: Catalyzed renewable energy production

- 2.a.1.1 Creation of renewable energy financing ecosystem (INR crore, 1 INR crore = $153,600)

	2015	2016	2017	2018
Gross Budgetary Support for Renewable Energy	246	-	-	-

Source: *Ministry of New and Renewable Energy Annual Report, https://mnre.gov.in/annual-report*

- 2.a.1.2 National Clean Energy Fund (INR crore, 1 INR crore = $153,600)

	2015	2016	2017	2018
Annual Budget	5,123	6,902	8,703	-
Annual Disbursement	5,234	6,902	0	-

Source: *Ministry of New and Renewable Energy Briefing Note, http://doe.gov.in/sites/default/files/NCEF%20Brief_post_BE_2017-18.pdf*

- 2.b.1.1 Total installed capacity for electricity generation based on renewable energy (from solar, wind, biomass, and small and large hydropower in megawatts)

	2015	2016	2017	2018
Total Installed Capacity for Electricity Generation based on Renewable Energy	80,215	93,206	107,346	77,898

Source: *Ministry of New and Renewable Energy Annual Reports, https://mnre.gov.in/annual-report*

- 2.b.1.2 Percent renewable energy in India's total Installed capacity electricity mix (not including large hydroelectric power)

	2015	2016	2017	2018
Percent of India's Total Installed Capacity for Electric Generation (Based on renewable energy, not including large hydroelectric power)	13.6%	14.8%	18.4%	21.2%

Source: *Ministry of New and Renewable Energy Annual Reports, https://mnre.gov.in/annual-report*

- 2.b.1.3 Total installed capacity for electricity on-grid by technology (in megawatts)

	2015	2016	2017	2018
Solar	4,879	9,012	17,052	24,312
Wind	25,088	28,700	32,848	34,986
Biomass	4,677	7,907	8,413	9,545
Small and Large Hydroelectric Power (Combined)	45,444	47,473	8,747	9,054
Waste-to-Energy	127	114	114	114

Source: *Ministry of New and Renewable Energy Annual Reports, https://mnre.gov.in/annual-report*

- 2.b.1.4 Total installed capacity for off-grid/captive power capacities (in megawatts)

	2015	2016	2017	2018
Total Installed Capacity for Off-grid/Captive Power Capacities	1,236	1,403	1,555	1,818

Source: *Ministry of New and Renewable Energy Annual Reports, https://mnre.gov.in/annual-report*

- 2.b.1.5 Total installed capacity for electricity off-grid/captive power capacities by technology (in megawatts)

	2015	2016	2017	2018
Waste-to-Energy	146	163	175	175
Biomass Congeneration, Gasifiers, Aero-Generators	782	841	827	827
Solar Photovoltaic Systems	289	406	552	767
Other	17	68	49	49

Source: *Ministry of New and Renewable Energy Annual Reports, https://mnre.gov.in/annual-report*

- 2.b.2 Effective ways to expand off-grid renewable energy (ratings 1-5, 5 = highest)

	2015	2016	2017	2018
Rating of Adequacy of Technology	4	-	4	-
Rating of Adequacy of Political Will	3	-	2	-
Rating of Adequacy of Policies and Regulations	3	-	3	-

Source: *Oxford Policy Management Context Assessment*

CLEAN TECHNOLOGY: Promoted and deployed clean technology

- 3.a.1.2 Total electricity consumption by sector (in megawatt hours)

	2015	2016	2017	2018
Domestic	238,876	259,311	-	273,550
Industry	423,523	426,665	-	468,825
Agriculture	173,185	195,473	-	204,293
Commercial	86,037	98,333	-	96,141
Traction and Railway	16,594	17,217	-	14,356
Other	62,976	69,269	-	73,079
Total	1,001,191	1,066,268	-	1,130,244

Source: *Ministry of Statistics and Programme Implementation, http://www.mospi.gov.in/*

- 3.a.2.1 Number of Energy Service Companies empaneled with Bureau of Energy Efficiency

	2015	2016	2017	2018
Energy Service Companies empaneled with Bureau of Energy Efficiency	129	137	141	125

Source: *Bureau of Energy Efficiency, https://www.beeindia.gov.in/*

CARBON PRICING: Demonstrated support for policies and practices that put a price on pollution

- 4.b.1.1 Number of Certified Energy Auditors

	2015	2016	2017	2018
Certified Energy Auditors (Ministry of Power)	8,542	8,820	9,219	9,330
Certified Energy Auditors (Bureau of Energy Efficiency)	5,986	6,790	7,477	7,698

Sources: *Ministry of Power, https://powermin.nic.in/ and Bureau of Energy Efficiency, https://www.beeindia.gov.in/*

POLITICAL WILL: Built political will to advance climate solutions

- 5.a.1.1 Number of major announcements from Government of India: Renewable Energy
- 5.a.1.2 Number of major announcements from Government of India: Clean Technology
- 5.a.1.3 Number of major announcements from Government of India: Climate Change

	2015	2016	2017	2018
Renewable Energy	18	-	6	28
Clean Technology	4	-	9	10
Climate Change	3	-	4	3

Sources: *Oxford Policy Management; Ministry of Power, https://powermin.nic.in/; Ministry of New and Renewable Energy, https://mnre.gov.in/; and Ministry of Environment, Forest and Climate Change, http://envfor.nic.in/*

Appendix B: Methodologies for Assessing the Foundation's Contribution

As mentioned in Section 3 of this report, Grassroots Solutions and M+R have adopted or proposed tailored methodologies to assess the contribution of the Foundation's work that are specific to the approaches the Foundation is undertaking to achieve its desired outcomes in each country-specific context. How the approaches the Foundation supports map to its desired outcomes and examples of the varying methodologies employed to analyze the Foundation's contributions in the U.S. and India are described in more detail here.

U.S. Examples

The Foundation supports multiple approaches in the U.S. to achieve its desired outcomes. To assess progress and the contribution of these approaches, we are analyzing a variety of data sources and employing various methodologies. As noted in Section 3, one way the U.S. will demonstrate leadership is by building political will. To promote leadership in this area, the Foundation is supporting efforts to alter political discourse. In this instance, Grassroots Solutions and M+R enlisted Protagonist to help analyze the climate change narrative landscape in the U.S.[74]

With Protagonist's help, we are examining who the influencers are, what is causing climate narratives to change, how the narratives are shifting over time, and the ways that the Foundation's grantees appear in the narrative landscape. More specifically, we are investigating the "signature" of the Foundation's grantees in the public and policymaker discourse by tracking and analyzing direct mentions of each organization as well as similarities between grantee messaging and candidates' and policymakers' talking points and statements in social and traditional media channels, the solutions-orientation of outgoing messages produced by grantees, which solutions are most prominent, and more. Indicators of progress since baselines were established in 2012 and 2013 are:

- **Increased candidate and policymaker discourse on climate.** Data sources analyzed include: Twitter handles, press releases, op-eds, blog posts, public Facebook pages, and quotes in media articles for the president, senators, representatives, governors, candidates, and materials about grantee messaging.
- **Normalization of solutions-oriented media coverage.** Data sources analyzed include: online content about one of 15 identified solutions such as reducing fossil fuel subsidies, energy efficiency, reduced coal use, renewable energy, and carbon pricing, and grantees' outgoing messaging and talking points.
- **A larger and broader base of advocates for climate solutions.** Data sources analyzed include: individuals and accounts commenting or engaging favorably through state and local newspapers, policy reports, press releases, and social media, including Twitter, Facebook groups, blogs, forums, and insights about grantees' geographic priorities.

Protagonist's input into our assessment of the Foundation's contribution is supplemented by a review of self-reports from grantees, independently verifiable data, and other information, including opinion polling conducted by the Yale Program on Climate Change Communications and Gallup.

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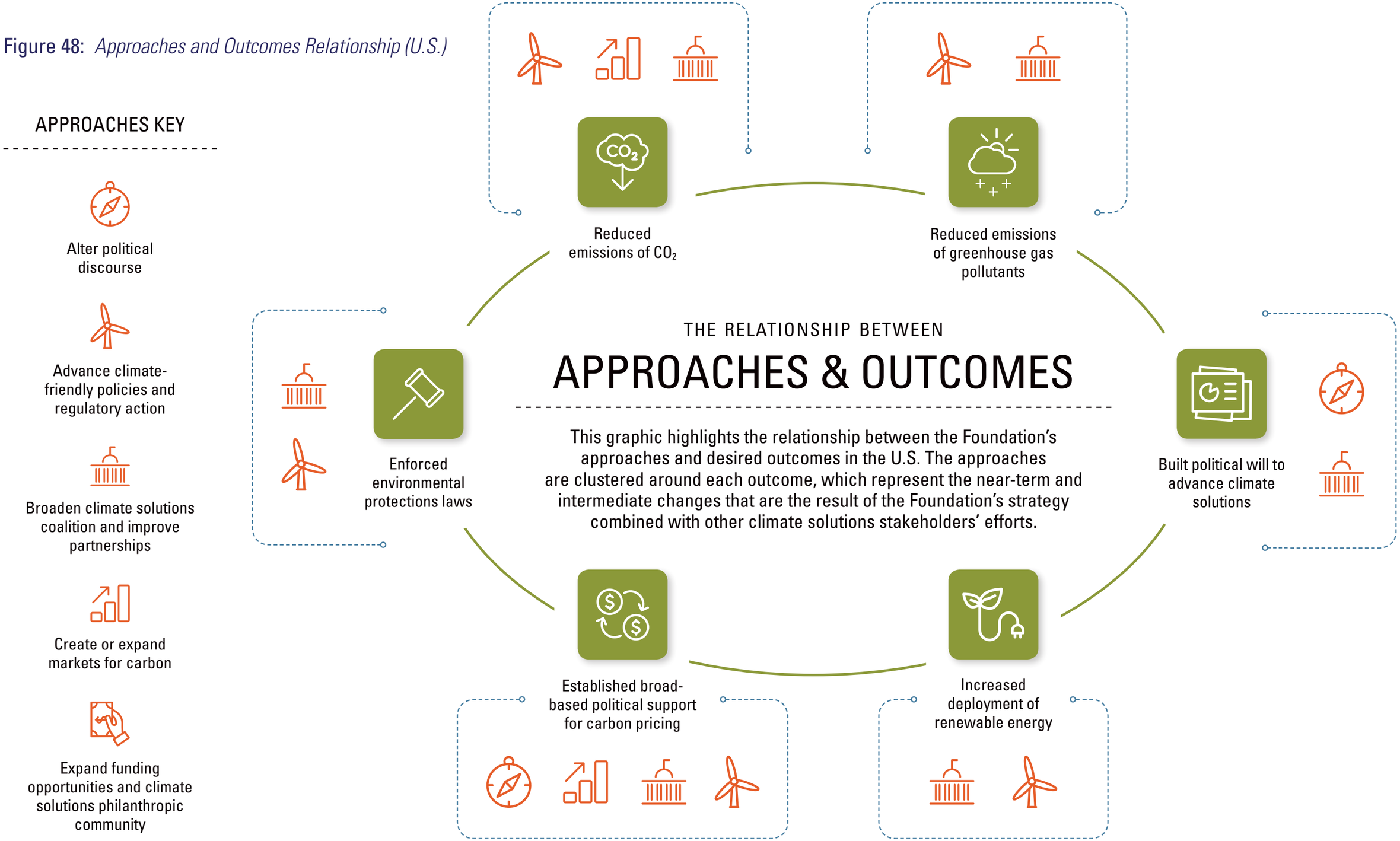
[74] Narratives articulate a population's underlying beliefs, attitudes, and assumptions. "Narrative Analytics" is a systematic approach to understand, shape, and track narratives by combining the depth of social science with the scale of data science. Synthesizing large robust data sets of social and other online media, Narrative Analytics uses evidence-based strategies to map, track, measure, and shift discourse.

To assess the other approaches the Foundation is undertaking in the U.S., we are undertaking a state assessment to better understand changes in the trajectories among states with the highest greenhouse gas emissions and progress toward the Foundation's desired outcomes—reducing CO_2 and other greenhouse gas emissions, enforcing environmental protection laws, establishing broad-based political support for carbon pricing, and increasing deployment of renewable energy—and the Foundation's role. Our analysis includes quantitative and qualitative dimensions to address the following:

- What explains the variation in trajectories among the top-ten energy-related emitters and progress toward the Foundation's desired outcomes?
- How do the funded approaches affect each other? Do certain approaches have an accelerant effect on others?
- How have Foundation-funded activities in certain states shaped climate policies or advocacy in other states (e.g., are there channels through which actions in one state spill over to another)?

An illustration of the relationship between the Foundation's approaches and desired outcomes in the U.S. appears on the following page.

Figure 48: *Approaches and Outcomes Relationship (U.S.)*



India Examples

Since 2016, the Foundation has supported multiple approaches in India to achieve its desired outcomes and awarded more than $37 million in grants.[75] As noted in Section 3, to measure progress and assess the Foundation's contribution, we are collecting and analyzing data at three levels:

- Grantees' self-reported activities and results
- Insights gathered through interviews with government stakeholders, third-party observers, or publications to validate or challenge the grantees' self-reporting
- Independently verifiable quantitative data, and where not available, qualitative information to fill key gaps[76]

For example, one of the Foundation's desired outcomes is that civil society organizations' capacity to engage with and affect the government's climate policies is increased. To achieve that outcome, the Foundation is supporting activities to advance climate-friendly policies and broaden the climate coalition and partnerships with government. One indication of progress is that central and state governments look to civil society organizations as stakeholders and partners in the policymaking processes. To assess the contribution of the Foundation in this area, we are tracking the percentage of grantees and grantee-supported organizations actively participating in government agencies or task forces and their self-reported results. That information is being examined in conjunction with insights gathered from government stakeholders about the value of grantees' participation and broader changes in the capacity of civil society organizations and sector since baselines were established in 2015.[77]

The Foundation is also supporting multiple approaches to catalyze renewable energy. One indication of progress is the creation of a renewable energy financing ecosystem. To assess the contribution of the Foundation in this area, we are tracking financing leveraged for renewable energy through grantee-developed mechanisms. That information is being examined in conjunction with insights gathered from relevant stakeholders about the value of the mechanisms developed by the grantees, a review of independent Internet-based sources, and data tracked about changes in India's electricity generation since baselines were established in 2015.[78]

The graphic on the following page illustrates the relationship between the Foundation's approaches and desired outcomes in India.

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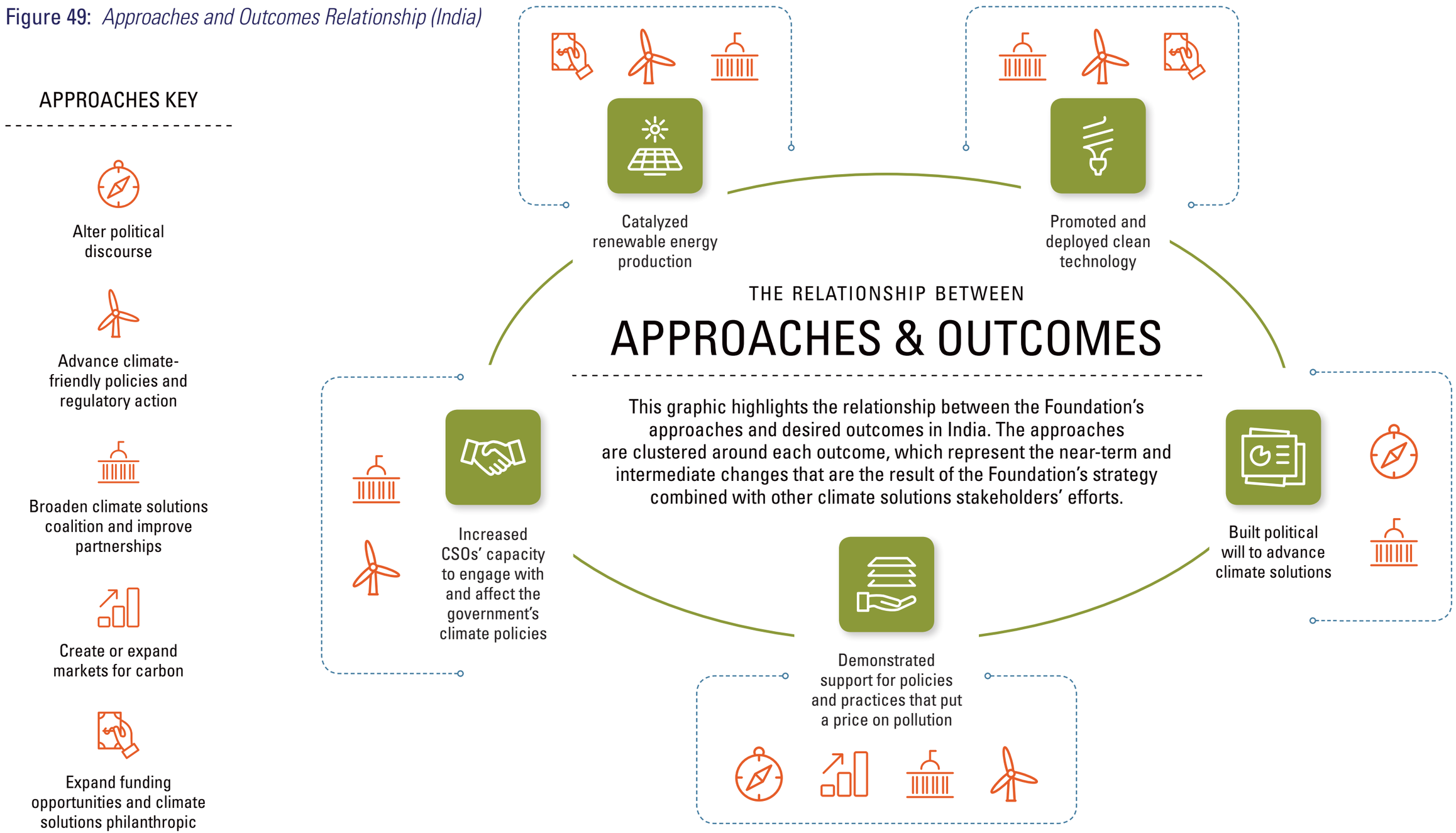
[75] Source: Climate Solutions_All Previously Awarded Briefs. MacArthur Foundation, January 31, 2019.

[76] For example, qualitative data collected from discussions with "key informants," including grantees and non-grantees who take part in full-day workshop-style discussions or interviews focusing on the Foundation's desired outcomes and discussing in detail some of the political and economic factors surrounding them.

[77] Changes we are tracking include the number of civil society organizations perceived as "major" players on renewable energy or climate at the federal level, the percentage of major civil society organizations considered partners and/or critics of the Government of India, and more.

[78] Changes we are tracking include the total percentage of India's total installed capacity for electricity generation based on renewable energy, gross budgetary support for renewable energy, loans sanctioned by the Indian Renewable Energy Development Agency, and more.

Figure 49: *Approaches and Outcomes Relationship (India)*



Appendix C: Glossary of Terms

Below are definitions for key terms that appear in this document and correspond to the Foundation's glossary of evaluation terms.

TERM	DEFINITION
Approach	An approach is a cluster of activities that represents one component of the Foundation's strategy.
Baseline	Baselines represent the starting points—generally prior to the Foundation's involvement—related to each indicator of progress that we will use for comparison to assess progress toward desired outcomes.
Carbon Dioxide (CO_2)	According to the U.S. Environmental Protection Agency, carbon dioxide is the primary greenhouse gas emitted through human activities. It enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and wood products, and also a result of certain chemical reactions (such as manufacturing of cement).
Civil Society Organizations	Non-state, not-for-profit, voluntary entities formed by people in the social sphere that are separate from the State and the market. Civil society organizations can include community-based organizations as well as non-governmental organizations. (This definition is adapted from the United Nations Guiding Principles Reporting Framework.)
Clean Power Plan	The Clean Power Plan is a U.S. policy aimed at combating climate change that was first proposed by the Environmental Protection Agency in June 2014; the final version of the plan was unveiled by President Obama on August 3, 2015.
Fluorinated Gases (HfCs, PFCs, SFS, NF_3)	The Environmental Protection Agency defines that Hydrofluorocarbons (HfCs), perfluorocarbons (PFCs), sulfur hexafluoride (SFS), and nitrogen trifluoride (NF_3) are synthetic, power greenhouse gases that are emitted from a variety of industrial processes. They are sometimes used as substitutes for stratospheric ozone-depleting substances like chlorofluorocarbons and halons). In addition, these gases are usually emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases.
Impacts	Impacts are the long-term, aspirational changes in a population, community, or system in which the Foundation's strategy operates and to which it contributes.
Indicators of Progress	Indicators of progress are statements of measurement used to show progress toward a strategy's intended outputs, outcomes, or impacts; can be qualitative or quantitative.
International Solar Alliance	An alliance of more than 122 countries, initiated by India, with the primary objective to work for efficient exploitation of solar energy to reduce the dependency on fossil fuels.

TERM	DEFINITION
Measures	Measures refer to the information that we will count and the methods we will use to measure the indicators.
Methane (CH_4)	The Environmental Protection Agency states that methane is emitted during the production and transport of coal, natural gas, and oil. It is a result of livestock and other agricultural practices and by the decay of organic waste in municipal solid landfills.
Narrative Analytics	Narratives articulate a population's underlying beliefs, attitudes, and assumptions. Narrative Analytics is a systematic approach to understand, shape, and track narratives by combining the depth of social science with the scale of data science. Synthesizing large robust data sets of social and other online media, Narrative Analytics uses evidence-based strategies to map, track, measure, and shift discourse.
Nationally Determined Contribution	The Paris Accord required all Parties to prepare, communicate, and maintain a Nationally Determined Contribution (NDC) that outlines each country's intended commitment and long-term goals to reduce national emissions and adapt to the impacts of climate change.
Nitrous Oxide (N_2O)	According to the Environmental Protection Agency, nitrous oxide is emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste.
Outcomes	Outcomes are near-term and intermediate changes among target audiences, individuals, communities, organizations, and policies that are the result of the Foundation's strategy combined with other climate solutions stakeholders' efforts.
Paris Climate Accord	The Paris Accord is an agreement within the United Nations Framework Convention on Climate Change aimed to strengthen the global response to the threat of climate change by keeping global temperature rise well below two degrees Celsius above pre-industrial levels. Negotiations took place at the United Nations Framework Convention on Climate Change's 21st Conference of the Parties in Paris, France and was signed in December 2015.
Political Discourse	Political discourse refers to discourse among federal and state policymakers and candidates for elected office. The Foundation is focused on altering political discourse within the permitted constraints of the law applicable to private foundations.
Public Discourse	Public discourse includes policymakers as well as the American public.
Qualitative Data	Descriptive information that can be observed and analyzed, but not precisely measured (e.g., stories and reflective insights; interviews with grantees, intellectual partners, and other funders).
Quantitative Data	Numerical information that can be measured and counted (e.g., emissions, people involved, number of legislative bills adopted, and media coverage).

TERM	DEFINITION
Regional Greenhouse Gas Initiative	The first mandatory market-based program in the U.S. to reduce greenhouse gas emissions by establishing a regional cap on the amount of CO_2 pollution a power plant can emit by issuing a limited number of tradable CO_2 allowances. It is a cooperative effort among states mostly in the Northeast and Mid-Atlantic.
Renewable Portfolio Standards	A U.S. state regulation that requires the increased production of energy from renewable energy sources such as wind, solar, biomass, and geothermal.
Strategy	The Foundation's strategy is a pathway, or set of objectives, designed to achieve change at the outcome and impact levels.
Targets	The quantity, value, or amount of something (e.g., the desired change) related to each indicator that we want to happen within a specific period.

	NARRATIVE TITLE	ABRIDGED NARRATIVE
Favorable	Defining Challenge of Our Time	We cannot afford to wait; the science is settled, and we must take urgent action to shift from the dangerous path we are on.
Favorable	Not Just an Environmental Issue	Climate Change will impact every aspect of our society from our economy, to our health, to national security.
Favorable	Dirty Energy, Dirty Politics	Big Energy is actively promoting and profiting from climate denial at a great cost to our planet and future.
Favorable	Clean Energy Revolution	Clean energy spells jobs, innovation, and prosperity for all—what are we waiting for?
Favorable	Wake-Up to the Weather	You only need to go outside or listen to your local weather report to see that Climate Change is real.
Favorable	States/Cities Must Lead	Our ability to fight Climate Change depends on states and communities far beyond the beltway.
Favorable	Biodiversity in Peril	We must protect our planet and its amazing animals who are the biggest victims of humanity's effects on the environment.
Unfavorable	So-Called Science	There is no scientific consensus that Climate Change is real, harmful, or caused by human activity.
Unfavorable	Green Conspiracy	Climate Change is a hoax, perpetrated on the American people by corrupt politicians, bent scientists, and special interests.
Unfavorable	Regulatory Red Tape	Regulations in the name of Climate Change are destroying jobs and hampering American competitiveness.
Unfavorable	Energy First	Fossil fuels are not the enemy; we need pragmatism not alarmism to solve the energy and environmental challenges we face.

Figure 50: *Overview of the U.S. Climate Change Narrative Landscape*